

The Natural State of Medical Practice



Volume 3 – Escape from Egalitarianism
William H. Adams, MD

**THE NATURAL STATE OF
MEDICAL PRACTICE
III**

This is the third volume of *The Natural State of Medical Practice*, a work in four volumes in which the history and prehistory of medicine reveal how authoritarian coercion has profoundly retarded mankind's progress since the earliest days of human society:

Volume I – *The Natural State of Medical Practice: A Natural Law Theory of Human Progress*

Volume II – *The Natural State of Medical Practice: Hippocratic Evidence*
Appendix: Wordlist and Phraselist

Volume III – *The Natural State of Medical Practice: Escape from Egalitarianism*
Appendix A: Statistical Analysis
Appendix B: Translation of *Diseases I* of Hippocrates

Volume IV – *The Natural State of Medical Practice: Implications*

The *Isagorial Theory of Human Progress*, used in earlier versions of *The Natural State of Medical Practice*, has now been replaced by the *Natural Law Theory of Human Progress*, but the definition is unchanged. This has required minor changes in all texts.



This copy of the famous rendering by Albrecht Durer of the original sin opens this volume on a note suggesting a profound and universal significance to its topic, which is true. Can social egalitarianism be equated with eating an apple from the Tree of Knowledge of Good and Evil? The bite from the apple can be viewed, metaphorically or fundamentally, as an attempt to personally acquire the right to define good and evil. In doing so it is an assault on civil society because it would allow the strongest among us to define right and wrong in others, whereas natural law declares all humanity has in its collective conscience but one definition. It is argued here that the coerciveness of egalitarianism, by constraining human liberty, has stunted progress of mankind from its earliest days. In doing so, egalitarianism can be viewed as contrary to nature, as described by Dr. Murray Rothbard, and contrary to natural law, as defined by John Locke.¹ The temptation to have others do our bidding is not a violation if others can freely choose not to do so. But once coercive, the unhealthy consequences of the choice of egalitarianism, like the bite from the apple, imposes its own conception of right and wrong and can afflict untold generations of both its choosers and those innocents who had no choice in the matter. The focus of this book is the latter, the unprivileged of all civilizations.

¹ References for the two works are: Rothbard, M. N., *Egalitarianism as a Revolt Against Nature*, Auburn (AL), 2000, 2nd edition, the opening essay, p. 1; John Locke's *Second Treatise on Government*, chapter 5, section 6: "The state of nature has a law of nature to govern it, which obliges every one: and reason, which is that law, teaches all mankind, who will but consult it, that being all equal and independent, no one ought to harm another in his life, health, liberty, or possessions." Also see *Essay II*, chapter xxviii, section 8; here he calls as Divine law what today is considered natural law. For a discussion of the *Book of Genesis* and its implications for natural law, see: Forte, D., *Eve without Adam: What Genesis Has to Tell America about Natural Law*, the Russell Kirk Memorial Lecture, from The Heritage Lectures, 1996.

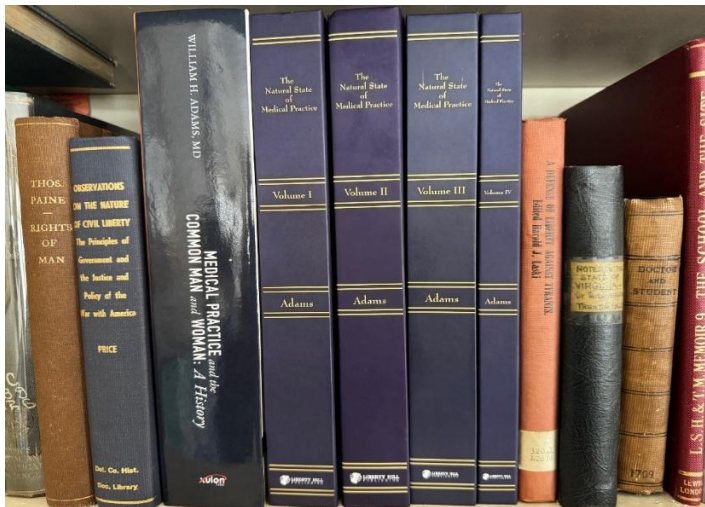
Volume 3

THE NATURAL STATE OF MEDICAL PRACTICE: ESCAPE FROM EGALITARIANISM

Doch uns ist gegeben
Auf keiner Statte zu ruh'n;
Es Schwinden, es fallen
Die leidenden Menschen
Blindlings von einer
Stunde zur andern,
Wie Wasser von Klippe
Zu Klippe geworfen
Jahrlang in's Ungewisse hinab.

[But man may not linger,
And nowhere finds he repose;
We stay not, but wander,
We grief-laden mortals,
Blindly, from one sad hour to another,
Like water from cliff unto cliff
Ever dropping, blindly
At last do we pass away.]

Final verse from the *Schicksalslied* (Song of Destiny), a poem by Friedrich Holderlin (1770-1843) set to music by Johannes Brahms (1833-1897). English translation of Rev. J. Troutbeck, D. D.



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The illustration on the front cover is of Stonehenge, a Neolithic monument erected in southwest England about 2500 BC. Medical wisdom of ancient classics of medicine was compiled at about this time in Mesopotamia, Egypt, India and China. Why not here?

Argument: In volume 1 of this series, *The Natural State of Medical Practice: A Natural Law Theory of Human Progress*, it was argued that a prepared society will, and any society might, evolve without access to preexisting knowledge a system of medicine approaching in understanding that of 19th C Western clinical medicine within a span of two or three centuries, its functional unit being a relatively small collegial group of medical practitioners. The essential requisite was group freedom within the larger society. Although the extent to which contemporary factors such as population size and density, geography, and social stability are necessary remains to be determined, and assuming the rate of discovery in fields other than medicine is permitted to progress as well, by analogy the equivalent of 20th C knowledge in many fields of human endeavor should have been approached or approximated long ago. But volume 1 also revealed that authoritarian restrictions on human liberty, whether emanating from an intellectual, economic or power elite, has impeded social development throughout history by replacing the natural growth of knowledge with canonic formulations and mysticism to suit authoritarian purposes. The present volume carries the argument further and explores why a benevolent science developed or did not develop in the first place. Is there something inherent in the early formation of human communities that irresistibly works to inhibit progress? If so, is its effect a consequence of size, governance, or lack thereof? The answer to this question, sought in seventeen major and minor civilizations, unexpectedly reveals itself in this volume: *social egalitarianism*. As the world continues its authoritarian drift, history and even prehistory may repeat itself. In a nod to historicism, it is wise to consider ways to prevent a recurrence. The field of medicine continues to be a focus in this volume as trauma and disease with their pain and suffering are a universal motivation for progress, and the field of medicine is, therefore, its reputable marker of human progress. Perhaps it also functions as a sentinel species for detecting aberrant social policies. Will the good genie of our conscience, the gentle giant that has provided moral guidance and thereby sanctioned progress since the first man and woman, again be pushed back into the bottle by powers that threaten our liberties?

Prologue

The Uncommon Man

Even the great Chesterton had it wrong, writing in an essay the following: “Progress has been merely the persecution of the Common Man.”² As medical practice emerged from mankind’s plebeian population and is used throughout this work as a marker of progress within a civilization, we must take exception with Chesterton’s broad brush. Throughout his essay he considers the “uncommon” man, the victorious General, the famed scientist, the esteemed intellectual, the great political leader, and on and on, to be not the sources of beneficence to mankind, instead being partner to persecution of the Common Man. Amid many unassailably ingenious, truthful and thoughtful observations his deeper message unexpectedly falls flat on its face. The reason? An incorrect definition of the common man. Not that Chesterton defines him. Instead, he characterizes him: not well-educated, not inclined to write a book, uninterested in social movements, prone to spontaneous and genuine expression in song and speech sometimes accompanied by unappealing and embarrassing metaphors, not always admirable but always forgivable because all this is normal and because the Common Man loves his family more than notoriety.

Dictionaries tend to agree with Chesterton. Here are some of their definitions. Merriam-Webster: “the undistinguished commoner lacking class or rank distinction or special attributes.” Thesaurus.com: “lowest common denominator,” “average Joe.” Cambridge Advanced Learner’s Dictionary & Thesaurus: “the hoi polloi,” “the man/woman in the street.” The eminent historian, Hendrik Willem van Loon, went further and identified two classes of humans: *Homo agitans*, “those that do,” and *Homo classificans*, “those who classify what the others have done.” He estimated the latter to outnumber the former by a million to one!³

Practitioners of medicine have always emerged from the common pool of humanity. In the first two volumes of this work the evolution of medical practice was analyzed primarily in Western civilization. In this volume, however, while medical practice will remain prominent, generalized implications of conclusions from the first two volumes are used to explore early attempts at human progress. It is an underlying principle of this book, as it was for volume 1 of *The Natural State of Medical Practice*, that every man and every woman is “uncommon,” that unique skills, interests, aptitudes, and other qualities guarantee a species heterogeneity that is unique to *Homo sapiens*, a heterogeneity that exists for a reason. That reason will not be discussed herein, but its correctness has found comfortable lodging in medical practice from ancient Hippocratic physicians to physicians of the present day: every patient is unique and is to be treated as such. From this perspective, the common man becomes more like the literary “everyman,” a person with his own story to tell but who is required to remain silent in the background. This volume is an inquiry into why he or she is, or has been, so required, an inquiry into what has led to the diminutive definitions of the Common Man and into what

² Chesterton, G. K., *Persecuting the Common Man*, in *The American Mercury*, January, 1936, pp. 67-71.

³ Van Loon, W. H., *Ancient and Medieval Civilizations*, in *Whither Mankind*, New York, 1930, Charles A. Beard, editor, p. 42.

Chesterton identified as “the familiar routine of oppressing him [the Common Man] in practice and adoring him in theory.”⁴ The “uncommon” men that are the real object of Chesterton’s disdain are, sadly, not uncommon enough, for he is referring to those persons who have, for whatever reason and through whatever means, willfully obtained power over the larger part of humanity, particularly that part which includes those unable to protect themselves from an authoritarian’s gambit, a population that has had little or no access to education, little hope of improvement in their lot, and often not even a conception of what such improvement can mean, a population that can be so shielded from knowledge and influence that its personal interactions are limited to the narrow generational passage of unique and often distorted behavior, good and bad, in a way that makes them unable to see the difference, a population whose cognitive world has been so rationed that the idea of escaping it is inconceivable, a population of victims that has always been ripe for the rhetorician and politician.

Even if Chesterton’s implied “uncommon man” were the superman as recognized by George Bernard Shaw in Cromwell, Napoleon, Julius Caesar, and Martin Luther, human society would still continue in its befuddled way unless the entire civilization were populated by similarly thinking superpersons.⁵ In Shaw’s view, therefore, the future was dismal indeed. But the “uncommon man” in this book should be, in contrast, the hope of the future. He is not only “everyone else” but he is also the source of beneficence in life for someone or everyone. Rather than composed of millions of Cromwells and Napoleons who were to be in perfect agreement for their superman’s dream to be fulfilled, heroes of the present work are the millions who disagree on almost everything but who have since the 18th C given Western civilization such a splendid start at making the future bright, and had they been permitted to materialize sooner many generations of our species would have been their beneficiaries.

Although authoritarianism, egalitarianism, natural law, spontaneous order and other charged terms will receive attention as the following chapters unfold, underneath it all is understood to be the story of “everyman,” a chronicle of the effect of his suppression from the earliest times, sometimes by others, sometimes by himself. It may not be considered a very interesting chronicle in that it is more an accounting for what did not happen rather than what did happen, but the effects have been profound and are unceasing. And it is as a warning that this process may continue unabated forever that prompted the verse from the *Schicksalslied* that opened this volume.

⁴ On this note reference is made to Aaron Copland’s *Fanfare for the Common Man*, composed in support of Henry Wallace’s 1942 “century of the common man” response to Henry Luce’s “American Century.” Wallace’s eloquent cry was that of the internationalist with a plan to enforce equality upon the world. His rhetoric of freedom, therefore, was not a force for freedom of choice but freedom from want, for a face-off between his view of the common man who demanded his share of the wealth from the wealthy and powerful of any country, and a coercive redistribution of wealth if dialogue failed. Luce, in contrast, had based his American Century on the spread of individual liberty and resistance to authoritarian governments around the globe, whether totalitarian or communistic, with the goal of permitting the common man everywhere to include himself in the quest for opportunity rather than merely being someone else’s means to it. The philosophical conflict between these opposing views runs throughout this book.

⁵ See: Shaw, G. B., *Man and Superman*, first performed in 1905.

SUMMARY OF PRINCIPAL POINTS OF THIS WORK

The following summarizes the principal points and locates their arguments in the appropriate chapters:

	Chapter
1. The field of clinical medicine is a universally valid gauge of a society's progress.....	1
2. The Archaic Greek city-state of Miletos was the likely original source of Hippocratic medicine.....	2
3. The predynastic city-state of Uruk was the likely source of objective Sumerian (Mesopotamian) medicine.....	3
4. The predynastic city-state of Hierakonpolis was the likely source of objective ancient Egyptian medicine.....	4
5. A city-state of the Indus River Valley civilization such as Mohenjo-daro was the likely source of objective Indian medicine.....	5
6. A predynastic city-state such as Liangchengzhen was the likely source of objective Chinese Medicine.....	6
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8. Group freedom, as a principle of society, preceded individual freedom.....	14
9. Individual freedom, as a principle of society, is solely a consequence of the Reformation.....	14
10. Human progress is not a consequence of democracy.....	14
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13. The early Hippocratic interpretation of phlegm, yellow bile, black bile, and blood was an objective description of the process of inflammation rather a theory of imbalance of humors.....	Appendix B

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Given the present subject, its huge volume and its vast unknowns, this opening chapter offers such justification for its examination and interpretation of ancient civilizations as is seemly for a clinical physician with an eye to the dearth of effective medical care over the ages.

- A. Justification for this endeavor
- B. Justification for the use of medicine as a symbol of progress
- C. Justification for equating ancient and contemporary human intelligence and motivation
- D. Justification for selective elevation of mythology to the status of evidence

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MILETOS AS THE ARCHETYPAL CITY FOR HIPPOCRATIC MEDICINE.....	35

The history of Miletos from its earliest days until its razing by the Persians in 494 BC is briefly reviewed with a focus on its governance and commercial enterprise. Ancient Greek civilization is second only to modern Western civilization in its embrace of progress and individual liberty. Miletos is selected as a paradigm population for an attempt at understanding that success. Its medical practitioners are assumed to have been the source of at least some of the earlier clinical observations found in the Hippocratic Corpus, although it would be reasonable to assign a similar course of political, commercial, and medical practice developments to other city-states in ancient Ionia and the Dodecanese Islands. This chapter also introduces societal terms and concepts that will frequently re-emerge throughout this volume. Selected metrics and observations are summarized at the chapter's conclusion against which sixteen other urbanized or proto-urbanized civilizations will be compared in subsequent chapters.

- A. Miletos as the birthplace of Hippocratic medicine
- B. Social structures of Miletos

CHAPTER THREE	
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Sumer is the first of four great civilizations to be compared to Miletos, all four having been the source of ancient medical classics. The prehistory of Sumer and the founding and rise of its largest

city-state of Uruk are presented, and the agricultural and commercial prosperity of that city before conquest by Akkadians (2350 BC) is proposed as the social milieu in which a network of medical practitioners acquired the ancient wisdom of clinical medicine that would find its way into later Babylonian medical writings. Writings and myth suggest that the independent *azu* (“physician”) was recognized as a commendable member of society probably as early as 3200 BC, although a mature cuneiform probably was unavailable to record his observations until 2900 BC. As scholarly literature has a number of fine articles revealing the clinical acuity of some Sumerian clinicians, only one example is reviewed in detail in this chapter. The rise of an autonomous city-state at a time of (1) weakening of egalitarian kinship ties, (2) commercial prosperity, and (3) prior to authoritarian centralization of power is proposed as containing the window of opportunity for the formation of a medical network capable of initiating medical progress. A companion to medical progress, another product of commercial prosperity, is writing.

- A. Early Sumer and the city-state of Uruk
- B. Uruk and the early medical works
- C. Clinical assessment of Sumerian medical writings
- D. Conclusion

CHAPTER FOUR

NILE RIVER VALLEY CIVILIZATION.....59

This chapter places the original compositions that would be transcribed *ca.* 1550 BC and subsequently known as the Ebers and Smith medical papyri to the Proto-Dynastic or Early Dynastic periods of Egyptian history. Apart from distinctive linguistic differences, reasons for this are presented, the principal one being the status of society adjacent to the unification of Egypt under the Pharaohs (3085 BC), a period noted for flourishing commercial manufacture, population growth, and prosperity. As the largest urban area along the Nile at this time, the city-state of Hierakonpolis is selected as the most likely site for the acquisition and collation of medical wisdom that is present in the two famous medical papyri. A clinical appraisal of some of their contents confirms their objective nature and supports the notion of a collaborative effort of a group of medical practitioners in the collecting and recording of their findings. Both writing and medical progress occur independently but contemporaneously as a consequence of prosperity and vigorous commercial activity, as they did in ancient Sumer. The dissimilarity between Sumerian cuneiform and Egyptian hieroglyphic/hieratic clinical descriptions does not support the notion that Egyptian medicine was an importation from the Mesopotamian civilization.

- A. Dating ancient Egyptian medical writings
- B. Hierakonpolis
- C. Clinical assessment of the *Papyrus Ebers* and the *Smith Papyrus*
- D. Conclusion

CHAPTER FIVE

INDUS RIVER VALLEY CIVILIZATION 75

Recent archeology has revealed the remarkable remnants of an Indus River Valley civilization that parallels in scope the Mesopotamian civilization. In contrast to Uruk, the minimal evidence of fortifications and social stratification provide traditional support for an egalitarian social organization in the region for much of its history. Over time it evolved extensive trade based on agriculture, pottery, sculpture, jewelry, timber, textiles, and ivory, quite different from that of Mesopotamia which was primarily based on agricultural products and trade. The Indus River Valley civilization had access to the Arabian Sea, to central Asia, east through the sub-Himalayan belt across the Indian subcontinent, and to the tropical south. New findings indicate the local culture, rather than an Indo-Aryan immigration, was the likely source of at least a portion of the

Vedas that have guided Indian culture ever since. The principal relevance to medicine has been the *Atharva Veda*, the foundation of Ayurvedic medicine. There is controversial evidence of a written, non-cuneiform, language for the Indus River Valley civilization, as yet undeciphered. The *Charaka Samhita* and the *Sushruta Samhita*, roughly 2,000 years old, are the classic expressions of Ayurvedic medicine, and they contain a wealth of clinical material unfortunately rewritten over the ages to support a theocratic elite class. But the original objective observations in the two works probably derive from the period when the Indus River Valley civilization was commercially flourishing (2600-2000 BC), suggesting the presence during that period of a network of medical practitioners.

- A. Overview of the Indus River Valley civilization
- B. The Vedas
- C. The medical samhitas (collections): their origin
- D. Conclusion

CHAPTER SIX

YELLOW RIVER VALLEY CIVILIZATION.....93

Legend holds that it was in the time of the Yellow Emperor (*ca.* 2400 BC) that the Chinese medical classic, the *Huang Ti Nei Ching Su Wen*, a dialogue between the Yellow Emperor and his ministers, was composed. The location was Shandong Province in what is now northern China. An example of a contemporary Shandong city-state is Liangchengzhen, a prominent coastal commercial center flourishing at that time. Although no medical presence has so far been uncovered from archaeological sites, it is proposed that the medical observations in the *Huang Ti Nei Ching Su Wen* may have first been made in such an urban environment. As the clinical contents of the composition, such as have been handed down to us, reveal much that is objective and insightful, it is suggested that at the time of its writing, or prior to it, there was a small network of medical practitioners who shared their medical expertise that ultimately made its way into the received text. Over the centuries substantial new content was amended, such that it now contains discussions of acupuncture and Yin and Yang. But underneath the “new age” additions and the heavy editing in the 8th C AD by Wang Bing, the practical, and sometimes acute, observations made by those ancient practitioners can be detected. These, the true authors of the authentic portions of the *Huang Ti Nei Ching Su Wen*, will remain unknown, but we can opine about the social world in which they worked.

- A. Longshan civilization and the Yellow Emperor
- B. The city-state of Liangchengzhen and its demography
- C. Commentary on the *Huang Ti Nei Ching Su Wen*
- D. The *Huang Ti Nei Ching Su Wen* and the social circumstances surrounding its origin
- E. Conclusion

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A distinction is made between so-called “great” civilizations and primary civilizations, the former being a sequence of civilizations that depreciate over time but their apparent longevity is viewed as a manifestation of “greatness,” whereas the latter can lay the groundwork for subsequent prosperity and progress. Urban examples from the four primary civilizations of the “great” civilizations, all city-states previously discussed, are then compared to the ancient Greek civilization city-state of Miletos, along with their chronological relation to the great medical classics associated with them. Then the results of all five civilizations are combined and metrics averaged, followed by a discussion of cities and urbanization.

- A. The “great” civilizations
- B. The significance of city-states and an introduction to heterarchy
- C. Overview of the four primary civilizations in comparison to Miletos
- D. Comparison and integration of data from the four primary civilizations and Miletos

CHAPTER EIGHT

SETTLEMENT, DEVELOPMENT AND DISAPPEARANCE OF TWELVE OTHER ALLUVIAL PLAIN CIVILIZATIONS.....129

After locating and defining a “lesser” civilization there is an explanation for the inclusion of the twelve civilizations in this chapter, including a discussion of the significance of alluvial environments, geography, reasons for non-selection, and issues related to identifying form of governance. A precis of each of the twelve lesser civilizations is then given, along with a list of metrics and other characteristics for each. A summary of those characteristics relevant to present purpose and an overview of the group of twelve with names of prominent population centers concludes the chapter.

- A. Geography and population size relevant to civilization development
- B. Definition and selected characteristics of twelve lesser civilizations
- C. Precis of twelve lesser civilizations
 - 1. Marajoara (Os Camutins)
 - 2. Norte Chico (Caral Supe)
 - 3. Poverty Point
 - 4. Cahokia
 - 5. Terramare
 - 6. Catalhoyuk
 - 7. Sintashta (Arkaim)
 - 8. Shahr-i Sokhta
 - 9. Djenne-Djenno
 - 10. Liangzhu
 - 11. Anasazi (Chaco Canyon)
 - 12. Cucuteni-Trypillia (Maidanets)
- D. Overview of the twelve primary lesser civilizations

CHAPTER NINE

THEORETICAL CONSIDERATIONS FOR SOCIETAL PROGRESS AS DERIVED FROM THE FIVE SUCCESSFUL PRIMARY CIVILIZATIONS (CHAPTERS 2-6).199

Early decisions about the preferred lifestyle of small kinships, especially hunter-gatherer bands, were based on rational considerations and personal preferences rather than a preset propensity to settle in villages as soon as the warmer climate of the Late Neolithic made it possible. Those decisions ultimately were the determinant for or against urbanization. If “against,” it could result in 50,000 years of nomadism as occurred with Australian aborigines. If “for,” subsequent commercial enterprise and discovery could lead to market towns and then to urbanization, from which subsequent generations might people a vast civilization. Some variables derived from the analysis of the five “successful” primary civilizations in which early forms of scientific medical practice appeared are reviewed for their relevance in evolving a civilization capable of progress.

- A. Rejection vs. selection
- B. Longevity (life expectancy)
- C. Population size and density
- D. Duration
- E. Prosperity

- F. Demographic conclusions
- G. Preceding and succeeding civilizations

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After identifying common features found among all the lesser primary civilizations, selected characteristics from each are compared to the same features from the five successful primary civilizations. Intergroup variations in size of nuclear population, regional population, area, duration of prosperity, governance, and other factors are discussed. Although most of the twelve had a mixed form of governance, meaning more than one of the four general patterns of organization mentioned earlier in this work (hierarchy, heterarchy, egalitarian, and corporatism), all can be considered as maintaining a plebeian population with prominent egalitarian kinship affiliations. Although that egalitarianism was manifested differently, in none of the twelve is there evidence of a medical practitioner network. In contrast, the role of egalitarian kinship was diminished in the nuclear populations of the five successful primary civilizations considered to have medical practitioners.

- A. The five successful and the twelve lesser civilizations compared
- B. Statistical analysis of successful and lesser (unsuccessful) civilizations

CHAPTER ELEVEN

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Egalitarianism is closely examined because its effects are greatest in that segment of ancient populations from which medical practitioners arose, the plebeian (commoner) class. Definitions of egalitarianism are discussed, political and social, with social egalitarianism as a practical answer to social organization in early/primitive societies. With permanent settlements, archeological characteristics have been the means by which egalitarian communities are characterized. As the mechanism by which an egalitarian social organization was usually selected, Maslow's system of motivational hierarchy is discussed. The primal levels of the hierarchy, survival and safety, are personal motivations and considered irrelevant to egalitarianism. But now the "need to belong" motivation comes into play as each member attempts to adapt to or modify the behavior of others to accommodate his or her own behavioral preferences. Differences of opinion are presented so as to attract others to a particular opinion, and at some point the more forcefully impelled or popularly held opinion restricts opposing ones. Thus, a seemingly democratic result can, in the hands of the majority of the society, shut down completely all alternatives. Motivation has been stifled. But egalitarianism is minimized as trade promotes urbanization, prosperity, and population growth. Urbanization, a consequence of commercial ventures, can weaken the allegiances to social structures, especially the kinship, and provide a window of opportunity for individuals and families to break free.

- A. What is egalitarianism?
- B. The source of primitive egalitarianism
- C. Egalitarianism, the move to settled existence, and commerce
- D. The nature and consequence of coercive egalitarianism
- E. Egalitarianism and transgression of natural law
- F. Sparta and imposition of the egalitarian state
- G. Egalitarianism and spontaneous order
- H. Egalitarianism and kinship
- I. Egalitarian kinships
- J. Conclusion

CHAPTER TWELVE

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Following a definition of natural law that includes its applicability to all mankind, it is axiomatic that it must apply equally to both early and modern man, including ancient hunter-gatherers. As far as it is a “law,” it exists to guide the community of man. Because of the varying definitions of natural law, the term as used here is equated with the *moral sense* as described by Dr. James Q. Wilson. Evidence supporting the existence and general applicability of natural law in historical and modern societies is reviewed. Its relevance to early human societies is then discussed in relation to specific areas in which moral valuation is displayed. The consequences of actions in accordance with, or inconsistent with, natural law as they affect the development of early man’s social organizations are then discussed. The conclusion is that coercive egalitarianism and egalitarian kinships (as discussed in the previous chapter) include within their strategies such practices as are inconsistent with natural law, thereby inhibiting proper societal evolution and the realization of progress. Sadly, the felonies of a few have devolved great misery upon the many.

- A. A brief review of the concept of natural law
- B. Spontaneous order and natural law
- C. Natural law in major civilizations
- D. Natural law in recent history
- E. Natural law in early societies

CHAPTER THIRTEEN

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The role of writing in promoting progress is reviewed and it is concluded that inscribed symbols first develop as a tool for commercial operation, but proper writing is a sign of progress rather than a cause of progress. In this sense it can be equated with a medical practice as an early marker of progress. Once matured, the usefulness of the tool is remarkable to the point that it becomes an intellectual end in itself. In contrast to writing, it is the formation of small autonomous groups promoting self-interest that, although developing in parallel with writing, are the true initiators of progress. Both writing and the small autonomous group were conceived by breaking egalitarian kinship bonds as commerce first appeared in settled societies. The optimal small autonomous group is the koinon and its features are discussed here. It is proposed that independent self-interest groups are more likely in a heterarchical society because such a society permits individuals to forego their allegiances to egalitarian kinships and thereby freer to pursue specialized self-interests that evolve as part of a settlement hierarchy.

- A. Writing systems and societal progress
- B. Which came first, the individualist or the group?
- C. The essential role of the “group” in societal progress; the koinon
- D. Heterarchy
- E. Conclusion: the city, city-state, and heterarchy

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After a definition of historicism and a review of its criticisms, it is argued that historicism may justifiably identify some basic threats to human progress and as an aspect of social science should not be discarded. It is further argued that historicism has yet to be fairly tested, for history has never recorded a “satisfactory” civilization. The negative social consequences of egalitarianism and the importance of smaller groups to progress are discussed, and the wide gap between democracy and individualism is noted. Progress which emerged from release of the plebeian class is not the

consequence of democracy. It is the consequence of the voluntary autonomous group fed and led by self-interest. That group is the koinon. Democracy is nonetheless useful, for it is the only form of governance that can accommodate the existence of koinons, meaning that it is the only form of governance that up to a point can resist the temptation to interfere with self-interest group activity. It is the not-so-subtle threat of today that such support is being withdrawn.

- A. Historicism, this book thus far, and anticipating the future
- B. Natural law theory of human progress as historicism
- C. Democracy, its origins; its roll in progress

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INTRODUCTION

A defensible theory that resulted from the first two volumes of *The Natural State of Medical Practice* can be simply stated: medical progress can result only from group freedom. This was supported by relating the course of medical practice over the ages, the conclusion being that a *Natural Law Theory of Human Progress* provided the sole explanation for medical progress irrespective of epoch, environment, or erudition, past or present.⁶

Definition of *Natural Law Theory of Human Progress*: A theory ascribing all apolitical advances for the betterment of mankind to autonomous self-interest groups in which each member has equal opportunity to speak freely and openly and to share ideas about his group's common interest without fear of retribution. Axiomatically it excludes "betterments" that have been stolen, copied, derived by exploitation, or used for subjugation of others.

Does this theory apply not just to medicine but to any scientific endeavor and even to other areas of knowledge? That is one focus of this volume. It would be preferable to evaluate the correctness of the *Natural Law Theory of Human Progress* in a variety of distinct areas such as mechanics, law, literature, and social venues before drawing conclusions about its ultimate veracity and value. But an alternative course is to study further those earliest days of human community in different regions of the globe, looking for evidence of sustained rational decision-making and societal progress as well as circumstances surrounding their appearance, duration, and disappearance.⁷ This third volume of *The Natural State of Medical Practice* analyzes in greater detail the earliest

⁶ In an analysis of Hippocratic medicine and modern Western medicine in volume 1 of this work the following features were notable in both: the patient and physician were equally at liberty to discuss and express their opinions on all facets of care to be provided, the patient was the final arbiter regarding the course of action to be taken, the physician had, under oath, a professional obligation to work solely for the benefit of his patient, and the profession of medicine, having no hierarchy, devised methods for collegial sharing of clinical knowledge that might improve patient care. Unanticipated conclusions of this review of the history of medical practice were (1) the critical importance of group liberty in providing effective medical care (in this case, the physician/patient interaction and the deliberations within the medical profession and its component organizations), and (2) that group liberty was, in contrast to individual liberty, the basis for all medical progress, although the former obviously could not exist without the latter. Two terms of expression were introduced in this analysis. The first, "koinon" (from the Greek *κοινονία*, meaning something held in common), refers to the distinguishing feature of the medical groups under discussion, namely an equal opportunity of their members sharing a common self-interest to present ideas and openly voice opinions about those ideas to each other without fear of reproach. Three levels of koinon were discussed: the local group comprising solely physician and patient, regional medical groups (e.g., medical schools and local medical societies), and state/national medical groups. The second term, "natural law," refers to a generalization of social behavior that has proliferated in the Judeo-Christian West and has provided the guidance for its dominance in medical progress that has since spread globally. The present volume is designed to assess other social environments for evidence of personal or group freedom as it may relate to human progress generally, with medical care again being its primary marker when possible.

⁷ Definition of *rational*: "Based on or in accordance with reason or logic" (Oxford English Dictionary), meaning that chance, coercion, rote and mysticism played no role in a decision or judgment; choices were based on merit.

appearance of rational medicine that ultimately led to the ancient medical classics of Mesopotamia, Egypt, India, China, and Greece. It then compares them to twelve now extinct prehistoric civilizations using a variety of markers, an important one being medicine. In a word, none had evidence of a medical professional. Throughout human social evolution medicine has been a creation of the common man, the “lowest common denominator,” the medieval midwives, the “bell doctors” of ancient China, the “corrupt” and “defiled” healers of Brahminic India, the solitary itinerant doctors of ancient Greece, India and Persia, and the anxious domestic seeker for botanical assistance in time of need since time immemorial. These, the true trailblazers of medicine, were trying to invent the profession of medicine since the first society. What stopped them?

The present volume is about the social circumstances surrounding the common man and woman, the unprivileged population, that over the ages that prevented progress. It is argued that (1) any civilization has the potential for progress and will progress, given sufficient motivation, stability, and *absence of obstructing forces*, (2) ancient Greece and the modern West have shown that it can be done, (3) an analysis of a variety of lesser civilizations will show that it should have been done and why it was not done, and (4) the four great civilizations, dynastic Mesopotamia, dynastic Egypt, theocratic India, and dynastic China, have shown how it should not be done.⁸ Authoritarianism (defined on the following page) represents the cultural aberrancy in human social development that prevents progress, easily subduing the salutary traits, or, if you will, the moral conscience of natural law, traits that enable open interchange of ideas that otherwise would gradually and naturally direct the proper progress of civilization.

⁸ See: Altekar, A. S., *State and Government in Ancient India*, Delhi, 2001, for a discussion of the religious forces that would have theocracy as government, especially chapter 3, Nature, Aims and Functions of the State.

DEFINITIONS

To avoid complex but nonetheless secondary sociological issues while describing the various civilizations to be deliberated in this work, the following basic definitions will be used. Some are simpler or more focused than dictionary or encyclopedia definitions, for scholarly articles offer a variety of definitions, sometimes conflicting, sometimes overlapping, for many of these terms. This listing reduces scholarly inferences considered irrelevant in present context.

1. Authoritarianism: Unconditional coercive social control at the expense of personal freedom.
2. City: A defined urban population held together by common enterprises.⁹
3. City-state: An autonomous or self-sufficient state consisting of a central city and its surrounding interdependent smaller settlements.
4. Civilization: An autonomous and self-sufficient urban and rural population sufficiently large to produce a surplus of food for trade that contributes to wealth and permits specialization of crafts and vocations.¹⁰
5. Corporatism: Central control of construction and production by special interest groups.
6. Culture: Learned social behavior.
7. Egalitarian: Archeologically defined, in whole or in part, as a society with no differential wealth in burials, dwellings, districts, or architecture, and no monumental structures, militarization or a distinct long-lived population.
8. Egalitarianism (social or coercive): A doctrine that would forcibly interfere with voluntary choice by imposing social or economic equality on a society.
9. Egalitarian kinship: A consanguineal and affinal group in which assigned status implements opinions and traditions regarding redistribution of effort.
10. Empirical: "Originating in or based on observation or experience," and verifiable by observation (Merriam-Webster.com, not dated, Web. 27 May 2017).
11. Group: "A number of individuals having some unifying relationship."
12. Heterarchy: A multifocal system of management in a social system in which there is no permanent head.
13. Hierarchy: A fixed chain of command structure of constituents within a social system.
14. Individualism: Advocating or tolerating political and economic independence of the individual.

⁹ By "defined" is meant a delineated space for a quantifiable population.

¹⁰ This definition assumes that storage contributes to accumulation of wealth. It is a minimalist definition because the object of this volume is an analysis of the earliest stages of urbanization rather than urbanization in full flower. It differs from the definition used in volume 1 because a tiered governing hierarchy is not specifically identified, but it is implied in the "settlement hierarchy" mentioned herein in the five "successful" civilizations. It is also somewhat at variance with that of Dr. B. G. Trigger (*Understanding Early Civilizations*, Cambridge, 2003, p. 46) who defined early civilizations as the "earliest and simplest form of *class-based* society." Social classes may have been a consequence of commercial success but not their cause or goal.

15. Kinship: A universal form of social organization based on real or alleged culturally defined family ties and rules of behavior.¹¹
16. Koinon: An autonomous voluntary and democratic group sharing a common self-interest that meets in common council to freely and openly exchange information and experience pertinent to all its members.
17. Network: Autonomous individuals or organizations that work together for a common goal.
18. Plebeian: A commoner; the unprivileged of a society
19. Polity: An organized society not subject to the jurisdiction of a higher power.¹²
20. Profession: A livelihood that is a way of life and not bracketed by specified hours of employment.
21. Progress (noun): (1) For the group: a social concept based on the awareness of improbability of the human condition. (2) For the individual: a path with a goal of self-betterment.
22. Rational: “Based on or in accordance with reason or logic,” meaning that chance, coercion, rote, or mysticism play no role in a decision or judgment (Oxford English Dictionary).
23. Socialism: “Any of various economic and political theories advocating collective or governmental ownership and administration of the means of production and distribution of goods.” (Merriam-Webster.com. Merriam-Webster, not dated. Web. 19 Dec. 2018.)
24. Sodality: A non-kin social organization united around a specific purpose.
25. Society: “An enduring and cooperating social group whose members have developed organized patterns of relationships through interaction with one another.”
26. Urban: Concerning a delimited populous area in relation to a non-populous rural area.

¹¹ The great value of the kinship is that it functions as a glue that holds somewhat disparate subgroups together. The structure of a kinship by itself may exert little authority if most authority resides within its constituent groups such as bands, clans, or tribes, for kinship is most prominently manifested in relations with non-kin. But what it does do is provide stability and credibility for the egalitarian groups under its umbrella, thus enhancing their powers of enforcement, although the tighter the grip of kinship is on its members, the stronger is the hold on social norms.

¹² From: Piscitelli, M., *Pathway to Social Complexity in Norte Chico Region of Peru*, in *Feast, Famine or Fighting?: Multiple Pathways to Social Complexity*, https://doi.org/10.1007/978-3-319-48402-0_14, 2017, pp. 393-415.

CHAPTER ONE

EXEGESIS

“So adaptable, so marvelous, so creative and efficient is the human mind that, if comprehension is not clouded by emotion, facts unobscured by myth and falsehood, and salutary action not impeded by the bully, the ability of the human brain to deftly lift its entourage up from the fear and brutishness surrounding primitive circumstance will promptly lead to a life permitting healthful security and provide the occasion for introspection and wonder at the brief but glorious opportunity humans have been granted on earth.”

The author of the present work (in the Epilogue to
The Natural State of Medical Practice, p. 579)¹

Given the present subject, its huge volume and its vast unknowns, this opening chapter offers such justification for its examination and interpretation of ancient civilizations as is seemly for a clinical physician with an eye to the dearth of effective medical care over the ages.

- A. Justification for this endeavor
- B. Justification for the use of medicine as a symbol of progress
- C. Justification for equating ancient and contemporary human intelligence and motivation
- D. Justification for selective elevation of mythology to the status of evidence

- A. Justification for this endeavor

Following such a prolix encomium on the human mind what can another book add? After thousands of years of practice it would seem that the human mind must already have things well under control, for today we in the West are quite comfortable, secure, and long-lived in comparison to the whole of human history. Alas, that is not the case. The first volume of the series of three volumes entitled *The Natural State of Medical Practice* was undertaken by the author after years of clinical experience in medicine, much within municipal hospitals and amid the inadequacies of medical care, to determine the optimal type of medical practice, defined more fully herein as “the natural state of medical practice.” It began with a regional appraisal of historical medical practices around the globe, but it soon became apparent that only twice in human history has a natural state of medical practice been approximated and it was only during those two periods that sustained medical progress occurred, one being Hippocratic medicine during the age of Classical Greece (5th and 4th centuries BC) and the other being Western medicine since the late 18th C. The opportunity for the human mind to “lift its entourage” has, it seems, rarely occurred in the course of human history, and emotion, myth, falsehood, and the bully have proven able adversaries.

The initial search for the natural state of medical practice also focused on four great civilizations of the past: monarchical Mesopotamia, pharaonic Egypt, Hindu India,

¹ The quotations at the opening of most of the following chapters are extracted from *The Natural State of Medical Practice*, volume 1, and are comments of the author. Their purpose here is to connect sections in that volume to related sections given greater attention in the present volume.

and dynastic China. The failure of those early sparks of medical wisdom to ignite a blaze of knowledge had massive repercussions over many centuries for billions of people subsequently to be born into the four regions. That analysis in volume 1 was obtained from the meager historical evidence of rational medical practices in even more ancient times from different regions of the globe. These included cuneiform writings indicating a Sumerian origin of most of the rational knowledge found in subsequent Mesopotamian medical writings, the Egyptian medical papyri that contain information thought to have been collected in predynastic Egypt, early Ayurvedic knowledge that found its way civilization from the Indus River Valley into much later Hindu medical manuscripts and oral tradition, and prehistoric rational medical knowledge from unknown practitioners in the Yellow River region that was subsequently incorporated into the medical classics of dynastic China. It was proposed in volume 1 that in each instance the collected knowledge obtained approximately 4,500 years ago during an embryonic stage of the specified civilizations included rational observations that over time became part of bureaucratic canon passed on as dogma from generation to generation with no significant additions and no significant challenge from new generations of official practitioners.² Restating these observations, rational medical progress was under way in four disparate geographic regions much earlier in human social evolution than Classical Greece. It was, however, commandeered by social forces with little interest in medical care other than as it might help maintain political hegemony. The “entourage,” or body politic, not “lifted.”

But a basic question lurked in the background: as it was arguable that nascent medical progress was evident as early as 2500 BC, what took humans so long to again develop a society capable of progress (roughly 2000 years: 2500 BC to the Hippocratic medicine of 500 BC)? Was the culprit that disrupted the four early historic medical practices the same that derailed Hippocratic medicine, and is it a threat to modern Western medicine? *The Natural State of Medical Practice*, volume 1, pointed out that, given the considerable medical insight obtained by Hippocratic physicians as indicated in recent translations of their clinical writings (see volume 2 of the present edition plus Appendix B of this volume), the same interval of 2,000 years stood between Hippocratic medicine and modern Western medicine. That interval, from 300 BC to 1700 AD, was associated with a reversion of the entire Western culture to an extended period of profound medical ignorance, the years 500-1000 AD often being referred to as the European Dark Ages. Thus, in about 1700 AD medical progress had to begin anew, starting from scratch.³

There is reason, however, to consider a larger view of the Dark Ages, namely, that most of humanity since its first appearance on this planet has lived in the Dark Ages, that here and there have been occasional dazzling glimpses of what the human mind was capable of doing, evanescent examples of genius and progress unfortunately doomed to disappear after a brief time in the sun. Hippocratic medicine was one of those examples. Others included the beginning of rational clinical practices in ancient Mesopotamia (Sumer), predynastic or early Dynastic Egypt, the Indian subcontinent (Indus River

² See: *The Natural State of Medical Practice*, volume 1, Book I, chapters 2, 3, 4, and 5, for details of each.

³ J. B. Bury, in his *The Idea of Progress: An Inquiry into Its Origin and Growth* (New York, 1932), makes clear his conclusion that the intellectual concept of “progress” is a recent human development that can be traced back only to the 17th C AD. This is in marked contrast to the present work, which views progress as being repeatedly attempted in all societies since mankind’s origin, its absence from the prehistorical and historical record being a consequence of its inhibition rather than want of its initiation.

Valley civilization), and predynastic China. What prevented their proper development? The answer was identified in volume 1 of *The Natural State of Medical Practice*: authoritarianism in its many guises. Also in volume 1, medical empiricism was shown to be the default system for medical practice. Once a progressing civilization has failed and descended back into a Dark Age, humanity must reinvent medical progress, once again beginning at the baseline level of empirical personal experience, a cycle repeated throughout the ages. In rediscovering medical progress we do not “stand on the shoulders of giants” of a previous age. This harmful piece of fiction has prompted undue reverence for the “great man” theory of progress whereby a civilization lionizes a few great personalities thought to make key decisions or discoveries that help set everything aright, whereas the true begetters and heroes of “setting everything aright” are, instead, the common man and woman of the brilliant species of hominid, *Homo sapiens*, who, if not suppressed or victimized, will automatically and without prompting drive civilization toward its zenith.⁴

But what factors led to development of rational medical practice in the first place? This may seem to modern readers merely a point of interest to historians, but the 20th C was flooded with examples of reversion to profound ignorance, including medical ignorance, of hundreds of millions of people manipulated through powerful State propaganda, physical exclusions or social and commercial activism. With modern communications of the digital age perhaps there will be no repeat of similar efforts to impress ignorance on millions, but with electronic marvels that can be manipulated with the flip of the switch, censorship and misinformation are imposable on a vast scale. What will happen if modern medicine becomes, as has inevitably happened in the past, an authoritarian tool, a government bauble? It is reasonable, therefore, to understand how rational medicine began so that, should social calamity threaten, mechanisms of repair and prevention can be promptly instituted. This, volume 3 of the series, seeks the answer to that question. But in doing so it is swimming upstream against the studied opinions of great historians and sociologists of the past. Dr. Toynbee inferred, with an intellectual bias, a Western-oriented goal for civilizations, judging progress and self-determination as a gauge of success and a failure to proceed in that direction leading to their demise. In contrast, Dr. Henri Frankfort, from his Egyptian studies, concluded that each civilization

⁴ The great importance of certain individuals in propelling progress was compared to governance and to economics by the eminent historian Herbert Butterfield (see: *The History of Science and the Study of History*, in *Harvard Library Bulletin*, 13:329-347, 1959). But his “individuals” (e.g., Francis Bacon, Isaac Newton) are described as uniquely qualified for their role in the advancement of progress. Butterfield thereby minimizes the significance of both the social environment in which they worked and the innate intelligence of the human species. This is in contradistinction to the individualism posited in this work in which the underlying thesis is that since the first human there have been innumerable Newtons. As for any demeaning comments about how we stand on the shoulders of giants, be assured that it is the historical interpretation of transmission of knowledge that is being demeaned, not the persons who made the discoveries. It is the fact that every advance must be rediscovered that is the issue. Another exception involves discoveries or inventions within the time frame of a given civilization, for obviously if someone clever makes an important discovery and that discovery leads to other discoveries or inventions, it is appropriate to praise the original discoverer, for the original discovery is a “shoulder” on which others could build (or stand). It is akin to a meme, which is “an element of a culture or system of behavior that may be considered to be passed from one individual to another by nongenetic means, especially by imitation.” Like genetic evolution, the more useful or interesting a discovery or invention is the more likely its transmission and mimetic effects will be extensive.

could be understood only as a unique culture, its success gauged by internal constructs of its own culture (relativistic) rather than how it compared to other civilizations. This volume will elude both relativism and Western tradition by focusing on the more fundamental nature of our species, more on a biological than a cultural basis for the passage of civilizations.⁵

In *The Natural State of Medical Practice*, volume 1, the medicine espoused in the early writings of the four great civilizations listed above was shown to subsequently have been incorporated into canonical structures by means of which the medical practices of the various regions were used to ensure enduring hegemony by authoritarian regimes. In doing this their content was promoted to dogma, usually after textual alteration, and thereby not to be subjected to change. The decline in rational/empirical medical practice that inevitably followed was also documented. But true clinical relevance of portions of those early writings cannot be denied. In each instance it is clear that some person(s) approached the subject of clinical medicine with an objectivity that managed to emerge despite its subsequent canonical format. The present work, therefore, will inquire into the authors, the social environment, and the fragile mechanisms that created and fostered these early writings in the first place. In doing so evidence will be reviewed that support the views that (1) the famous works alluded to above and listed below were indeed conceived long before extant copies were made, and (2) despite expropriation of the texts over the centuries it is certain that the original medical thinking in each case resulted from rational observations by a group of persons purposefully attempting vertical transmission of their cumulative medical knowledge. Those persons, however unsophisticated their scientific inquiry, are justifiably described as physicians and as pioneers of progress in medicine. Their names are unknown; they were merely common people.

It is remarkable that scholars from four extensive regional civilizations have, over many centuries, assigned the authority for regional development of medical philosophy and medical practice to eras bordering on the prehistoric and technically designated the Late Neolithic and Bronze Ages, the dates in the range of 2500-2000 BC.⁶ Those regions, cultures, their modern States, examples of their venerable medical writings, and dates of the oldest documentable versions of those writings are:

North Africa (Nile River culture)	Egypt	<i>Ebers and Smith papyri</i>	1550 BC
Near East (Euphrates/Tigris culture)	Iraq	<i>Diagnostic and Therapeutic Manual</i>	1100 BC
South Asia (Indus River culture)	India	<i>Charaka and Susruta Samhitas</i>	100 BC
East Asia (Yellow River culture)	China	<i>Huang Ti Nei Ching Su Wen</i>	200 BC

Although most archaic medical traditions in the Middle East and Egypt have, over many centuries, been replaced or have disappeared, they persist with vigor in India and China in their modern vestments of Ayurveda and Traditional Chinese Medicine, this despite the obvious successes of modern scientific medicine. Something about these early works has elicited an enduring appeal and a sense of dependability to the point that they have been considered authoritative after thousands of years. Yet Jeremy Bentham commented on *Argumentum ad verecundiam* (the Appeal to Authority), or, as he called

⁵ For a discussion of historical perspectives and criticism, see, for example: Frankfort, H., *The Birth of Civilization in the Near East*, London, 1951.

⁶ Bronze Age dates are approximate and there is regional variation. Mesopotamian region: 2900-1200 BC; South Asia region: 3000-1200 BC; East Asia region: 2000-700 BC; North Africa region: 3100-1200 BC.

it, “the Chinese argument:” “What, then, is the wisdom of the times called old? Is it the wisdom of gray hairs? No; it is the wisdom of the cradle.” He was pointing out that the “old” times were, in fact, the “new” times of the archaic, and thereby archaic wisdom had yet to be tested by time and experience and was, implicitly, inferior knowledge. While Bentham was absolutely correct, the present work is in part a response to his view of ancient knowledge, for in one sense his argument may be misstated: not being a medical person, he conflates authentic ancient knowledge with its subsequent authoritarian expression. The following pages will argue that the two versions are often dissimilar.

The present work provides a more focused assessment of those four civilizations, particularly their earliest stages, along with a selective analysis of the early medical texts themselves. This will then be followed by a comparison of that assessment with archeological analyses of twelve lesser civilizations more limited in size and scope. All sixteen are then reviewed with an eye to pre-Hippocratic Greece and the modern West.

B. Justification for the use of medicine as a symbol of progress

In the preceding two volumes of this work the history of medicine was examined for evidence of the natural state of medical practice, defined as “a clinically effective medical practice free from institutional influences or other forms of external coercion except for those social influences to which both physician and patient are equally exposed and susceptible.” As clinical medicine was the fundamental issue it was appropriate that the author be a clinical physician licensed in the specialty of Internal Medicine, although the breadth of the topic at times strayed considerably from the field of medicine. This third volume will seem even further afield, as it addresses evidence for the progress of societies generally, doing so by examining prehistoric and historic civilizations that have arisen in very different times and places. It is argued, however, that by using the profession of medicine as a yardstick, all societies can receive equitable assessment. Medical care, after all, is a universal marker of societal progress. Disease, with its infirmities, suffering, and mortal closures, is a primal, unrelenting, and pervasive motivational stimulus common to all mankind, rich or poor alike, even when other motivational stimuli are inoperable. Although there is great regional variation in type, cause, and treatment of illness, there is an overall similarity in the human condition as it pertains to health. Medical practices, therefore, are a generic marker of progress that can be applied to any human population, although writing can serve as well, albeit in a much more restrictive way (see p. 287). The prominent Indian philosopher, Dr. Debiprasad Chattopadhyaya, has provided another reason for inquiring into medical practices as a mechanism for understanding the past: “In ancient India, the only discipline that promises to be fully secular and contains clear potentials of the modern understanding of natural science is medicine.”⁷ A further validation of the greater general significance of medical investigation was identified by Hippocrates himself in the work *Ancient Medicine*, XX: “I also hold that clear knowledge about natural science can be acquired from medicine and from no other source.”⁸

⁷ See: Chattopadhyaya, D., *Science and Society in Ancient India*, Bangalore, 1977, pp. 3, 4.

⁸ Hippocrates’ statement, here translated by A. H. S. Jones in the Loeb Classical Library series on *Hippocrates* (vol. 1), refers to “nature” and the “life sciences” rather than to an all-inclusive definition of the sciences. But the point is that the pursuit of knowledge must be observational (objective) rather than philosophical (subjective).

It is also readily apparent that medicine is the easiest science to initiate and develop because so much of clinical medicine is based on direct observation of the patient. Observable lesions and rashes, simple common-sense techniques such as touch, taste, smell, and direct auscultation (listening with the examiner's ear placed on the patient's chest or abdomen), and a rudimentary medical history are examples of the quick, simple, economical and painless procedures that can initiate scientific inquiry into causes and prevention of illnesses and effectiveness of treatment. And because of the ease of implementation and without the necessity of technical or procedural assistance from elsewhere the pool of contributors to a central "data base" for the sharing of information can be relatively small both in regional area and in the population served. It is these four characteristics, namely universality, secularity, feasibility, and economy, that justify emphasizing medical practice as a generic indicator of progress in ancient societies.

C. Justification for equating ancient and contemporary human intelligence and motivation

As an opening generalization, all mankind, in all societies and cultures, historic and prehistoric, has had the benefit of an equivalent intellectual heritage, a feature that can be likened to or listed among those genetic traits necessary to be classified as *Homo sapiens sapiens* of the, presumably, same genetic strain that has peopled the globe in the last 50,000 years.⁹ Charles Darwin viewed human intelligence as gradually improving over hundreds of thousands of years from man's hominid ancestors, which is consistent with his concept of morality and its variability among different ethnic and racial groups based on genetic distinctions. It must be admitted that if his conditions for genetic selection are accepted, there might have been such a peculiar pattern of evolution of intelligence, although at what point intelligence would or will reach a stable level is unknown. But how the present group of *Homo sapiens* in aggregate would measure against the intellectual potential of competing strains or species of migrant genus *Homo* is also unknown, although the cranial volume of present-day adult *H. sapiens* is smaller than some earlier species of genus *Homo*, including *H. neanderthalensis*. Another factor to be considered is what effect local environmental changes, perhaps some induced by activity of *H. sapiens* himself, might affect genetic transmission in the short term with consequent local alteration of specific neurological or intellectual capabilities. The role of intercurrent disease and the natural rate of mutation would, of course, play an additional part in survival and thereby might affect intellectual ability in some circumscribed populations. But if it can be accepted that, by and large, equivalent intellectual potential can be applied to any society, large or small, old or new, then ignoring the possibility that present-day humans are less intelligent than their distant forebears, it is fair to state that

⁹ "Therefore it is meaningless from the biological point of view to attribute a general inferiority or superiority to this or to that race." This statement is from the American Association of Physical Anthropologists statement on biological aspects of race, proposition 6, published in the *American Journal of Physical Anthropology*, 101:569-570, 1996. An updated scholarly interpretation of new data published in 2012 is in agreement (as reviewed by Nisbet, R. E. et al., *Intelligence: New Findings and Theoretical Developments*, in *American Psychologist*, 67:130-159, 2012), although much new information on regional and environmental conditions, genetic interactions, and motivation is known to affect social success and IQ rating, as well as global evidence for very active genetic change in *Homo sapiens* from regional pressures.

factors other than intellectual capacity have been the effectors of social change among groups of *H. sapiens* over recent millennia. Had this not been so, had intellect been the sole mediator of progress for human societies, once populations reached a critical size and density the superior intellect of some humans should have triggered some internal self-propelling awareness of the desirability for improvement in the daily life of their respective populations. The time to achieve a localized population of sufficient size for this awareness of improbability of the species may have required many centuries, but if local environmental stresses and external forces did not disrupt species-wide intellectual maturation, perhaps far-reaching but localized modernization might have been accomplished long ago.¹⁰ Why was this not the case?

Innate human factors other than intelligence that are relevant to individual and group survival and, ultimately, to societal change are curiosity and motivation. Curiosity is not an attribute of intellect or a species-specific phenomenon, and it is operative in all human groupings. It would not be readily susceptible to peripheral restrictions, and would, like genetic stability of the collective human intellect, be unlikely by itself to effect social change of a longitudinal nature. Which brings us to motivation, a more relevant phenomenon in the making of and benefiting from new observations.

Intelligence and motivation are linked in that objective measures of intelligence can fluctuate depending on motivation. In seeking an explanation for the delay in devolvement of scientific progress upon humanity, and if intelligence is a constant function, the answer may lie with a deficiency of some motivating factor. To be more specific, was a motivating factor lacking in early civilizations that led to delayed development of medical professionals and other evidence of progress? Factors that surely were motivational included sickness, trauma, difficult birthing, and early death, sufferings affecting all people in all eras. Yes, sickness was a potent motivation, a propellant for progress and change, especially as the occasional long-lived individual would have been viewed as evidence of what was possible. Both intelligence and motivation must have been in play to a similar degree in prehistoric as well as historic times.

Despite the simple scheme just presented and with so many motivational catalysts attached to sickness, there must have been strong inhibitory factors to explain why early civilizations that would have benefited from, and were intellectually capable of, medical progress remained without identifiable medical practices for so many centuries/millennia. Levels of motivation, or “hierarchy of needs,” specified by Maslow are referred to here, for their relevance in many cultures has been examined.¹¹ Two factors, biological survival and safety, take precedence in Maslow’s hierarchy of five

¹⁰ The merits of modernization, good or bad, are not the issue here, for the past is past. But in determining the best path for man’s social progress going forward it is important to know what has restricted progress in the past. Also, “modernization” as used here is relative, meaning that the difficulties and dangers of existence have, as a consequence of intellect and motivation, been lessened when contrasted with preceding times. Similarly, the present-day issues relating to climate change reflect concern for the future. Civilizations of the past have often been profoundly affected by changes in climate, sometimes global, sometimes regional, as will be apparent in the pages to follow. But the equivalent intellectual status of all global populations indicates that, when mixed in with all the other potential forces that might induce genetic change in intellectual function, if there has been any species-wide change related to climate it has so far been undetectable.

¹¹ See: Maslow, A. H., *Motivation and Personality*, New York, 1954. Despite scholarly criticism of the hierarchy of needs, most is directed at psychological fine-tuning of personality, whereas its value in the present work is as a practical referent for sequencing stages of early human social existence, or, as indicated by Maslow, the three “primitive” stages: survival, security, belonging.

levels of motivation, with the third level involving one's interaction with others. These factors represent "primitive" motivational requirements. The original Maslow scheme identifies two other factors as less primitive: the desire for esteem and the personal goal of self-realization. The relevance of this classification of levels of motivation to early culture can be questioned, but intuitively the "primitive" requirements seem reasonable, and they have been found generally applicable to a variety of modern cultures. Assuming the perceived universality of the "primitive" motivational factors as operative in ancient or primitive groups as well as modern, and that there is equivalent intellectual potential in ancient and modern man, could progress as understood today have resulted from attempts by early man to survive an unforgiving environment?

A variety of local physical and biological impediments could intercept ancient attempts at progress. But mankind's attempts would have been perennial and at one time or another some must have led to an observation, discovery, or invention that would have prompted the motivational process to further improve the quality and length of human life, for everything we know of ancient times is consistent with fear, dread or fascination with death. In a small group the observation, discovery or invention of something of a vital nature could have been rapidly transmitted to others in the group or to nearby groups. Such a sequence in the right setting might have been the spark that would propel a further search for improvement, augmentation, and propagation of the original observation. But knowledge of a vital discovery will seldom be sustained to a point where it can permanently improve the lot of human society if it can be communicated to only a few family members or fellow tribesmen. A minimum level of population size, density and duration must be necessary, a focus of later discussion.

Also important is a need for that observation, discovery or invention. If there is no perceived need for more water, there will be no progress in improving water supply. If there is plenty of game, there will be no need for domestication. In Eden, of course, there would have been no need for progress because everything was present that was necessary and useful, and nothing was present that was unpleasant or dangerous (with one exception!). In a sense, progress can be viewed as the path toward a secular Eden, for no other path will lead a society to a place where everything necessary, useful and pleasant is available. If, therefore, there were no perceived need for improvements, should there have been no foreseeable shortage of food or water, no external threats, no environmental hazards, there would have been little need for activating the "primitive" motivational factors conducive to survival and safety, and an early form of communal association would have little reason to change its social pattern, however simple, from generation to generation, perhaps for thousands of years.

But primitive life was, whether in jungle or tundra, no Eden. Thus, to motivation must be ascribed a major role in societal evolution. Even if an Eden-like environment existed, surely human biological inevitabilities that include disease and death would have been a perpetual motivation to improve health and longevity. Motivation and intellect as universal human attributes are omnipresent and the engines of progress toward a secular Eden. *Ergo*, human "progress" comes with the blessing of Heaven.¹²

¹² In the translation of Dr. Paul Sigmond (*St. Thomas on Politics and Ethics*, New York, 1988, p. 49): "... all the things to which man has a natural inclination are naturally apprehended by the reason as good and therefore as objects to be pursued, and their opposites as evils to be avoided." St. Thomas Aquinas made clear the role of free will, the appropriateness for the individual to seek happiness, and the equating of individual good with the common good, all this under the aegis of a

D. Justification for selective elevation of mythology to the status of evidence

In *The Natural State of Medical Practice*, volume I, Book I, the course of medical practice in defined civilizations in different regions of the globe was analyzed. One conclusion of that analysis was that only twice in the past 2,500 years has medical progress been systematically implemented: in the Hippocratic medicine of Ancient Greece and in the modern West, the mechanism of its success being a particular form of medical practice, the “natural state.” While laying out arguments supporting such a claim it became apparent that there was clinical evidence, limited but enticingly valid, that much earlier attempts had been made to establish a progressive medical practice in the four ancient civilizations previously mentioned: Mesopotamian, Egyptian, Chinese, and Indian. But even with certain societal constants that include (1) equivalence in intelligence and curiosity, (2) a levelling scale for assessing motivation applicable to a broad range of societies, (3) the “universal” yardstick of medicine for comparing progress among civilizations, and (4) modern archeological methods, how can a prehistoric society be truly known?

A clearer picture of those earliest attempts at a medical profession is desirable, but data are few and the ancient texts have suffered alteration over many centuries. But myths and legends abound that relate feats of good and evil in the archaic inventories of all cultures and civilizations, stories of superhuman strength or wisdom or malevolence. Perhaps a source of valid information on prehistoric and early historic medicine can be found in folklore or teachings from oral tradition. The importance of myth and legend in telling the story of mankind has been enhanced in recent decades as archeological discovery has unearthed evidence supporting the veracity of significant portions of anecdotal prehistory. Heinrich Schliemann’s Troy, the Great Flood of the Gilgamesh, and many biblical scenarios now being unearthed are examples of such narratives.

Given the ostensible conjunction of myth and legend with extant manuscripts, perhaps the historicity of medicine should be more closely considered with an eye to its mythical or legendary past. Medicine has had its share of seemingly unrealistic champions in the distant past. Three that are relevant to present discussion are: Huang Ti (the Yellow Emperor of prehistoric China, cosmic ruler, inventor of the wheel and writing, *ca.* 2400 BC), Bharadwaja (Indian sage and architect of Ayurveda, to whom divine wisdom was imparted by means of the *Atharva-veda*, *ca.* 2000 BC), and Imhotep (Egyptian semidivine Vizier, architect, high priest, astrologer, scribe, founder of medicine, *ca.* 2700 BC). For Sumer there is no legendary originator of medicine, although by 2900 BC Ninsun, mythical mother of the 1st dynasty king Gilgamesh, was identified as the goddess of medicine.

Literary instruments that support an early productive period in medicine at the approximate time of the legendary persons mentioned in the previous paragraph include *The Therapeutic Manual of Diagnosis and Prognosis* from Sumer, the Ebers and Smith

natural inclination toward the good. To this end can be positively assigned the concept of human progress, as long as it can remain undiverted from the good. Insofar as untoward consequences can ensue along the path of progress, as long as all unambiguous attempts are made to avoid them, that path can be pursued. Disease, suffering, and premature death as causes of great unhappiness are “the good’s” justifiable targets. St. Thomas indicated that no perfect happiness will be obtained in our earthly state, but he did not criticize the attempt to improve it. The role of natural law, a much-discussed topic and on which St. Thomas also expounded, will receive close inspection in later chapters of this work.

papyri from Egypt, the *Shennong Bencaojing* and the *Huang Ti Nei Ching Su Wen* of 200 BC China, and Ayurveda from the Indian subcontinent as expressed in the 100 BC *Charaka Samhita* and 400 AD *Susruta Samhita*. With justification to be offered in the following four chapters, the ancient works purportedly composed during the age of the legendary sages and masters will be teamed up with the status of society at or about the time of their purported authors. Rather than the fusion of early society and early works providing a level of veracity to the myths and legends, perhaps the reverse will result, *i.e.*, hints derived from myths and legends will be found to support ancient origins of medical progress.

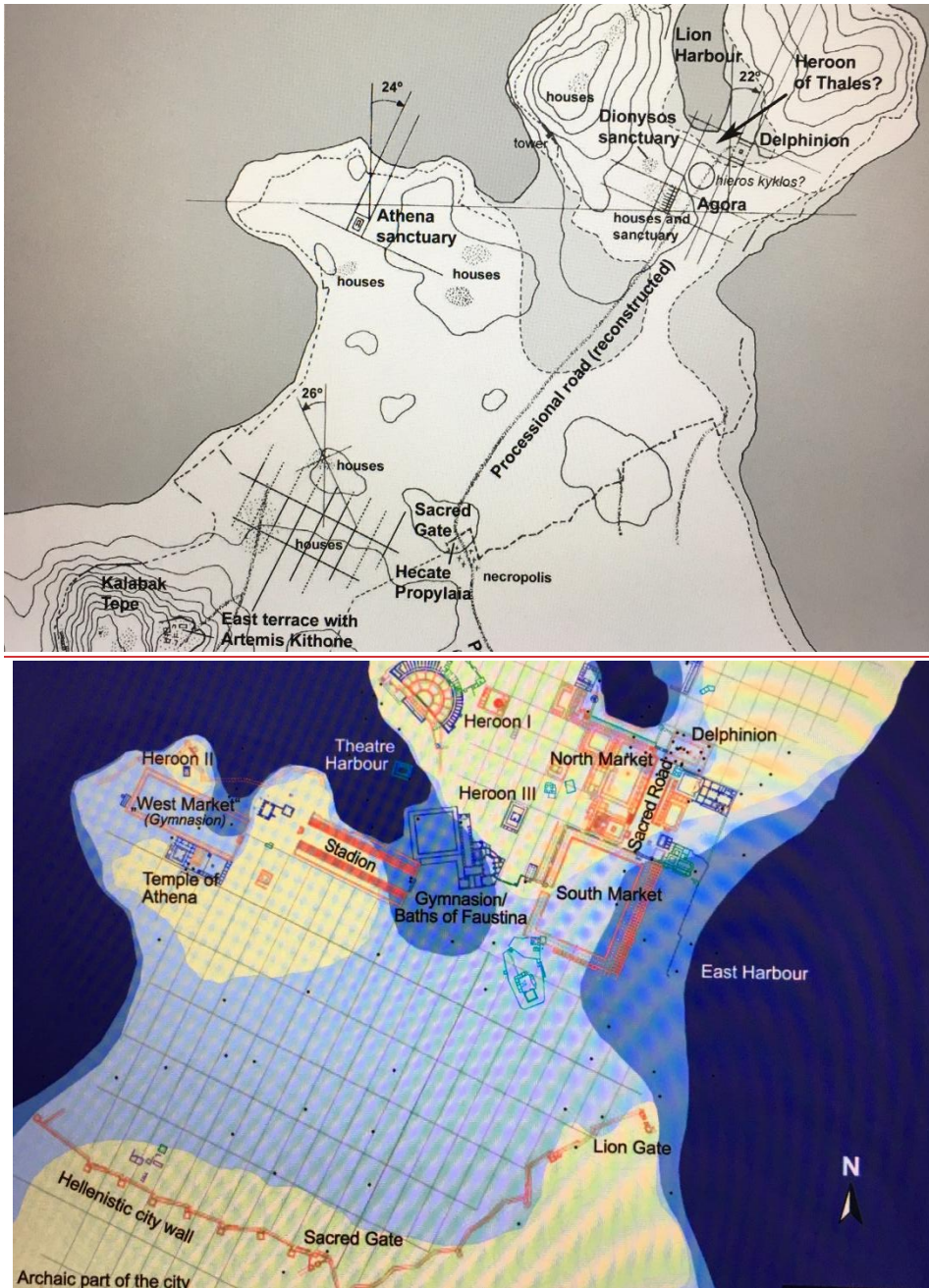


Fig. 1: Two topographical outlines of ancient Miletos show changes over time of silting at the mouth of the Meander river that gradually obstructed sea access, the more archaic areas represented as higher ground. The original Archaic Age city was destroyed in 494 BC and was later rebuilt. An artistic perspective of Archaic Miletos is, therefore, unavailable, and so archeological and geological mapping is provided in its stead.

CHAPTER TWO

MILETOS AS THE ARCHETYPAL CITY FOR THE FOUNDING OF HIPPOCRATIC MEDICINE

“Despite the association of Hippocrates with the island of Cos, the ancient centerpiece of Greek culture was not that small island and its Dorian inhabitants. It was, instead, the city-state of Miletos and its Ionians.”

The Natural State of Medical Practice, vol. 1, p. 221

The history of Miletos from its earliest days until its razing by the Persians in 494 BC is briefly reviewed with a focus on its governance and commercial enterprise. Ancient Greek civilization is second only to modern Western civilization in its embrace of progress and individual liberty. Miletos is selected as a paradigm population for an attempt at understanding that success. Its medical practitioners are assumed to have been the source of at least some of the earlier clinical observations found in the Hippocratic Corpus, although it would be reasonable to assign a similar course of political, commercial, and medical practice developments to other city-states in ancient Ionia and the Dodecanese Islands. This chapter also introduces societal terms and concepts that will frequently reemerge throughout this volume. Selected metrics and observations are summarized at the chapter’s conclusion against which sixteen other urbanized or proto-urbanized civilizations will be compared in subsequent chapters.

- A. Miletos as the birthplace of Hippocratic medicine
- B. Social structures of Miletos

A. Miletos and the birthplace of Hippocratic medicine

In *The Natural State of Medical Practice*, volume 1, it was shown that the only approximation to a “natural state” of medical practice other than 18th-19th C Western civilization occurred in ancient Greece. As we are still living in the former, this chapter will review the era of Hippocratic medicine of ancient Greece with focus on its origin.¹ The term “Hippocratic” is used to describe the medical practice associated with the legendary practitioner with whom it has been identified over the ages: Hippocrates (460-380 BC). In that tradition it must be understood that the term does not include all medical practitioners, for no linguistic distinction is provided in Classical Age or modern literature that separates those relatively few in ancient Greece who practiced according to principles of Hippocrates from the great majority, and great variety, of practitioners who did not. The written record of Hippocratic physicians, as reflected in the *Corpus Hippocraticum*, is sufficiently large and detailed to provide irrefutable evidence of medical progress, but nothing of this sort exists for other practitioners. The first two volumes of *The Natural State of Medical Practice* describe in some detail the clinical achievements of Hippocratic physicians, their social environment, and their disappearance. This will not be repeated

¹ The course and denouement of Hippocratic medicine is presented in detail in Book 2 of *The Natural State of Medical Practice*, volume 1. Also mentioned in volume 1, p. 218, is the uncertainty that surrounds the legend of Hippocrates, although scholarly opinion presently favors the existence of the man. And in this work I prefer the romanized “Miletos” to the Latin “Miletus.”

here. The point to be established, however, is that it was possible 2,500 years ago to develop within a space of about two or three centuries a network of medical practitioners capable of instituting a rational basis for making medical decisions, and that this was done without benefit of technology and without being the recipient of prior codified medical knowledge. Hippocratic medicine, therefore, can be considered the universal *editio princeps* of medical practice against which other textual medical traditions and social environments can be compared.

The locus of origin of Hippocratic medicine has traditionally been identified as the island of Cos, home of Hippocrates, just a few miles from the Ionian coast, now the western coast of Turkey. The ancient term that comprised the mainland sites of ancient Greek cities on that coast is Ionia, and Miletos was the most prominent city of Ionia in the 6th C BC. Miletos was sacked by the Persians in early 5th C BC, and little remains of that early city. For reasons given in volume 1 of this work there is reason to consider Hippocratic medicine as having its origin in an Ionic city such as Miletos rather than the small and relatively backward island of Cos. This analysis of city-state development, therefore, will use Miletos as the template for the civilization that would introduce Hippocratic medicine to the world. But it will not be the magnificent Miletos that was rebuilt in the 4th C BC; it will instead be the earlier Miletos as it emerged from prehistory only to be totally destroyed in 494 BC.

The ancient port city of Miletos (discussed in some detail in volume 1, p. 221ff.) has a complex and incompletely understood prehistory. Relevant to present purpose, it was associated with the Mycenaean empire and then the Carian culture in the 13th C BC, but in mid-12th C BC it was completely destroyed and the area deserted for one or two centuries.² Thus, from roughly 1050 to 650 BC, after it was settled anew by Ionian Greeks, it developed into a free-standing city-state with hegemony over roughly 700 square miles of territory, including the alluvial plain of the Meander River where it entered the Aegean Sea. Protected by a mountain range to the north and east, and with a fertile delta to support a flourishing agriculture, a self-sufficient Miletos became increasingly prosperous as an independent city run by an oligarchical government. It is relevant that by “oligarchical” is meant that city government, in its offices and deliberations, was in the hands of a wealthy socio-economic group involved in commerce and trade, suggesting it was functionally a heterarchy, a management style much

² Excavations at Pylos of the Mycenaean palace and surrounding region have revealed a writing system called Linear B that is directly related to ancient Greek. An early form of the Greek word for medical practitioner (ἰατρός, iatros) was found in palace records, transliterated as *i-ja-te*, and a description of presumed medical instruments has been made by E. Protonotariou-Deilaki (Ανασκαφικαὶ Ἐρευναι εἰς Περισχὴν Ναυπλίας, in *Αρχαιολογικὸν Δελτίον* 28:90-94, 1973), but neither claim can be considered definitive. Michael Ventris, who first translated Linear B, considered the translation of “physician” to be tentative, although this translation has subsequently not been questioned, and the “medical” instruments have also been considered to have been for cosmetic use. Stated comparisons of Pylos medical instruments with Classical era medical instruments must be in reference to those from Pompeii, 79 AD, or the Surgeon’s House, Rimini, 2nd C AD, *i.e.*, 1500 years later. These details are mentioned here because it might be argued that Hippocratic medicine represented the natural progression of a nascent form of rational Mycenaean medical practice. To which it would be responded that evidence for this is frail and occurs at only one point in time. Nothing suggesting other than simple empirical treatments appear prior to the Hippocratic writings (*e.g.*, in Homeric epics, *ca.* 750 BC, or poetry of Hesiod, *ca.* 700 BC). It can be considered settled that there is no association of Hippocratic medicine to anything prior to the settlements of Ionia, as laid out in *The Natural State of Medical Practice*, volume 1, p. 231ff.

discussed in later chapters and defined on p. 21. It did not have, as a relatively new city, a powerful hereditary ruling class.³ Turmoil erupted from time to time, and the importance of tradesmen and craftsmen is evident in that contention was not between rival nobility but between the wealthy and an increasingly wealthy middle class arising among the plebeians.⁴ To counter this menace as well as military threats from the nearby kingdom of Lydia, a highly regarded statesman, Thrasybulus, was chosen as tyrant to guide the city, which he successfully did between 650 to 600 BC, at the end of which time oligarchical control was reinstituted.⁵

But the period of special interest impinging on Hippocratic medicine is the century preceding the writings now attributed to Hippocrates, for it would have been during that century (600-500 BC) that clinical observations were made that would become the source of the wisdom imparted in early compositions of the *Corpus Hippocraticum*. In 560 BC the Kingdom of Lydia achieved hegemony over the Ionian city-states, at that time autonomous polities guided by commercial interests that were flourishing from maritime trade. Of those that bowed to the will of Croesus, the Lydian king, Miletos was granted special status and permitted to follow its commercial interests in return for supporting Croesus against the Persians. This was thwarted in 546 BC when the Persians defeated Croesus and assumed hegemony over the region, but again Miletos obtained special status. A tyrant, Histiaeus, was put in control of the city by the Persians. It does appear that, despite the “tyranny” of Histiaeus, the commercial and cultural well-being of Miletos was maintained. Both Croesus of Lydia and the Persians “did not impede in any way economic and cultural development.”⁶ It has also been stated that increased prosperity of Miletos coincided with the rule by Histiaeus, the Persian “vassal,” and that the Persians in general interfered little in the internal affairs of their conquests. A contributing factor to Milesian prosperity may have been the assassination of Polycrates, tyrant of the neighboring island of Samos, for his previous blockades had restricted sea commerce in the area.⁷ This would have helped soften the effects of any tribute and military support required of Miletos by the Persians. The favored status of Miletos persisted until about 500 BC when Histiaeus was replaced by his son, an event that

³ See: Gorman, V., *Miletos, the Ornament of Ionia*, Ann Arbor, 2001, chapter 1. This excellent book is the source of much of the information on archaic Miletos used in the present work.

⁴ It is from these two groups, or political parties, that the *ἀειναῦται*, or “perpetual sailors,” were derived, their prominent leaders embarking on a ship to thrash out political differences, disembarking only when solutions had been decided. This preceded the tyranny of Thrasybulus, thus revealing the early 7th C BC prominence of commercial interests and the fruits of *heterarchy*, an organizational system much discussed later in this work.

⁵ There was also this difference between the island of Cos and Miletos. Cos was Dorian, Miletos was Ionian. The Dorian culture venerated ancient customs to the point that the Spartans, who were Dorians, prevented contact with foreigners by having their cities inland rather than coastal, by restricting travel of their citizens, and closing their gates to foreigners. The Ionians, in contrast, welcomed novelty and interacted with foreign ideas, its morality repugnant to Dorians. The idea that the fount of medical knowledge of the Hippocratic era emanated from the small island that Dorian settlers appropriated from the aboriginal population of Cos is culturally and demographically highly unlikely. See: Muller, K. O., *History and Antiquities of the Doric Race*, two volumes, London, 1839, H. Tufnell and G. C. Lewis, translators, especially the first chapter of volume 2.

⁶ See: Dandamaev, M. A., *A Political History of the Achaemenid Empire*, Leiden, 1989, translated by W. J. Vogelsang, p. 153 and p. 21. Also see: Meyer, E., *Geschichte des Altertums*, vol. 3, i, p. 57.

⁷ See: Ure, P. N., *The Origin of Tyranny*, Cambridge, 1922, p. 270.

ultimately would lead to a war with Persia in 494 BC during which Miletos was razed and its population dispersed or enslaved, thus terminating the history of that great city of Archaic Greece and leaving little tangible record of its existence. Years were to pass before Miletos again achieved prominence. Resettlement began in 478 BC, but by then Athens had become powerful and expanded its influence in areas previously under the aegis of Miletos. The city had to be repopulated, rebuilt, and social structures and networks reestablished. Although both Athens and the Persians maintained an association with the city it would remain a secondary regional force for two centuries. It is concluded, therefore, that it was during the earlier period of Persian hegemony over Ionia (*i.e.*, prior to 494 BC) that Hippocratic medicine first emerged. It is possible that Hippocratic medicine prior to Hippocrates evolved in other Greek city-states, but if that were the case the basic argument put forth in this volume would likely be unchanged except for minor alterations in city-state metrics. The fact remains, however, that from all the other city-states that existed at the time of archaic Miletos there has appeared no information whatever on Hippocrates that would indicate an alternative site for the origin of Hippocratic medicine except for the well-known reference to “Hippocrates of Cos” in Plato (*Protagoras*, 311b) and Soranus’ *Life of Hippocrates* written 500 years later.

It is a reasonable assumption that a minor craft or profession such as a medical practice had little to fear from a change in early Milesian masters in the absence of widespread violence. At its peak the population of Miletos may have reached 65,000 and its urban size over 200 acres at the peninsular tip of an alluvial region of about 80 square miles. As a functionally autonomous city-state it lasted for 550 years. The importance of population size and density in supporting a small network of medical practitioners will be discussed in detail later, but a local population of about 10,000 is arbitrarily proposed as a necessary minimum. During the 8th C BC this number was surpassed in several population centers of Ionia, with Miletos being the largest.⁸ There is no information on the health of its population prior to its destruction, and there is no archeological or literary information on its medical practitioners, although some famous personages prior to its destruction included Thales, Anaximander, Cadmus, Anaximenes, Aristides, Hecataeus, and Hesychius. These famous intellects (among many), the extraordinary Temple of Apollo at Didyma, and the thirteen-mile statue-lined road between Miletos and Didyma attest the greatness of Miletos prior to the Persian destruction. As for governance, the role of tyrants early and late in the 6th C BC having been discussed, there was in mid-century a mediation by Parians who were called to settle violent disputes between the wealthy and the artisanal class. The result has been likened to a “constitution,” and in the short term it increased the power and municipal responsibility to a “middle class” composed of prominent landowners. The actual functioning of this arrangement is not evaluable, however, and it has been suggested that even with the proposed changes in governance that the highest offices remained within an established oligarchy.⁹

In the 70-80 medical treatises associated with the *Corpus Hippocraticum*, none mention Miletos, whereas Thessaly, the island of Thasos, Cyricus in northwest Anatolia,

⁸ See: Morris, I., *The Growth of Greek Cities in the First Millennium BC*, 2005, p. 4 of this 29-page publication of *Princeton/Stanford Working Papers in Classics*. Prior to the 8th C BC it has been stated that there were no Grecian (Hellenic) cities, and that no settlements exceeded a 2,000 population. The city of Miletos can, therefore, be considered a city newly formed and without regional precedent.

⁹ See: Dunham, A. G., *History of Miletus Down to the Anabasis of Alexander*, London, 1915, especially chapter 12, Constitutional History.

and Perinthus on the Sea of Marmara are specified as being the homes of some patients mentioned in those works, the latter three located near or on the route to the Black Sea where many Milesian colonies were established. Scholarly opinion holds that no Hippocratic works predate early 5th C BC and the destruction of Miletos. On the other hand, many clinical descriptions thought to have been written in the mid-5th C BC suggest their authors already had a background of knowledge that would have taken a group of physicians years to collect. It is that background of knowledge that may have come from Miletos as predecessors of Hippocratic physicians first began to form networks, organize, and collate and share their cumulative knowledge. Had a few Milesian practitioners escaped the Persian destruction a description of their practices might have been available, but medical practitioners were not highly valued in any ancient civilization, with the exception of those few who, for whatever reason, contributed to the welfare of the elite. And Athens had already denied its assistance to Miletos in the latter's plan for armed rebellion against the Persians. History, therefore, is left with no information on this point.

What is evident is that no other Ionian city-state, including Samos, Chios, and Ephesus, is likely to have been a fount of early medical knowledge. Furthermore, the home island of Hippocrates, Cos, is out of the question as a source of Hippocratic medicine, as is mainland Greece and its attendant islands. Given its wealth, importance, vast network of associations with other city-states, colonies, and empires, and being the home of famed pre-Socratic philosophers, for purposes of argument Miletos has been selected to represent the civilization that produced an archetypal medical practice, aspects of which have now persisted for 2,500 years. There is no practical alternative.

B. Social structures of Miletos

In addition to the physical features of Miletos and the cities of other civilizations to be discussed in subsequent chapters, the freedoms and the limitations on individual and group enterprise that might have existed in ancient population centers is essential to an understanding of the concepts to be put forth in this volume, for its focus is the role of group freedom in the progress of any society. In volume 1 of *The Natural State of Medical Practice* Hippocratic medicine was uncoupled from traditional views that it represented or emerged from a medical school or a family of hereditary medical healers traceable to the legendary Asclepius. Instead, it was placed within a network of medical practitioners formally communicating their clinical findings to a central source that, for a fee, communicated updated knowledge to its membership. It was likened to a “physician’s cooperative,” a group of persons with similar goals that was created voluntarily to improve the function and reputation of the “cooperative,” in effect their profession. The commercial network of that group of Hippocratic physicians was also likened to a *koinon* (κοινόν) as used by Aristotle in a political sense (see chapter 13, section C, for further background of the *koinon* and related subjects). Essential to the success of a *koinon* was freedom from constraints by outside authority, equality in the rights of membership, a goal of self-interest, and the ability of members to speak freely without fear of reprisal. Implied in this, therefore, was the role of group liberty as the touchstone of progress. What information from Miletos, if any, bears on this point?

In all early or primitive societies the role of the family and its consanguineal and affinal social relationships has been dominant in social organization and power. Groups based on these connections, “kinships,” are varied in content, size, structure, and purpose, but in early or primitive societies they consistently share one feature: egalitarianism, or,

to more restrictively define the term for present purposes, a form of social egalitarianism. In this system there is a social structure within the kinship that assigns duties and obligations to all members depending on their status within the group. In an egalitarian society one obligation is the sharing of assets within the kinship, whether it be food, a product of work, or work itself. In modern times egalitarianism has come to include equal status and equal opportunity, but such philosophical details of equality were irrelevant to primitive and early kinships.¹⁰ It is also recognized that the degree of egalitarianism is inversely related to group size; the smaller the group, the more profound the role of the kinship on each member. Kinships were prominent features of ancient Greek society, and Dr. Kenneth Walters has stated: "Kinship cut across territorial concerns. Indeed, it may have been ... a primary motive factor in the politics of the 6th century [BC]."¹¹ This would have included the city-state of Miletos.

But the hold of kinship on behavior weakened as cities formed and personal and family allegiances were shifting to economic and political associations according to personal preference. It was in ancient Greece that the political groundwork was laid that would formally support a concept of individual liberty and democratic process. The Greek city-states adopted it to varying degree, ranging from the elections by lot in Athens to the rigid authoritarianism of the Spartan State. But one of the earliest manifestations of this revolutionary concept of democratic process occurred in Ionia, of which Miletos was the dominant city during the period of special interest for present discussion. Reference to democratic process is found on an early 6th C BC inscription from the island of Chios, approximately 90 miles northwest of Miletos.¹² The relative freedom enjoyed by merchants of Miletos allowed their maritime trade to proceed apace even though other aspects of social control in city-state life were administered by tyrants or oligarchies. There was, as a consequence, little interference in the mercantile networks that were the primary source of prosperity.

This lack of State interference is consistent with recent scholarly analyses of a variety of urban areas: free-standing and self-sufficient networks of crafts, trades, and vocations provide stability to centralized populations despite disorder within hierarchical systems because their day-to-day work and associations are outside the range of leadership interests or control. Such networks and associations can determine the course of a polis irrespective of a co-existing hierarchy and are now thought to have been critical in maintaining an intact city or city-state in the face of hierarchical turmoil. The relative importance of these networks varies and can change over time, and therefore the term "heterarchy" has been applied to indicate that there is no one group having permanent direction over other groups. If there appear to be commercial networks in operation irrespective of the form of governance in the civilizations evaluated herein, (1) it will be

¹⁰ This preliminary sketch greatly oversimplifies the basis of kinship, which is an organizational latticework that is used to enforce an egalitarian ethic. See chapter 11.

¹¹ See: Walters, K. R., *Geography and Kinship as Political Infrastructures in Archaic Athens*, in *Florilegium*, 4:1-31, 1982.

¹² For the actual inscription see: Tod, M. N., *A Selection of Greek Historical Inscriptions*, Oxford, 1933, pp. 1-2. Dated by Tod to ca. 600-575 BC, the inscription is taken to indicate a popular council composed of representatives of subgroups that placed restrictions on its leadership and implied isonomia (equality before the law). As Tod states, "...the democratic tone of the Constitution is unmistakable." A perhaps earlier statement has been found at Dreros, an ancient Dorian Greek colony on Crete. Known as the Dreros Law and dated as Archaic, 650-600 BC, it imposed term limits and sanctions on the leadership of the colony.

assumed that medical practices could be counted among them, and (2) the primary governance of those civilizations will be listed as “heterarchy.” It is a term now widely used in many scholarly discussions to explain functional successes in societies and other systems that were not adequately explained by hierarchy, the latter being a linear chain of command in which all but the highest level is sequentially nested in the next higher level. Heterarchy, as a term of management, clarifies much about social and economic dynamics of early societies and is often used in studies of ancient and primitive societies to explain their survival and growth despite little archeological evidence of a leadership or elite class to guide or entail labor from a population, especially in building monumental structures. Heterarchy and hierarchy commonly occur together, the former adding flexibility and valuable opinions that can help support or maintain a hierarchical system. But a heterarchy has its unique commercial or production services, sometimes even with its own separate settlements or neighborhoods, for the use of its labor force that are distinct from those of a political authority. The commercial ventures of Miletos, mentioned above, are evidence of heterarchy as inferred from historical comments on political events. Even earlier, during the 7th C BC colonization of coastal regions around the Black Sea by Miletos, many areas have been characterized as heterarchy. And the Greek Dark Age has been characterized as not “dark” but as a time of development of commercial interests that were considered heterarchy in an early stage of development.¹³

A final organizational feature to be sought in early or primitive cities is the existence of specialization. This is an indication of predictable surpluses in food supply that allow accumulation of products by storage that for reasons of commerce and stability can support trade and the luxury of technical specialization in other service and craft areas. “Specialization,” therefore, is included in the list of features to be sought in the various civilizations to follow. Furthermore, the presence of specialization is part of the definition of “civilization” used herein (p. 21), and when present implies the capability, if not the probability, for a medical practitioner network. If specialization in a city can occur in the commercial stockpiling and trading of grain, ceramic production, and jewelry manufacture, it is possible that the prospering city will also have some citizens who would, if they could, join together to provide special services for a fee. There is at present absolutely no information about medical practitioners, Hippocratic or otherwise, in early Miletos. On the other hand, it is inconceivable that none existed.

To summarize this chapter, the location of the Ionian settlement of Miletos was unoccupied at its founding, and the evolution of Milesian governance, having no urban precedent and its economic development and provisioning of its population evolving locally, has been selected as an archetypal city-state governance in ancient Greece in which medical progress, as exemplified by Hippocratic medical practice, could have arisen. In that many of its initial settlers represented a forced emigration from the Greek mainland and shared some cultural behaviors and traditions, Miletos did not evolve from nomadic hunter-gatherers. But as a city it did not acquire prosperity by conquest, its future course depended on local decisions unguided by some distant center of power, and it was not a colony or satellite of an existing culture. These features indicating the

¹³ See: Enverova, D. A., *The Transition from Bronze Age to Iron Age in the Aegean: A Heterarchical Approach*, Bilkent University Master’s thesis, Ankara, 2012. Also see papers by Dr. Jan Driessen that propose an early Minoan system of economics based on commercial “houses,” each with its dedicated workforce and administration probably directed along lines of kinship, a form of corporatism. Driessen, J., *A Prepalatial Matrilinear Society*, in *Back to the Beginning*, Oxford, 2012, I. Schoep, et al., editors, chapter 12.

development *in situ* of a permanent population center independent of outside authority is what sanctions Miletos as a prototype to which other large free-standing population centers, including prehistoric ones to be discussed later, will be compared, for they, as “primary city-states,” also will have developed independent of outside authority.

In the Summary Table below it is not known if any of the nineteen listed characteristics and metrics were important to societal progress or, if relevant, whether quantitations represent minimum or maximum values. Other features of Milesian civilization may have been more relevant but are unavailable for assessment.

Summary Table for Miletos:

STAGE – Late Archaic

POPULATION, LOCAL – 65,000

POPULATION, TOTAL – unable to locate information; perhaps 100,000-200,000

PRIMARY AREA – 1 square mile (hegemony: 700 square miles, *ca.* half the size of Rhode Island)

URBAN DENSITY – 100 persons per acre

PRODUCTION – agriculture, ceramics, services and products relevant to commercial maritime trade

GOVERNANCE – aristocracy of wealth with intermittent tyranny, but primarily a commercial heterarchy that included colonies

EGALITARIAN ARCHEOLOGY¹ - no

PROMINENT EGALITARIAN KINSHIPS – no

WRITING – yes

DISTANT TRADE – yes; maritime colonies

SPECIALIZATION - yes

MONUMENTAL STRUCTURES – yes, temples and statues

DENOUEMENT – razed by Persians

MEDICAL PRACTICE – assumed

FORMATIVE PERIOD – 250 years

FLORUIT² – 300 years (starting with the time the first Ionian cities reached populations of 10,000)

CITY-STATE – yes

AVERAGE LIFE EXPECTANCY – n.a.³

¹ EGALITARIAN ARCHEOLOGY is defined on p. 21.

² FLORUIT refers to the period covering a society’s mature prosperity, often a nebulous estimate.

³ n.a. = not available. But see reference 42, p. 223, for Dr. Angel’s estimate of Classical Greece.

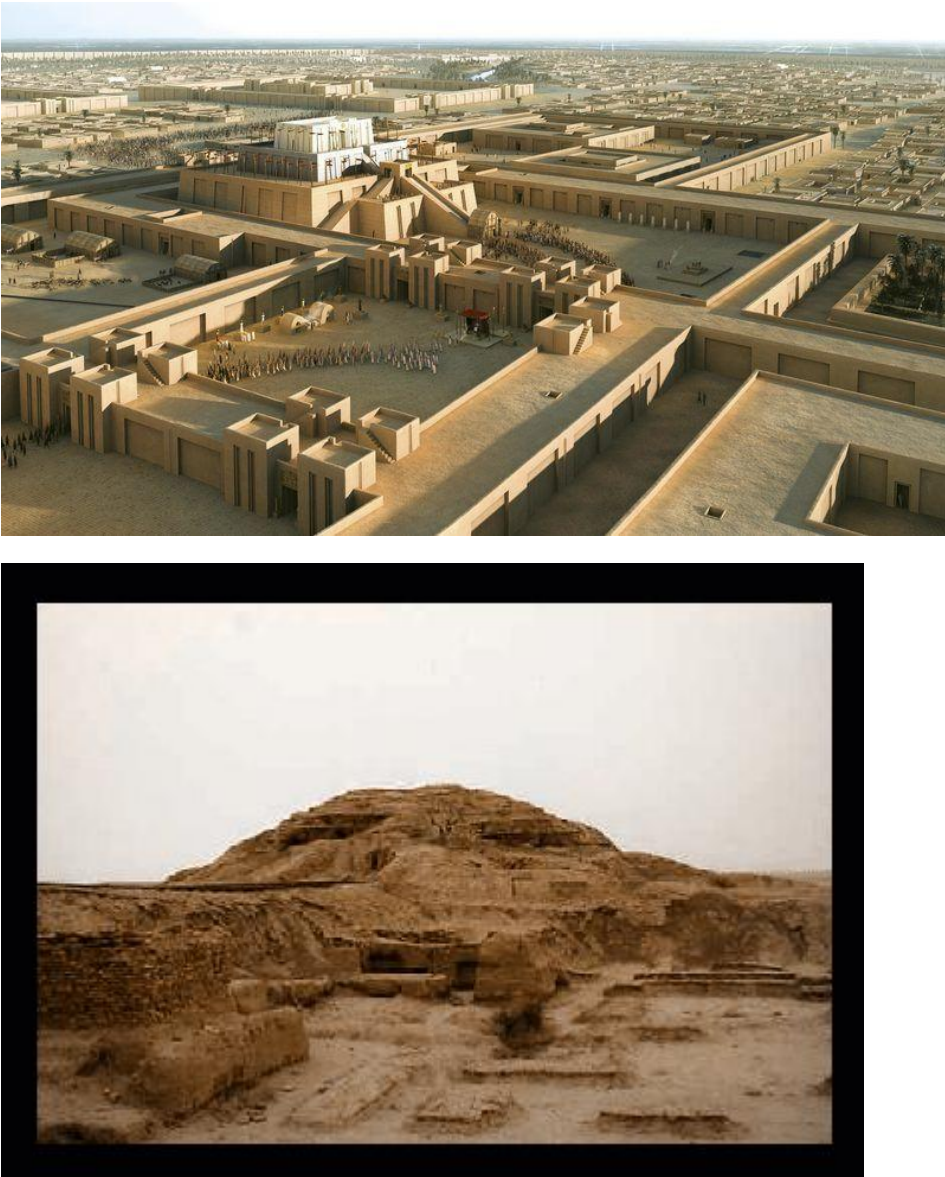


Fig. 2: (Top) Artistic reconstruction of the Eanna District of the city of Uruk *ca.* 3000 BC. This photograph is licensed under Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International. (Bottom) Photograph, by Carmen Asensio and available in Wikimedia, of the Eanna temple of Uruk as seen earlier at the excavation site. Lying alongside a branch of the Euphrates River, Uruk was the largest city in the world at that time.

CHAPTER THREE

MESOPOTAMIAN CIVILIZATION

“[Sumerian] medicine was then copied by the Akkadians, nobbled by the Amorites, co-opted by the Kassites and their priests, and become barely recognizable after the fall of the Assyrians.”

The Natural State of Medical Practice, vol. 1, p. 65

Sumer is the first of four great civilizations to be compared to Miletos, all four having been the source of ancient medical classics. The prehistory of Sumer and the founding and rise of its largest city-state of Uruk are presented, and the agricultural and commercial prosperity of that city before conquest by Akkadians (2350 BC) is proposed as the social milieu in which a network of medical practitioners acquired the ancient wisdom of clinical medicine that would find its way into later Babylonian medical writings. Writings and myth suggest that the independent *azu* (“physician”) was recognized as a commendable member of society probably as early as 3200 BC, although a mature cuneiform probably was unavailable to record his observations until 2900 BC. As scholarly literature has a number of fine articles revealing the clinical acuity of some Sumerian clinicians, only one example is reviewed in detail in this chapter. The rise of an autonomous city-state at a time of (1) weakening of egalitarian kinship ties, (2) commercial prosperity, and (3) prior to authoritarian centralization of power is proposed as containing the window of opportunity for the formation of a medical network capable of initiating medical progress. A companion to medical progress, another product of commercial prosperity, is writing.

- A. Early Sumer and the city-state of Uruk
- B. Uruk and the early medical works
- C. Clinical assessment of Sumerian medical writings
- D. Conclusion

- A. Early Sumer and the city-state of Uruk¹

The prehistory of Sumer is provided here to suggest the social setting that may have existed at the time clinical observations were made by early Sumerian medical practitioners that were later incorporated into its medical classics.

Like Miletos, all four of the great riverine civilizations discussed in this and the subsequent three chapters (the Uruk and Jemdet Nasr cultures of predynastic Sumer abutting the Euphrates River, the Naqada culture of predynastic Egypt along the lower and middle Nile River, the Shandong culture of predynastic China along the Yellow River, and the Harappan culture in the Indus River Valley) developed in alluvial plains. Their association with the large river valleys and deltas can be ascribed to a hospitable agricultural environment capable of supporting a large population. This, rather than any innate superiority of the inhabitants, explains the prominence of the four large riverine civilizations in world history.

¹ A more extensive history of Mesopotamian medicine is found in chapter 2 of Book I of *The Natural State of Medical Practice*, volume 1, as are histories of Egyptian, Chinese, and Indian medicine in chapters 3, 4 and 5, respectively. They can be reviewed if a more detailed picture of the social history of medicine in those regions is desired.

The intention now is (1) to identify characteristics of the early days of each of the four great civilizations that developed medical practices so that they can be compared to Miletos and to a group of prehistoric civilizations to be discussed later, and (2) to assess socio-economic evidence that the classical medical writings associated with those four great civilizations can be traced back to their originating (primary) civilizations.

Human settlement with primitive agriculture surrounding the upper Tigris and Euphrates rivers was occurring as early as 9,000 BC. A progressive southerly expansion and maturation of the northern cultures is proposed as an early phase of what is now called the Ubaid culture (6500-3800 BC) in the area that would become known as Sumer. This culture with its numerous small communities evolved a system of urbanization, temple building, and irrigation. Its settlements were without walls, and projects were undertaken that required organized communal effort. It has also been proposed that over time a hierarchical form of governance developed with a temple-associated system of centralized redistribution of food, although social stratification was minimal. This pattern was continued into the Uruk Period (4000-3100 BC) that supplanted the Ubaid, social stratification surging as the Uruk Period came to a close. Despite this, the Late Uruk Period (3400-3100 BC), the formative phase of Sumer, saw the early evolution of larger villages and early developmental stages of city-states, the development of writing, and the expansion of trade into distant regions. This important cultural expansion proceeded apace in some regions for the next 200 years, now called the Jemdet Nasr period (3100-2900 BC), during which city-state populations exceeded 10,000.

An important social change during the Late Uruk and subsequent periods was the change from traditional small group kinship intrafamilial ties to ties with the more successful families. In the process of changing affiliation, the egalitarianism of traditional kinship structure was gradually replaced by a less domineering inter-kinship association, one more personal than that provided by a class-defined traditional hierarchy of power.² The affiliation of a kinship was now with another kinship, one that was more successful and might prove a profitable companion and provide leadership in commercial ventures. Both the traditional and the new “nested” kinship alliances were probably patriarchal, but the latter infringed much less in one’s personal life. This shift was taking place in the late 4th millennium and ultimately would lead to dynastic Uruk, its significance being discussed more fully in chapter 7 as the proposed time a nascent network of medical practitioners would begin to compile their medical knowledge for future colleagues.

The role of natural disasters, especially flooding (including the great flood mentioned in *Genesis*), during this period of Mesopotamian civilization is heatedly debated, and so all that can be inferred is that flooding of some degree was not a rare occurrence in the region and how any flooding that did occur affected regional society is uncertain. In either event, in the subsequent Sumerian early dynastic period (onset: 2900 BC) the city-states grew in size, proliferated, and remained autonomous for centuries until united under a single Akkadian ruler *ca.* 2350 BC. The history of this period (2900-2350 BC) is poorly attested, but intercity rivalry was important. Some have argued that city-states during the early dynastic period may have resembled monastic centers in medieval

² See: Ur, J., *Households and the Emergence of Cities in Ancient Mesopotamia*, in *Cambridge Archaeological Journal*, 26:2, 2014.

Europe whereby the monastery often served as a commercial and distribution center as well as a religious center for the surrounding region.³

The largest Sumerian city during the period under consideration, and one of the earliest, was Uruk, for which the Uruk Period is named. In the Jemdet Nasr phase (the final stage of the Uruk Period) the city was at its peak, with a population of about 50,000 in 2900 BC. It may be the same city as the biblical Erech. Earlier construction had produced some stone buildings, a ziggurat, elaborate temples, baths, courtyards, and monumental structures with cone-mosaics, and Uruk was, by 2900 BC, a walled city with hegemony over much of Sumer. The large size of the city has been explained by an extensive system of irrigation and the agriculture of domesticated grains that provided large food surpluses. Initially a market town of moderate size, the agricultural success of early Uruk and the region was the basis for most of its early economic development, and the initial urbanization was in response to that excess production. So effective was agriculture that trade and commerce over great distance was initially established for that surplus, subsequently followed by mass production of pottery, figurines, finished jewelry, textiles, and weapons. To produce these commodities, centralization of power and specialized crafts and vocations appeared. Although arising from and surrounded by small agricultural communities, Uruk had, by 2900 BC, a system of small colonies, a developed military, and slaves obtained from peripheral conquests. The first nonmythical king also emerged as a ruler during the 1st Dynasty (2900-2800 BC) of Uruk. That king is now thought to have been the legendary Gilgamesh, hero of the *Epic of Gilgamesh*, commonly recognized because of its inclusion of a description of a calamitous flood. As such, the *Epic* is now considered a source of information on the social status of Uruk at that time. A stratified society, thirty-foot-high walls surrounding the city, and its militarization indicate it had become involved in destructive wars.

Despite its militarization, however, the statement is made in the *Epic of Gilgamesh* that Gilgamesh consulted with an “assembly of men” from the city when considering war with the city-state of Kish, the approximate date of this being *ca.* 2800 BC. The nature of the assembly is not specified, but it is made clear that support from within the community was required for such a strategic decision. Dr. Samuel Kramer proposed there was a bicameral representation of citizens, the lower house composed of plebeians.⁴ Even as king and presumably as the head of a large military force, unilateral action ordered by Gilgamesh himself was not possible. A purely hierarchical system of governance, therefore, is not supported.

Egalitarian governance was also unlikely, for, during the Jemdet Nasr period (3100-2900 BC) that preceded the 1st Uruk dynasty, tablets with administrative accounts of a commercial or distributive nature indicate careful tallying of products by a central authority. The vast storage of grain and the attraction of commercial ventures added population to the enlarging city-states and document the commercial consequences of agricultural achievement. This required leadership that, in the absence of evidence of a

³ As an example, Cistercian monks at Fountains Abbey in England in the 13th C had about 15,000 sheep on their granges (land holdings) and provided the economic surge that changed Yorkshire and surrounding areas from their previously described “desolate” state to a thriving countryside dotted with fields, villages, and marketplaces. See: Internet Homepage of Petyt, A., and her monologue on *Medieval Monasteries in Yorkshire* (2001), at Learning Centers at Ancestry.com; (“The contribution of the Cistercian Order to the economic development of the North was little less than revolutionary.”)

⁴ See: Kramer, S. N., *The Sumerians: Their History, Culture, and Character*, Chicago, 1963, p. 99.

hereditary or political ruler, could only have been achieved by either commercial ventures (perhaps a heterarchy) or approval by the target population as a whole working through its leadership (a form of corporatism, as described on p. 21).⁵ In either event, the *Epic of Gilgamesh* interpretations would suggest that even into the 1st Uruk dynasty the functioning of city-state daily life was still primarily in the hands of mercantile interests rather than a rigid dynastic kingship.

There is a similarity between the metrics of Uruk and Miletos. The smaller agricultural settlements adjacent to Uruk provided surplus agricultural products to the city in return for goods and services and for storage and perhaps redistribution in times of need or to provide a settlement specializing in one particular product with essentials produced by another settlement. It is unknown if the distribution of goods and services by the temple and religious offices of Uruk should be viewed as an egalitarian process or a commercial one, but given the vast size of grain storage the latter is most likely, although, with input from the people regarding storage and distribution, a system based on corporatism is possible.⁶ There may have been a formal monarchy, but importance of the temple in daily life of citizens was great in its early years. It may, therefore, have provided a stabilizing social network that operated independent of a titular king, gradually being replaced as commercial interests assumed day-to-day functioning of city life. As for sharing of provisions and other essentials, it is one thing for a society to be egalitarian when there is little to distribute, as in small hunter-gatherer groups. The distribution is by personal effort and the survival of a small group is likely to be affected by the disability of one or a few members. But if the redistribution is overseen by the contributors, a voluntary agreement on distribution needs to be reached. This is more likely to have occurred within a commercial network, although if the population involved sought its own arrangements for storage and distribution of commodities, the functional system might then have been a form of corporatism. Among the specializations there should have been medical practitioners serving the central and peripheral populations during the period discussed here. A few centuries later, when the temples had become fully secularized, the fee for the *azu* is mentioned in the *Laws of Ur-Nammu*. In earlier centuries, therefore, the earlier *azu* must have been independent and perhaps free to form a network with other medical practitioners.

Life expectancy at this time in Uruk is not certain, but in the contemporary Bronze Age Sumerian city-state of Kish the age at death averaged 30 years for men and 28 years for women.⁷

B. Uruk and the early Sumerian medical works

⁵ “Heterarchy” and “corporatism,” defined on p. 21, are important concepts in the chapters to follow. There is also a recently described mechanism of social relations that springs from group interactions in which the groups have roughly equivalent prominence in the early stage of urbanization. It called a “settlement hierarchy” and it is proposed as the natural way intergroup adjustments take place as an enlarging population center that has had no prior experience with a leadership hierarchy becomes more complex and must deal with new goods and services needed by the evolving society.

⁶ There may be some equivalence with the early Minoan economy, which began to flourish about 2500 BC. See: Driessen, J., A Prepalatial Matrilinear Society, in *Back to the Beginning*, Oxford, 2012, I. Schoep, *et al.*, editors, chapter 12.

⁷ See: Rathbun, T. A., *A Study of the Physical Characteristics of the Ancient Inhabitants of Kish, Iraq*, Coconut Grove, 1975, p. 187.

The three famous works attributed to the civilization of Sumer include: (1) a tablet of fifteen medical prescriptions from the final phase (Ur III) of Sumerian dynastic rule *ca.* 2150 BC (a photograph can be found on p. 46 of volume 1 of this work), (2) the *Therapeutic Handbook*, also written about 2100 BC, and (3) the *Medical Treatise on Prognosis and Diagnosis*, an extensive work on general medicine that exists only in a 11th C BC copy. That copy, however, is thought to have been derived in part from a composition of the Old Babylonian period (19th-16th C BC). Furthermore, some of the text is linguistically attributed to the Ur III period, indicating that at least part of its content was much earlier and of Sumerian origin.⁸ Given the affinity of post-Sumerian cultures for Sumerian intellectual property, in conjunction with their limited ability to develop their own (the Amorite empire of the 20th to 16th C BC was considered primitive in the eyes of the conquered and had no written language of its own), it is possible that most of the rational clinical content of the *Medical Treatise on Prognosis and Diagnosis* was of Sumerian origin. Many cuneiform medical texts, when transcribed, distinguish Sumerian terms from Akkadian ones. This might indicate that their contents could be Akkadian but that certain technical terms in Sumerian were retained, just as Latin and Greek roots underlie many technical terms in modern medical texts. It is scholarly opinion, however, that documents with Sumerian terms tend to be from Sumerian originals. It is also relevant that incantation priests go unmentioned in Sumerian texts but ubiquitous thereafter.⁹

An important consideration is social stability during these several centuries. When Sargon the Akkadian won the battle of Uruk (*ca.* 2300 BC) the walls of the city were destroyed and much of the population fled to other Sumerian cities. Sargon proceeded to form an empire by military conquest. A previously symbiotic association between Sumerian and Akkadian peoples was disrupted as the Akkadian language was imposed in some areas. Wars near and distant were waged as the Akkadian Empire expanded, and at times of weakness chaotic conditions occurred in some Sumerian cities. After only 180 years of dominion, Akkadian rule was overthrown by the Gutians, considered at that time also a barbarous people. Again there was considerable destruction, principally of Akkadian society, and the Gutian presence was borne for almost 50 years. Then followed the period of Ur III (or third dynasty, 2112-2004 BC), which saw a resurgence of Sumerian hegemony by the king, Ur-Nammu, and at this time the law code of Ur-Nammu was written.¹⁰ It included several laws directed at medical practitioners, the purpose being to limit the size of payment for various surgical procedures. The son of Ur-Nammu carried on the legacy of his father by instituting a calendar, maintaining civic

⁸ *The Medical Treatise on Prognosis and Diagnosis* was compiled in the 11th C BC by the scholar Esagil-kin-apli, a non-physician. It contains Sumerian text as well as later additions, and the trend of the additions and alterations became progressively mystical over time. There is even controversy as to whether the diagnostic component, which reflects observational skill, was to be used as a guide for exorcism or for medical therapy. As the *Treatise* was directed at the *asipu*, the exorcist, it is proposed that primordial physicians, the Sumerian *azu*, was the source of the clinical observations, but that it was the *asipu*, the Akkadian exorcist who entered the medical scene in the late 3rd millennium, who became dominant over time, reflecting an unfortunate degradation of the medical practitioner that was effectively perpetuated by Esagil-kin-apli and his “innovative” interpretations of the texts. A convenient review of this complex sequence is available: McGrath, W., *The Diagnostic Series SA>GIG: Ancient Innovations and Adaptations*, a Master of Arts thesis from the Department of Near and Middle East Civilizations, University of Toronto, 2016.

⁹ Robson, E., *Mesopotamian Medicine and Religion: Current Debates, New Perspectives*, in *Religion Compass* 2/4 (2008): 455-483, 10.1111/j.1749-8171.2008.00082.x, p. 470.

¹⁰ See volume 1, p. 58, for more on the *Law Code of Ur-Nammu*.

archives, and developing a standing army. Sumerian writing and literary form were maintained despite the preceding two centuries of disruptive rule.

As the Akkadian reign lasted 180 years, the Gutian reign for 50 years, and the Ur III period lasted about 100 years, periods that began and ended with military conflict and during which the temples, fundamental in and unique to the existence of each city-state, were placed under central secular management, it is difficult to imagine how a group of medical practitioners could have not only formed a network for the purpose of improving their services to the public, but also would have compiled and authored their collective knowledge. Furthermore, the city of Uruk must have been badly damaged in the process of conquest, both in structure and population, and it is conceivable that, like ancient Miletos under the Persians, the destruction was sufficient to wipe out evidence of a nascent medical profession.¹¹

There are, however, mentions of Sumerian medical practitioners (the *azu*) in letters and documents from the early part of the 3rd millennium. The *azu* appears to have been a private citizen. Then a powerful negative force to medical progress appeared, for the Akkadians introduced into local medical practice the *asipu*, or exorcist, who would share, and over centuries ultimately replace, the traditional medical practitioner (*azu*). Relevant to this period is the *Code of Ur-Nammu* mentioned above, for it provides evidence that crafts and vocations like medicine had come under the control of the State. Significantly, its medical directives extended only to the *azu*, not the *asipu*.

Finally, there is evidence of a professional medical practice already existing in 2350 BC in Ebla, a hegemonic kingdom that was in communication with Sumerian city-states 550 miles distant. The finding of a room in a palace in ancient Ebla that was apparently reserved for herbs with medicinal value and in which their more active components could be extracted by boiling or perhaps even distillation in making salves and other medicaments is evidence that at least as early as 2400 BC there was enough information on their use to suggest professional management of medicinal therapeutics made from herbs.¹² The listing of contents thought to be for a medical practitioner's kit in Ebla would have been appropriate for a professional rather than a local empiricist, and a pharmaceutical tablet devoid of mysticism that mentions the *azu* has been uncovered, aspects of the text consistent with the Early Dynastic Period (2900-2350 BC).¹³

The events and items in the preceding paragraphs predate the Ur III period and support the contention that the wisdom found in the Sumerian pharmaceutical tablet, the *Therapeutic Manual*, and the *Medical Treatise on Prognosis and Diagnosis* was collected by Sumerian medical practitioners prior to the destructive era initiated by the Akkadians, *i.e.*, prior to 2350 BC. Perhaps Uruk was the home of that nascent medical profession, and, like Miletos, its evidence of a professional medical group or network being destroyed during the city's conquest. That there is a possibility of a much earlier date for Sumerian medical wisdom is supported by the aforementioned classic *Epic of Gilgamesh*. There is increasing scholarly agreement that Gilgamesh was not mythic, being in fact an early king of the 1st Dynasty of Uruk, dating to *ca.* 2800 BC. His mother in the mythological telling is Ninsun (also Ninisin or Gula), a goddess who included among her attributes the gift of

¹¹ See: Hamblin, W. J., *Warfare in the Ancient Near East to 1600 BC*, London, 2006, chapter 3.

¹² See: Wachter-Sarkady, C., *Consuming Plants. Archaeobotanical Samples from Royal Palace G and Building P4, in Ebla and Its Landscape*, Abingdon, 2013, Matthiae, P. and Marchetti, N, editors, chapter 23.

¹³ See: Fronzaroli, P., *A Pharmaceutical Text at Ebla (TM.75.G.1623)*, in *Zeitsch. F. Assyriologie*, 88:225-239, 1998.

healing, both medically and by incantation. In one description of Ninsun found in other writings she holds a scalpel and is identified as an *azu*, a physician. For the lowly *azu* to be associated with a deity by 2800 BC there must have been social recognition of effective medical practitioners for at least two or three preceding centuries. The (so far) earliest mention of the *azu* in cuneiform was also dated to this same period by Dr. Leonard Wooley.¹⁴ Although dating of the fragments and emendations to the *Epic of Gilgamesh* is an inexact science, there is some similarity between this “legendary” association of a superhuman king with medicine and (1) the polymath Vizier Imhotep of the Egyptian 3rd Dynasty (2650-2575 BC; see chapter 4), and (2) the Yellow Emperor of ancient China (ca. 2400 BC) and his superhuman feats that included the composition of the famed Chinese medical classic, *Huang Ti Nei Ching Su Wen* (see chapter 6).

A peripheral reason to consider the late 4th or early 3rd millennium as the source for the knowledge in the *Medical Treatise on Prognosis and Diagnosis* is that there clearly was contact and intellectual exchange between Sumer and Proto-Dynastic Egypt (Naqada III, 3300-3100 BC).¹⁵ The question has been raised as to whether medical wisdom from Sumer entered the intellectual realm of predynastic Egypt, centuries later reappearing in the Ebers and/or Smith papyri to be discussed in the next chapter. To have done so would suggest that Sumerian medical wisdom was already being acquired by medical practitioners during the Uruk III and Jemdet Nasr periods in Sumer, although this is not to say that the specific writings referred to above had their origin at that time.

C. Clinical assessment of Sumerian medical writings

The Sumerian pharmaceutical text, devoid of mysticism, offers a fleeting glimpse into medicine’s scientific past. It has been explicated by a prominent pharmacologist and thereby has revealed a convincing measure of technical knowledge and scientific process.¹⁶ The *Therapeutic Manual* also has been translated into English with an astute clinician’s help and is now known to contain much that is empirical and rational. But it is the *Medical Treatise on Prognosis and Diagnosis* that is the primary source of the clinical knowledge that has elicited admiration for the quality of Sumerian medicine.

It has been proposed that medical knowledge displayed in the *Medical Treatise on Diagnosis and Prognosis* was obtained through a gradual accretion of knowledge over centuries, from the Old Babylonian Period (1830-1531 BC) down to the 11th C BC, an ever-enlarging book of knowledge of tediously acquired observations somehow maintained by a central authority that collated it despite intervening years of war, famine, and natural catastrophe.¹⁷ This seems unlikely, for Near Eastern civilizations all had their

¹⁴ Cited by: Kramer, S. N., *The Sumerians: Their History, Culture, and Character*, Chicago, 1963, p. 99. The physician’s name was Lulu, presumably a prominent figure.

¹⁵ See: Rice, M., *Egypt’s Making: The Origin of Ancient Egypt 5000-2000 BC*, London, 2003, 2nd edition, chapter 2.

¹⁶ Webb, J. L., *The Oldest Medical Document*, Medical Library Association, 1956.

¹⁷ This is the expert opinion of Prof. Jo Ann Scurlock, the prominent historian and cuneiformist. See: Scurlock, J. A., and Andersen, B., *Diagnoses in Assyrian and Babylonian Medicine: Ancient Sources, Translations, and Modern Medical Analysis*, Urbana, 2005, p. 6. She contends the 11th C BC *Medical Treatise on Prognosis and Diagnosis*, being lengthy, did have an earlier origin, perhaps

own paths of conquest, and military ventures were common. A physician's organization that might preserve clinical wisdom of its members would have had a difficult existence given the incessant social disruptions. It is far more likely that the clinical foundation for the *Medical Treatise of Diagnosis and Prognosis* was a local Sumerian effort and was obtained at a specific time and over a fairly brief span, perhaps several generations, *i.e.*, 50-100 years. It may, of course, have been subsequently disassembled and then reassembled.

Excursus on *The Medical Treatise on Prognosis and Diagnosis*

It is not a purpose of this excursus, or indeed of the entire volume, to judge the accuracy of an ancient medical work by modern scientific knowledge. It is instead to determine the accuracy of the observations expressed in ancient medical writings as estimated by clinical techniques available to practitioners of any age and to identify those observations that must have resulted from repeated observation, *i.e.*, had what can be called scientific confirmation. If it so happens that a specific disease or disease process is identifiable, the value of that identification lies not in the correctness of the diagnosis but in inferences that can be drawn about the accuracy and relevance of the original clinical observations. For there is to be found the starting point for medical progress, one that is available to every age and every society. At that starting point and once an accurate observation has been made, inductive reasoning can be applied and the validity of the reasoning confirmed or not based on further observation. Once both variety and quantity of observations have been adequately acquired it becomes possible to opine on mechanisms and associations. From these ideas spring the recognition of syndromes and the consequences of treatment. Progress is under way. But the starting point lies always with an accurate initial clinical observation and the motivation to do something with that information.

Unfortunately, progress can be stopped at any point, be it by war, famine, directive, or loss of opportunity. If we wait for the stage whereby syndromes, named diseases, and

Old Babylonian, but was changed in "format and wording" and amended over the centuries with new observations continually added by generations of physicians. She provides examples that are considered uniquely Akkadian rather than Sumerian, and considers the recipient professional of the medical knowledge in the *Medical Treatise* to be the *asipu* rather than the *azu*. It may be, however, that just as Romans were to the ancient Greeks, the Akkadians were but excellent students. Furthermore, the conservative nature of the writing is shown by the finding of cuneiform copies as late as the 2nd C BC that retain recognizable features of the Diagnostic Series parts of the *Medical Treatise*, indicating that aspects of the original composition remained functional after 1500-2000 years. Dr. Robert Biggs commented that the wording of some Neo-Assyrian medical texts were exact copies of texts a thousand year older (see: Biggs, R. D., *Medicine, Surgery, and Public Health in Ancient Mesopotamia*, in *Civilization in the Ancient Near East*, J. M. Sasson, editor, New York, 1995). While undoubtedly new information was added at times, some of which might have been valid improvements, overall the course of the *Medical Treatise* was probably similar to that of the Ebers and Smith papyri in ancient Egypt: the 11th C BC version of the *Medical Treatise*, like the two 16th C BC Egyptian papyri, reflect sequential canonical versions of original writings made over a thousand years earlier. As for the *asipu* and *azu*, the present work champions quite different clinical roles for the two practitioners, the former being essentially an exorcist, the latter the true clinician.

optimal treatment have been identified we may be able to define how medical progress endured or ended, but we will have missed the opportunity of determining how it began. And the present volume is about its beginning. Although observations obtained from taking a medical history and performing a physical examination on a patient tend not to be complex, there are qualitative aspects of the procedures. Pulse-taking at various points of the body can be made complex as it was in ancient China, but the basic observation is a simple one. In contrast, the Hippocratic physician who 2,400 years ago identified the clinical evidence of pupillary muscle paralysis as a significant finding in a patient now known, with a high degree of certainty, to have had diphtheria made a much more keen observation.¹⁸

Just when the earliest steps in clinical medicine occurred in prehistoric times is impossible to say, for accurate oral tradition can travel through many human generations. But for such a prominent civilization as ancient Mesopotamia, generational characteristics, grouped into archeological phases, can provide a scholarly chronological backdrop against which early medicine appeared. Furthermore, those archeological phases are dated, which permits inferences about stability of the civilization. It takes only a few generations of medical practitioners to acquire a base of knowledge from which not only prognosis, but also effectiveness of treatments, can be extracted, and the “generations” of practitioners need not be familial. It is sufficient that they be in convenient periodic contact with each other to exchange experiences and ideas and to transmit the updated material to the next generation. Social stability for a century might be a reasonable minimum for a network of knowledgeable clinicians to form, acquire, and then transmit their combined observations in the form of a treatise. Clinical acumen of medical professionals is rapidly acquired in a stable social setting, but if average life expectancy, expressed as age at death, is about thirty-five years this places an additional limitation on the individual practitioner’s medical experience, especially as medical practitioners were not of an elite class and would have shared the universal workload of daily living, may have been subject to being impressed for military ventures, and would have contributed to the effort required for communal projects. Thus, the requirements for this are an adequate number of practitioners covering a sufficient population for their combined experience to permit reasonably accurate generalizations and clinical predictions, and sufficient time in the day to carry this out, just as do other crafts and trades.

As for a critique of the *Medical Treatise on Diagnosis and Prognosis* itself, a definitive and convincing translation and commentary has been published by Drs. Scurlock and Andersen.¹⁹ Clinical insight for the translation was therefore the work of a knowledgeable clinician, an Internist with a subspecialty of Infectious Disease, and it therefore is unnecessary to repeat here the abundance of empirical-rational elements that are found throughout the text, with the following exception.

¹⁸ See volume 1 of *The Natural State of Medical Practice*, p. 265ff, for a translation of a section on *The Cough of Perinthus* from the *Epidemics* of the Hippocratic Corpus.

¹⁹ Scurlock, J., and Andersen, B. R., *Diagnoses in Assyrian and Babylonian Medicine*, Chicago, 2005, p. 181.

A recent publication by one of the authors includes an additional description of what might be drainage of an empyema of the chest.²⁰ That translation, however, concludes that an incision is to be made at the level of the fourth rib from the top, although an earlier translation had specified the enumeration was to be from the bottom. As there are twelve ribs the fourth rib from the bottom would also be the ninth rib from the top. Anteriorly, of course, the fourth rib from the top overlies the heart, and the side of the empyema is not specified. But prior to the ready availability of ultrasound examination the usual site for needle insertion has been the eighth intercostal space (between the eighth and ninth rib) in the posterior axillary line, a level that would in most situations be performed safely on either side of the chest. Thus, unless examination of the chest wall by the ancient practitioner showed localized external evidence of internal inflammation as the spot to incise, just above the third rib *counting from the bottom* posteriorly would likely be the best place for an incision. If this were the thinking of the ancient practitioners who performed the procedure it would indeed be an amazing feat, for it must have been based on prior experience and anatomical knowledge of unexpected degree. The alternative, incising below the fourth rib from the top, would probably have been disastrous, inducing a pneumothorax or lacerating a large blood vessel, or at the least unproductive, because gravity causes free fluid to layer in the lower chest when the patient is upright. In either instance this is a notable example of medical progress. There is no mysticism implicated here.

End of excursus

D. Conclusion

There is abundant evidence of clinical competence in early Mesopotamian texts that could only have been acquired by a professional group over time, perhaps three or four generations in one productive century. It also would have required a preceding century or two for the first individual practitioners to appear and establish the notion that specialists in medical care were superior to the care provided by friends or family. The only question is to what early era they belong, for it may have been as early as the Late Uruk Period (3400-3100 BC). It would have been unlikely after 2400 BC, when city-states in Sumer began to lose their autonomy. For purposes of comparison of Sumer with other civilizations, Uruk at its peak (during the Jemdet Nasr phase, 3100-2900 BC) has

²⁰ Scurlock, J., *Sourcebook for Ancient Mesopotamian Medicine*, Atlanta, 2014, pp. 484-486. This is from the *Babylonisch-assyrische Medizin* version of the text (BAM 39), and it and the preceding footnote provide both transcription and translation of the pertinent sections. But as reviewed by Kinnier Wilson (*Diseases of Babylon: An Examination of Selected Texts*, in *J. Royal Soc. Med.*, 89:135-140, 1996), the incision was above the third rib from the bottom, *i.e.*, in the eighth intercostal space if counted from the top (there are twelve ribs). It was assumed, however, that the purpose, as pointed out by Scurlock, was to drain a liver abscess, whereas the associated pulmonary sounds and the apparent placement of a lead tube for drainage indicate the clinical problem was a pleural infection, a collection of pus called an empyema. In modern procedures care would be taken to avoid the blood vessels on the underside of the bottom of each rib. This extensive explication of management of empyema is provided because of the extraordinary implications attendant to the Scurlock translation.

been chosen as the archetypal Mesopotamian city-state where a nascent medical profession might have existed, for Uruk was the largest regional population center for the longest period and, as a religious center for much of Mesopotamia, it was relatively stable up to the time of its destruction. Miletos had some two or three centuries after its population reached 10,000 to develop a network of medical practitioners, which would be consistent with independent practitioners in Uruk appearing at roughly 3100 BC. The medical compilations may have occurred over the next two centuries.

The principle clinical writings of early Mesopotamian medicine of which excerpts are, directly or indirectly, extant, have now been reviewed in the context of prevailing culture and changes in ruling dynasties. Several points can be made about the nature of these texts. (1) Neither the earliest tablets, the *Therapeutic Manual*, dated to Ur III (ca. 2100 BC), nor a pharmacologic tablet containing fifteen medical prescriptions as presently published, has any supernatural connotations. (2) More complex in origin is the *Medical Treatise on Diagnosis and Prognosis*. From the Old Babylonian period (ca. 1600 BC) there are cuneiform tablets of an extensive work containing diagnostic and prognostic methods that were later compiled and substantially edited in the 11th C BC. The latter text includes much that is clinically perceptive, but it is also brimming with mysticism. (3) There is scholarly evidence that much of the *Therapeutic Manual* of Ur III and the *Medical Treatise on Diagnosis and Prognosis* share common features, the two texts seemingly part of a single work, or at least two works designed to complement each other. If this is so, then the original *Medical Treatise on Diagnosis and Prognosis* itself probably existed as early as the *Therapeutic Manual*. (4) The differences between the earlier and the 11th C BC edition of the *Medical Treatise of Diagnosis and Prognosis* need, however, to be explained. It is reasonable to infer that the mystical component is entirely a Neo-Assyrian attempt at emendation of an originally rational Sumerian work much as the earliest Ayurvedic tracts were greatly altered centuries later to accommodate Brahminic religious practices in India. Similarly, the earliest clinical medical tracts of ancient China were greatly altered centuries later to accommodate both acupuncture in the 1st C BC and the philosophy of Yin and Yang in the 3rd C BC. These points are discussed in the next two chapters.

It is proposed that the initial collection of medical wisdom was occurring in the predynastic period or 1st Uruk dynasty, roughly sometime between 3200-2700 BC, probably closer to the former date. The actual writing down of such a compilation might have occurred perhaps one or two centuries later. A weakening of egalitarian kinship ties and the lure of prosperity occurring in a rapidly growing population yet to be impeded by a coercive centralized bureaucratic governance would have been the optimal time for a group of medical practitioners to combine their knowledge and collate it. From this their knowledge would become the mainstay of rational medical wisdom that would find its way into later Babylonian and Assyrian medical treatises after being dramatically altered in the 11th C BC by the learned scribe, Esagil-kin-apli (for more information on the role of this scribe see *The Natural State of Medical Practice*, volume 1, p. 63).

Summary Table for Uruk:

STAGE – Bronze Age

POPULATION, LOCAL – 50,000 (2900 BC)

POPULATION, TOTAL – 1,000,000 (hegemony, not domination)

PRIMARY AREA – 2.3 square miles

URBAN DENSITY – 33 persons per acre

PRODUCTION – initially food surplus from irrigation, with subsequent commercial trading ventures producing a burgeoning economy and population growth.

GOVERNANCE – practical everyday governance during the period of interest was initially one of corporatism which then evolved into a commercially-based heterarchy, with subsequent centralization, secularization of temples, and strengthening of kingly authority.

EGALITARIAN ARCHEOLOGY - no

PROMINENT EGALITARIAN KINSHIPS – no, nested

WRITING – yes

DISTANT TRADE – yes

SPECIALIZATION – yes

MONUMENTAL STRUCTURES – yes, temples

DENOUEMENT – declined after annexation by the Akkadian Empire (2350 BC)

MEDICINE – yes, the *azu*

FORMATIVE PERIOD – 900 years

FLORUIT – 700 years (the Jemdet Nasr and early dynastic periods: 3100 to 2400 BC)

CITY-STATE – yes

MEAN LIFE EXPECTANCY – 31 years (Kish)

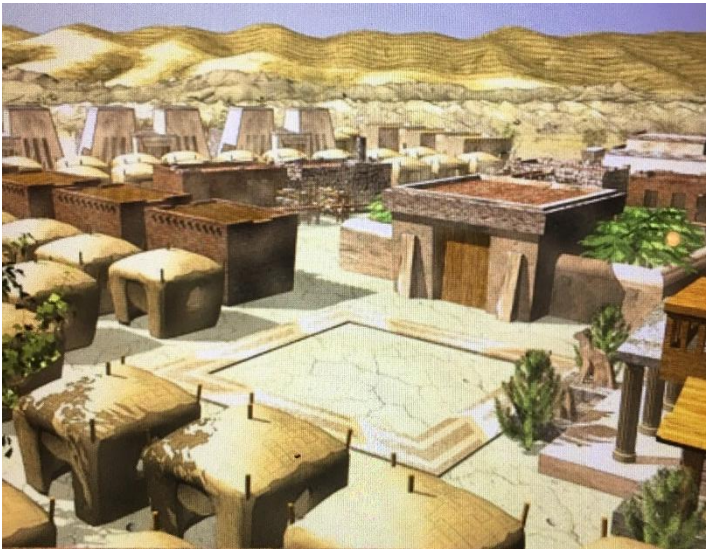
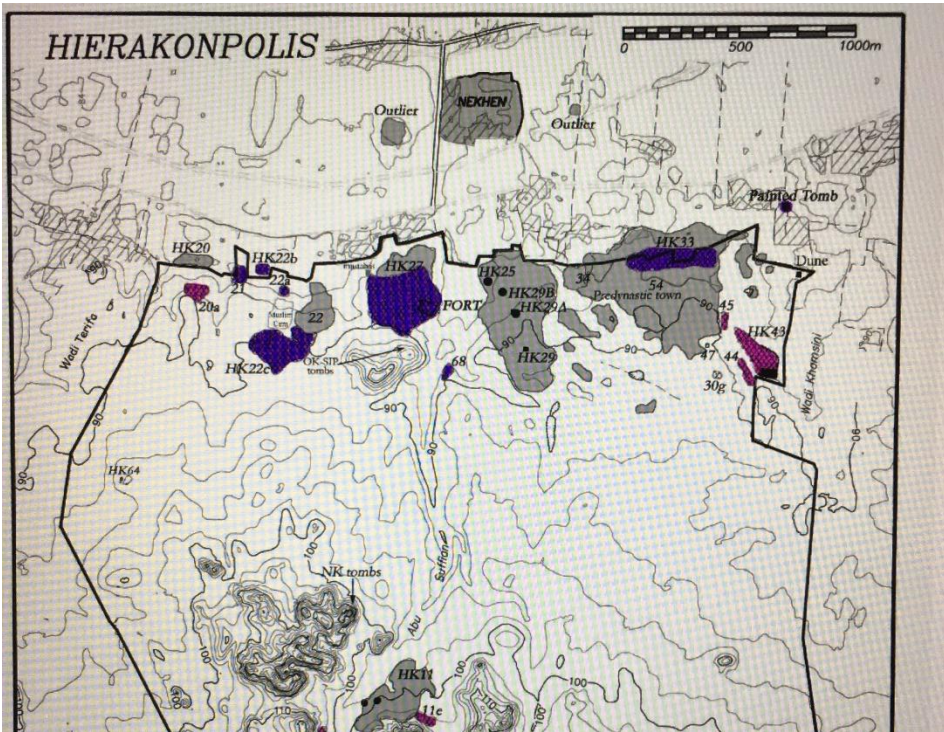


Fig. 3: (Top) Topographical map of predynastic Hierakonpolis and surrounding region showing the locations and sizes of a predynastic town and, about a kilometer away, of Nekhen (Hierakonpolis), as well as locations of predynastic cemeteries. This photograph was provided by Dr. Renee Friedman for *Hierakonpolis Online* as displayed by Egitalloyd Travel Egypt. (Bottom) Artistic rendering of the city in the 3rd millennium BC.

CHAPTER FOUR

NILE RIVER VALLEY CIVILIZATION

“Returning to the subject of Egyptian medicine, empirical medicine may have evolved to the rational stage in the predynastic period and the early dynasties, if modern scholarship is correct about the source of the information found in the Ebers and Smith papyri.”

The Natural State of Medical Practice, vol. 1, p. 83

This chapter places the original compositions that would be transcribed *ca.* 1550 BC and subsequently known as the Ebers and Smith medical papyri to the Proto-Dynastic or Early Dynastic periods of Egyptian history. Apart from distinctive linguistic differences, reasons for this are presented, the principal one being the status of society adjacent to the unification of Egypt under the Pharaohs (3085 BC), a period noted for flourishing commercial manufacture, population growth, and prosperity. As the largest urban area along the Nile at this time, the city-state of Hierakonpolis is selected as the most likely site for the acquisition and collation of medical wisdom that is present in the two famous medical papyri. A clinical appraisal of some of their contents confirms their objective nature and supports the notion of a collaborative effort of a group of medical practitioners in the collecting and recording of their findings. Both writing and medical progress occur independently but contemporaneously as a consequence of prosperity and vigorous commercial activity, as they did in ancient Sumer. The dissimilarity between Sumerian cuneiform and Egyptian hieroglyphic/hieratic clinical descriptions does not support the notion that Egyptian medicine was an importation from the Mesopotamian civilization.

- A. Dating ancient Egyptian medical writings
- B. Hierakonpolis
- C. Clinical assessment of the *Papyrus Ebers* and the *Smith Papyrus*
- D. Conclusion

A. Dating ancient Egyptian medical writings

The history of ancient Egyptian medicine is largely based on two papyrus manuscripts, the *Papyrus Ebers* representing internal medicine and the *Smith Papyrus* representing surgery. The date for their production is approximately 1550 BC, although it is scholarly opinion that they are copies of works composed many centuries earlier. One estimate suggests a date as early as 3400 BC for *Papyrus Ebers* and 3000 BC for the *Smith Papyrus*, although some authorities feel the latter preceded *Papyrus Ebers*. Archeological finds support the following approximate sequence of major societal shifts in ancient Egypt that surround the dates of the presumed first composition of the two works:

- 6000 BC – beginning of rapid immigration back into Egypt of a people who had previously moved to the Near East because of hostile environmental changes.
- 3800-3085 BC – the Naqada culture
- 3085-2686 BC – Early Dynastic Period (1st and 2nd Dynasties) initiated by unification of Upper and Lower Egypt

Narrowing down the proposed dates of the original medical compositions, or at least the period in which the clinical observations were made, it is argued herein that the social conditions of the later Naqada culture or early dynastic period were the most appropriate times for a nascent medical profession. Naqada culture has been divided into three periods, then evolving, within chronological uncertainties, into the 1st Dynasty:

Naqada I – 3800-3500 BC

Naqada II – 3500-3300 BC (a few villages began urbanization, with populations as high as 5000)

Naqada III (Proto-Dynastic) – 3300-3085 BC (lasted *ca.* 215 years)

1st Dynasty – 3085-2890 BC (lasted *ca.* 195 years)

From these sequences, which to non-specialists seem reasonably consistent, attention can focus on the social period and its characteristics, more than the dates themselves, most likely to have been associated with, and conducive to, the wisdom found in the two papyri.

As background, ancient Egypt is for the most part considered to have been throughout its prehistory and early history a rural and relatively peaceful region. As late as the Old Kingdom (2686-2181 BC) the estimated total population of Egypt was no more than about one million contained within a cultivatable agricultural region of only 15,000 square miles, little larger than the state of Maryland (the present population of Maryland is about six million). There is little evidence that early population centers had defensive construction. Consistent with this, it is generally held that there were no autonomous archaic Egyptian city-states, suggesting that in their earliest times the various population centers were so diminutive and culturally similar that they readily grouped together in provinces rather than contesting territory. Perhaps the necessity of communal efforts to control the flow of the Nile river was at the heart of this apparently benign early relation.

But beginning with the Naqada period, perhaps as a response to a growing population, scattered small villages began to coalesce and cluster around centrally located larger settlements. It has been proposed that these represented chiefdoms. Implied in this term is that the underlying society was partitioned along the lines of egalitarian kinships, as defined on p. 21. It was at this time that distant trade and commercial development are first noted. Society became more complex as the central locations began to amass excess agricultural production, perhaps to sustain the general population through difficult times.¹ This has been termed a redistributive economy, a management method whereby that which was available or abundant in one community could be made available to others that were deficient. Population continued to increase and to become more concentrated, now sometimes within walls, as small communities disappeared and the central administrative settlements merged to become divisions of larger organizational strategies that had in their turn more powerful central bureaucracies. It is thought that the population increase of the centers was primarily from immigration from peripheral settlements rather than proliferation. Evidence of conflict now became common as the middle of the Naqada

¹ A relatively new perspective is that of Dr. Ian Hodder, who, from his studies of the ancient community of Catalhoyuk (see p. 163), thinks some prehistoric settlements were not the consequence of herding, agriculture, and resulting sedentism. They were, instead, religious or ritual centers that attracted regional nomadic groups, those centers then becoming agricultural to support the increasing number of workers and visitors; *i.e.*, their decision to institute agricultural techniques was the result, not the cause, of settlements. Regardless of origin, it is among stable settled societies that a nascent medical profession would later develop.

period approached. Nevertheless, a hieroglyphic/hieratic writing was developed in response to commercial development, a remarkable degree of specialization in crafts and trades appeared, fermented beverages were mass-produced, remarkable art forms were created, elite cemeteries were established, and a multi-tiered stratified society emerged, presumably essential to accomplishing large-scale tasks that were beginning to appear.² A few population centers now developed what might be termed true cities, one being Hierakonpolis, to be discussed below. It might be asked if these large administrative units would be considered city-states, to which most scholars would answer in the negative. But, as this early coalescence does not seem to have been a matter of conquest, for present purposes they will be considered to have evolved in response to commercial ventures and needs, thereby autonomously developing into city-states as defined on p. 21. Ultimately there evolved at the end of the Naqada period, and often out of conflict, a unified Egypt. Throughout this period the delta region remained agricultural and organizationally slower in evolution. A concurrent phenomenon, as concluded from examination of royal cemeteries of the late Naqada period, was “stark social differences” within the population, a forecast of the profound authoritarian governance that would follow. In support of this dismal outlook is the (limited) archeological evidence that estimate a mean life span of peasants of 30 years, whereas the upper class more often reached ages of 50-60. Childhood mortality is estimated at about 50% of those under five years.³

B. Hierakonpolis

Egyptian legend places the origin of medicine and the first named physician, Imhotep, in the 3rd Dynasty (2686-2613 BC).⁴ For present purposes, however, the late Naqada city of Hierakonpolis will be used as the most likely locale for those early medical professionals who could have compiled the medical experience provided in the Ebers and Smith papyri. As the dominant city of Proto-Dynastic (Naqada III period) and early Dynastic Egypt, Hierakonpolis was located in Upper Egypt beyond the Wadi Hammamat, the principle and shortest trade route between the Nile and coastal trading communities that bordered the Red Sea. Its location permitted ready access to gold mining further east. At its peak Hierakonpolis is thought to have been the home of about 10,000 people, but it held bureaucratic sway throughout the south of Upper Egypt and into neighboring Nubia. A rough estimate of the population in that region is 30 percent of the total Egyptian population of perhaps 350,000, or in the range of 100,000. Hieroglyphic/hieratic writing is first found there, probably a necessary invention in response to the development of

² Much of the information in this paragraph is adapted from: *Before the Pyramids*, Chicago, 2011, E. Teeter, editor, especially chapter three by Renee Friedman and chapter four by Branislav Andelkovic.

³ A recent study of a non-elite cemetery at Hierakonpolis concluded that the age at death of those who reached 15 years of age was, during the late Naqada period, 30.6 years for men and 35.1 years for women. See: Batey, E. K., *Population Dynamics in Predynastic Upper Egypt: Paleodemography of Cemetery HK43 at Hierakonpolis*, a Ph.D. thesis, Univ. of Arkansas (Fayetteville), 2012; <http://scholarworks.uark.edu/edt/565>.

⁴ The irrelevance of Imhotep to the history of medicine is discussed in *The Natural State of Medical Practice*, volume 1, pp. 71, 72. Nevertheless, the legendary/mythological attribution of the profession of medicine to a recognized 3rd Dynasty notable supports the idea that the event of a medical profession, if not the inventor, was not only wrought by this early date, ca. 2700 BC, but had developed to the point of being admired.

commercial interests which included mass production of ceramics, importation of wood, precious metals, and significant interactions with Mesopotamian cities, especially Uruk.⁵ Jewelry, trade in ivory, and other ventures as noted led to development of specialization of crafts. Hierakonpolis was the administrative center for the region and burial site of Narmer, probably the first Pharaoh of a united Egypt (3085 BC). In Egypt of the Proto-Dynastic period, Dr. Juan Castillos, a noted authority on predynastic Egypt, has concluded an important social characteristic of the period was that “Kinship ties [were] played down and largely replaced by other types of allegiance to semi-divine king ruling over a large territory.”⁶

The archeological structure of Hierakonpolis is said to encompass in close proximity both the ancient city and an even more ancient, and larger, settlement area. Its development over centuries as described in the preceding paragraph has received more scholarly attention than other areas and has provided many of the findings that define the transition over time of predynastic Egypt. But with unification of Egypt ca. 3085 BC and a change of in the course of the local Nile, its significance decreased as the center of power moved to the as yet undiscovered city of Thinis. Thereafter, Hierakonpolis became primarily a religious center.

Earlier in the Proto-Dynastic era the towns and small cities must have had their own medical practitioners, for practical management of abscesses, dental disease, and trauma demands attention in any era, and the person who learns how to manage them would be appreciated by the local community. Although they might have been appreciated, they may not have been paid, for they would have been merely common folk who had a local reputation for such nasty work as medical practitioners often must do. But with prosperity things could change. After transition to dynastic rule, a unified Egypt during the 1st and 2nd dynasties has been characterized as a time when specialization began to occur among plebeians, and there was a period of “great creativity and inventiveness.”⁷ Certainly one of those specializations could have represented medical practitioners, plebeians able to devote more of their time to medical care. These are the people who would have provided the clinical wisdom present in the Ebers and Smith papyri.

Religious practices in ancient Egypt included a variety of deities, the deity varying from city to city.⁸ Shamanism is not a recognized feature of the mystical life of ancient Egypt, although it has been pointed out that pharaohs, like shamans, were viewed as mediators between the people and the after-life, an interesting analogy that may be correct. It is unexpected that shamanism, which is a very individualistic enterprise and which has even been characterized as entrepreneurial, would be affiliated with small egalitarian societies that have no ability or no opportunity to improve their lot by exploiting individual initiatives. Yet, one reason for the shaman’s success in egalitarian societies everywhere may reside in the unique and unrestrained practitioner and his or her relative freedom from social controls. The people were in awe of such freedom of action, something they forbade each other. Even the elite and the chief feared the shaman. In

⁵ See: Meza, A., *Ancient Egypt before Writing: From Markings to Hieroglyphs*, XLibris Corp., 2012. This book contains an extensive account of evidence supporting both a close commercial effort between predynastic Egypt and Mesopotamia and a significant Mesopotamian influence on Egyptian culture.

⁶ Castillos, J. J., *The Development and Nature of Inequality in Early Egypt*, in *British Museum Studies in Ancient Egypt and Sudan*, 13:73-81, 2009.

⁷ See: Trigger, B., et al., *Ancient Egypt: A Social History*, Cambridge, 1983, p. 66.

⁸ See: David, R., *Religion and Magic in Ancient Egypt*, London, 2002, chapter 2.

this sense the shaman may have satisfied an egalitarian people's unstated desire for leadership and for a power broker that could override an intrinsically fractious community. In contrast, the priesthood, which would tend to smooth out differences between people and to maintain a ritualistic and predictable similitude for the larger group, was the friend of the leaders. In the egalitarian environment, therefore, it was an entrepreneur who now held the individuality card under which the people were socially managed. The shaman and strong leader would each have a monopoly on their positions, but the great power of a shamanistic pharaoh would lay in his or her combination of the two.

Traditional shamanism, as discussed in volume 1 of *The Natural State of Medical Practice*, p. 39ff, was not a competitor of empiric medical practitioners in those early years. In the days prior to the development of the pantheon of Egyptian deities and prior to the formal Egyptian priesthood of the Old Kingdom (4th Dynasty, a period of great pyramid building), individual medical practitioners would have had little or no official association with or position in a central government. As local members of small town and city society they would have received no special attention or remembrance, and, if the later history of medicine is any example, they came from the lower end of the socioeconomic scale within their communities. The point to be made is that this may have been a time, *i.e.*, during late Proto-Dynastic or Early Dynastic periods, when empiric observations and decisions could be made by plebeians who chose to form a collegial network and focus their efforts on managing trauma and illness within their communities, rather than in the 3rd Dynasty, by which time the shamanistic façade of authoritarian pharaonic rule had become indelible.⁹

C. Clinical assessment of *Papyrus Ebers* and the *Smith Papyrus*

⁹ Despite suggestions that in ancient shamanism is found the origin of religious feelings and the easing of physical stresses via hypnotic "altered states of consciousness" that might give a sick patient some survival advantage, classic histories of medicine, including those of Baas (*Outlines of the History of Medicine*, 1889), Nutton (*Ancient Medicine*, London, 2004), and Edelstein (*Ancient Medicine*, Baltimore, 1967), do not even mention the term "shamanism," confirming its insignificance in the history of medicine. A prominent physician, Dr. William Corlett, in his book *The Medicine Man of the American Indian and His Cultural Background* (Springfield, 1935), while providing a beautifully sympathetic (unjustifiably so, and racially demeaning as well) picture of the North American shaman, contains absolutely nothing of medical value, the few attempts at "treatment" often being grotesque. Also see: McClenon, J., *Shamanic Healing, Human Evolution and the Origin of Religion*, in *J. Scientific Study of Religion*, 36:345-354, 1997. This is in part based on a misrepresentation of the shaman's role, however, for the goal of the shaman was to control events. The fear and awe some tribal societies had for their shaman was but a shadow of the prodigious power surrounding the pharaohs. As the intermediary between the people and the gods, unlimited power was granted to pharaohs in all aspects of Egyptian life. While this was not implemented via drug-induced trance, other altered states of consciousness, or psychotic behavior, the mystical role of the shaman provided the same veneer of mystique surrounding and protecting the pharaoh. This shamanistic role of the pharaoh was not in competition with or shared with medical practitioners, but in exercising his powers over the people medical practitioners would have been swept up with all other components in society and used to the benefit of the ruling class. Thus, while the priest, like the shaman, had no reason to display other than benign neglect toward medical practitioners, the pharaoh's wide-ranging power in ancient Egypt made priests of his practitioners.

Assuming the clinical findings in the Ebers and Smith papyri were not solely the product of an oral tradition of medicine, either the Proto-Dynastic (3300-3085 BC) or Early Dynastic Egypt (3085-2700 BC) was the probable time of at least some and perhaps most of the clinical observations that led to the compositions. The location of the compiler(s) of those observations may have been Heirakonpolis, for it had the largest concentration of people, but there is no reason that a network of practitioners could not have existed in many of the peripheral settlements, periodically exchanging ideas and observations. Remarkably, however, there is no documentation of any medical practitioner or medical instruments so far discovered from either the Proto-Dynastic or the Early Dynastic periods except for mention by the 3rd C BC historian, Manetho, of the pharaoh Athothis and the *Papyrus Ebers* allusion to the pharaoh, Den, both of the 1st Dynasty, both being discussed in more detail on pp. 69-70.

To better appreciate the significance of the work of ancient Egyptian practitioners a limited review of the texts of *Papyrus Ebers* and the *Smith Papyrus* in modern context will reveal the careful observations that underlie their clinical descriptions. A lengthy exposition is unnecessary as decades of focused attention have led to their popularity in the modern mind, but some mention will be made of modern analyses. It is important that these works be shown to be the result of a concerted group effort.

Excursus on *Papyrus Ebers* and the *Smith Papyrus*

The two most important of the ten ancient Egyptian papyri that contain medical information are the Ebers and the Smith papyri, both from the 16th C BC, but both with their initial composition dated to the Proto-Dynastic or the Early Dynastic periods, sometime between 3300-2700 BC. Of the remaining eight papyri, much of their medical content can be traced to the Ebers papyrus and therefore of little help in determining the origin of its knowledge. But who collected and collated the original wisdom, and what was its nature? The medical knowledge in the Ebers and Smith papyri has been repeatedly assessed over the past century, and some claim ancient Egyptian medicine to be the foundation of Western medicine. Is that knowledge so unique, sufficiently rational and scientific, and widespread over time to justify that claim?

The complete hieratic texts of the Ebers and Smith papyri have been edited with commentary several times in the past by scholars but not by clinical physicians. The texts upon which commentary apropos ancient Chinese and Indian classics of medicine are based are readable to a limited extent without special training. In contrast, scholarly interpretation of hieroglyphic and hieratic texts, like cuneiform from Mesopotamia, requires familiarity with a form of writing that is the domain of few people. Fortunately, there has been interest by some physicians in assessing the role of their profession in the early papyri, both in literal translations and idiomatic expressions. Their specialized knowledge, often with the help of linguistic scholars, has provided meaningful interpretations of otherwise incomprehensible translations. It is for this reason that this Excursus will review some modern physicians' perspectives of ancient wisdom as presented in the Ebers and Smith papyri.

The *Smith Papyrus* and Neurosurgery:¹⁰

The text of this papyrus contains 48 descriptions of injuries to the head, arms, chest, and spine. One new perspective is an interpretation of the *Smith papyrus* that posits it comprises case studies that were not from actual patients, instead being idealized patients used to point out instructive clinical features to its readers. The authors of this theory point out that the clinical acuity present in descriptions of orthopedic injury in the manuscript is remarkable given the early state of the written language of the time. These opinions are supported by a review of the examination signs described in the text, *i.e.*, physical examination findings rather than a medical history provided by the patient, although it is apparent in many of the descriptions that the patient would have been in no condition to provide any information whatsoever. Those physical findings include:

- a. Nuchal rigidity, an involuntary (reflexive) rigidity of the neck that resists flexion, results from blood in the cerebrospinal fluid or inflammation of the meninges as seen in meningitis. It is here differentiated from simple pain in the neck from local trauma in which, even though painful, the neck can be rotated and flexed (usually not a wise thing to do!).
- b. A forerunner of the Lasegue straight leg-raising test is described in a lumbar spine injury.
- c. Description differentiating a vertebral compression fracture from a “burst” fracture, the latter being a vertebral compression fracture with neurological deficits.
- d. Knowledge that neurological complications from a cord injury depends on the level of the injury, a concept that implies an anatomical continuum of central control of peripheral functions.
- e. Knowledge of anatomical changes resulting from axial trauma to the spinal cord, something unlikely to have been known without information obtained from dissection.
- f. Knowledge that vertebral injury could cause peripheral sensory and motor deficits. As open bone-against-bone injuries, commonly encountered in armed conflict, produced no such deficits elsewhere, it is implied that the spinal cord, rather than the vertebral bones, was involved in neurological function. But only in two cases were spinal cord deficits described, which implies that if cord damage, as opposed to vertebral damage, was evident the case was hopeless and there was no reason to teach that type of information to others if nothing could be done.

These six points of clinical deduction were made from six of the forty-eight cases described in the *Smith Papyrus*. That the person(s) who first made them was a keen and logical observer is without question, and that the selection of the cases as demonstrating six distinctive injuries was based on prior experience with similar injuries is also beyond doubt. Medical colleagues involved in translations such as this are to be commended for permitting modern readers to appreciate the subtleties of clinical examination that were apparent to those ancient practitioners but unapparent in most translations that followed.

¹⁰ See: van Middendorp, J. J., Sanchez, G. M., and Burridge, A. L., *The Edwin Smith papyrus: a clinical reappraisal of the oldest known document on spinal injuries*, in *Eur. Spine J.*, 19:1815-1823, 2010.

The Smith Papyrus and wound management:

It is to Dr. Majno and his familiarity with hieroglyphs and their etymology that much is owed regarding meaningful clinical translations of ancient papyri, and the following is based on his interpretation of Case 47 from the Smith Papyrus.¹¹

- a. The patient had a wounded shoulder and a sequence is described for its management. Although washing the wound is not described, perhaps that had already been performed, for the next recommendation was to suture the wound. This is interesting, for in the recent past a “dirty” wound, one received in an unsanitary environment or by an unsanitary device, has, after superficial cleaning, often been allowed to heal without suturing, a slow process called “healing by secondary intention.” This requires careful nursing attention, but the fear is that a focus of infection might be enclosed within the wound if it is sutured. But it has been stated that in every war surgeons quickly relearn that prompt cleansing and suturing even “dirty” wounds is often quite satisfactory, and so apparently thought the practitioner who wrote about Case 47; sew up the wound, apply a grease and honey mixture, and it may well heal satisfactorily.
- b. On repeat examination if the sutures are loose, tighten them and apply more salve, and here the practitioner says that, as the swelling is decreasing, the procedure he is recommending can be applied anywhere on the body, not just the shoulder.
- c. If, on the next examination the wound is inflamed and the patient has a fever, the practitioner does not bind (close) the wound, for enclosed infections are, for the most part, much more dangerous than draining ones. Thus the general approach to this patient has been sound.
- d. Another interesting aspect of this Case is the definition of “inflamed,” for the ancient practitioner had no term for the redness, swelling, pain, and heat associated with infection, but Dr. Majno has convincingly described the hieroglyphic signs meaning “heat” in context. With this the implied terms of local heat (from inflammation) and generalized heat (fever) are appropriate translations.

The Ebers Papyrus and “cutting:”

Although the Ebers Papyrus is primarily a pre-Iron Age therapeutic composition and contains almost 800 recipes, it has snippets of clinical work that help to assign it to an empirical-rational document. One is the use of “knives” for making incisions. Several are mentioned, and Dr. Majno has convincingly pointed out that one form of knife was made from papyrus reeds, and those who have suffered a paper cut will recall the strength of thin and seemingly fragile pages of paper. But beyond this, Dr. Majno mentions three types of swellings conducive to incision:

¹¹ See: Majno, G., *The Healing Hand*, Cambridge (MA), 1975, p.97-99.

- a. Paragraph 871 probably describes an abscess and is to be incised and drained, with care being taken to avoid cutting any nearby blood vessels.
- b. Paragraph 872 suggests a vascular tumor that can be excised if the knife is hot, which implies that the anticipated bleeding will require a hot knife. Proteins coagulate at about 60 degrees C (140 degrees F), so heating a knife made from a papyrus reed could have been heated to boiling (100 degrees C, 212 degrees F; modern paper ignites at 200 degrees C [390 degrees F] or a bit higher) and perhaps helped minimize bleeding or oozing from an incision.¹²
- c. Paragraph 876 describes a swelling where a physical blow had occurred. If bleeding occurred a level of heating approaching cautery was necessary, and a “fire-drill” was used, presumably a slender piece of wood heated by friction.
- d. Dr. Majno also notes that the wounds in the Smith Papyrus were generally not infected, at least initially, whereas in the Ebers Papyrus the lesions probably were all infected. As such, there often would have been local collections of pus that required incision and drainage if they did not drain themselves.
- e. In Paragraph 522 a section on assisting healing of a wound restates the importance of maintaining drainage until the wound has healed, but it also mentions the use of “spoiled” bread to assist if the purulent drainage is excessive.¹³ Perhaps this was to help dry the wound, but moldy bread has at times been suggested as a source of salutary antibiotic activity.
- f. Finally, some swellings could be removed cleanly whereas others required care so that retained material would not cause a recurrence of the swelling. In other words, it was important to allow an infected wound to completely drain, or the infection would flare up again.

All these points confirm a practical empirical approach to management of visible lesions of various types, including a probable umbilical hernia and the removal of a Guinea worm.¹⁴ That instructions would not only be given on handling such patients but that they would be recorded is proof sufficient for the existence of collaborating medical professionals in that distant age.

Papyrus Ebers and the vascular system:

In paragraphs 854 and 856 are found descriptions of a distribution system extending throughout the body. At the center of the system was the heart. Pulsations of the heart were recognized and could be felt at different sites around the body. Confusion arises in this interpretation because the ancient Egyptian practitioner(s) who inferred this

¹² Bamboo knives were common in ancient southeast Asia.

¹³ The potential for some penicillin-like activity from moldy food has received attention for topical use (see *The Natural State of Medical Practice*, volume 1, p. 498f). The Egyptians also used honey and copper salts on wounds, also significant sources of antibiotic activity. There is also evidence that herbal “wines” were available in the late Naqada period, which suggests that alcohol extraction might have been used to obtain more active principals from botanicals. (McGovern, P. E., Mirzoian, A., and Hall, G. R., *Ancient Egyptian Herbal Wines*, in *Proc. Nat. Acad. Sci.*, 106:7361-7366.)

¹⁴ See: Strouhal, E., Vachala, B., and Vymazalova, H., *The Medicine of the Ancient Egyptians*, New York, 2014, especially chapter 3, *Ancient Egyptian Surgery*, which updates thinking on this section of *Papyrus Ebers*.

distribution system could not, as did not the early Hippocratic physicians centuries later, differentiate between cord-like (tendons, nerves) and tube-like structures (blood vessels) that were found throughout the body. Assuming this to be the case the term “pulse/vessel” will be used here to include (1) palpable pulsations and (2) cord- or tube-like structures that were known to exist but were not palpable and therefore not susceptible to pulse-taking. A comprehensive review of anatomical descriptions in the Papyrus Ebers is provided by Dr. John Nunn, an accomplished physician. A slight modification of the opinions expressed in that work is provided here:¹⁵

- a. There were three pulses/vessels in each arm: the radial pulse at the wrist, the brachial pulse at the elbow, and the axillary pulse in the axilla.
- b. There were three pulses in each leg: the femoral pulse at the groin, the popliteal pulse in back of the knee, and the dorsalis pedis pulse on the dorsum of the foot. As the popliteal pulse is not so obvious the third pulse could have been the posterior tibial pulse on the medial aspect of the ankle.
- c. There were four pulses of the temple: the superficial temporal arterial pulse is noticeable in two places, immediately in front of the ear and on the forehead lateral to the eye. As this would be bilateral the total would be four.
- d. There are two pulses for the nose that carry blood and two that carry mucus: the dorsal nasal artery is bilateral and felt on the bridge of the nose near the inner angle of the eye. It is possible that the other pair was thought to be internal and the cause of the common nosebleed. The responsible area is now called Kiesselbach’s plexus, wherein lies an anastomosis of five small arteries that would not have been identifiable. That plexus is bilateral, one on each side of the nasal septum. If the two thought to be carrying blood represented the latter, the palpable ones (the dorsal nasal arteries) near the bridge of the nose may have been those postulated to carry mucus.
- e. The two pulses referable to the bladder are thought to have been ureters, the tube-like structures that carry urine from the kidneys to the bladder.
- f. The two pulses to the testes are thought to have been the bilateral spermatic cords. (These are fully palpable but do not pulsate.)
- g. The four pulses to the liver: the bile duct, hepatic artery, portal vein and hepatic vein. These would have been identified easily in the butchering of animals or in mummification of humans at the time the liver was removed. As the incision was not long and usually on the left side, the four tube-like structures would have been identifiable on the removed wedges of liver. Although not routinely performed until the dynastic period, organ removal was occasionally practiced as early as 4,000 BC.
- h. There are four pulses for the spleen and lungs: the spleen has two vessels, the splenic artery and vein; the lung has the trachea which splits into two mainstem bronchi, one to each lung.
- i. There are two pulses for each ear: the external ear canal and the Eustachian tube.

Although the association of pulse with vessels other than arteries indicates gross ignorance of the physiology involved, the mere palpation of peripheral pulses in some of the sites noted above indicate an element of assiduity in observation and examination that

¹⁵ See: Nunn, J. F., *Ancient Egyptian Medicine*, Norman (OK), 2005, p. 48.

would not have been undertaken, and certainly not recorded, by a layman. Again, this is evidence of an early professional at work, but not merely one professional. It was the work of a group of professional practitioners who maintained a collegial network.

In conclusion, those ancient Egyptian writings that have come down to us may not have laid out a scheme of physiology, anatomy, and physical examination that would lead to modern medical discovery, but it was a solid commencement by persons who were capable of improving their original work. That their observations would never be built upon by others was not a fault of theirs.

End of excursus

D. Conclusion

What argument can be made that would place the original compositions of the Ebers and Smith papyri (or the fragments from which the later copies would be made) after the middle Naqada period and before the third Dynasty of a unified Egypt, *i.e.*, between 3300 and 2700 BC. It is unlikely that an earlier date was the source, for settlements were small and scattered. Early Naqada village populations ranged from 50-250. Medical care may have been in the hands of a family member or advice from a neighbor in populations too small to support other than perhaps an occasional itinerant practitioner. By the middle Naqada period, however, several large towns existed with populations as high as 5,000, although some suggest the increase in size of a few towns reflected regional immigration rather than an overall internal population growth. There must have been a few local empirical practitioners and midwives at this time, but an important factor in the settlements at this stage was egalitarian kinship of smaller family groups. The obligations and assigned status of kinship relations would have made it unlikely that someone with a modicum of medical experience or interest would be assigned to anything other than traditional duties, not to mention a network of them that could exchange and collate ideas and then write them down.

It is also unlikely that compilation/composition occurred after the 2nd Dynasty because, after the uniting of Upper and Lower Egypt, the 3rd Dynasty pharaoh, Djoser, initiated monumental projects that included fortifications, pyramids as burial monuments with sacrifice of humans and animal, and military conquests into the Sinai that indicate profound control over most of the Egyptian population by a sizeable elite class and military. Although Imhotep is a legendary physician of the 3rd Dynasty who was declared a demigod during the New Kingdom, there is no evidence whatever that he was a physician. On the other hand, Manetho, the 3rd C BC Egyptian historian, declares the 1st Dynasty's second pharaoh, Athothis (ruled *ca.* 3050-3000 BC), a "physician" and that he wrote an anatomical text.¹⁶ While it seems unlikely that a pharaoh would have done such a thing, the placing of a medical work early in the 1st Dynasty is (1) consistent with the

¹⁶ Manetho's text: Αθωθις υἱός, ἔτη νζ, ὁ τὰ ἐν Μέμφει βασιλεία οἰκοδομήσας· οὗ φέρονται βίβλοι ἀνατομικαί, ἱατρὸς φάρ ην. (Athothis his son, [he ruled] 57 years, he built the palace in Memphis; anatomical books were brought forth, for he was a medical practitioner.) This is found on p. 28 of the Loeb Classical Library text of Book 1 of Manetho's *History of Egypt*. Manetho, a 3rd C BC Egyptian priest, is not known with certainty to have been an authentic figure.

reasons put forth in this section regarding Hierakonpolis, and (2) chronologically believable because of the mention of the fifth 1st Dynasty pharaoh, Den (ruled 3000 to 2960 BC), in paragraph 856a of the *Papyrus Ebers* and not far removed in time from the legendary Imhotep. It also suggests that the information in Athothis' book on anatomy must have been acquired during at least the preceding century or two to have been considered so important. The timing of the professional collation of medical wisdom of the Ebers and Smith papyri, based circumstantially on social environment and legend, is likely to have been between 3300 and 2700 BC, with a probability it was close to the earlier date, *i.e.*, Proto-Dynastic. The Smith papyrus may be equally ancient, but in popular literature it traditionally has been associated with Imhotep, *ca.* 2700 BC, even though, as noted above, there is no contemporary evidence that Imhotep was a physician.

The local concentration of the population at Hierakonpolis at its peak was considerable smaller than Miletos, although it is likely that the size of the regional population interacting at Hierakonpolis was not too different, perhaps 100,000. Proto-Dynastic Egypt was a period of growth and centralization, with development of extensive distant trade, surplus production of food, and foci of groups involved in production of a variety of products, including luxury items of individualistic design, that seemed unrelated to any central authority and were often organized outside the central city. As a functional urban center it must have been the trade network and production of commodities that provided the necessary cohesion for a stable city. Indeed, Proto-Dynastic Egypt has been identified with "industrial scale mass production."¹⁷ Of the different possibilities, a heterarchical system of commercial, and thereby social, management existed. Moving away from egalitarian kinship villages and into population centers, the citizens of the city, now prospering, could have supported a small group of medical practitioners that remained in contact over time and communicated personal experiences to one another of medical problems they had seen. A recent analysis of Egyptian state formation by Dr. Alice Stevenson includes the following statement: "... intractable and permanent inequality was established at the end of the Predynastic..."¹⁸ This may have reflected an elite class of wealth, a consequence of successful commercial ventures. But to many plebeians this must have meant opportunity. Allegiance of individuals and some nuclear families began to move from traditional kinships in peripheral communities to commercial or bureaucratic organizations in the large population centers so that they could share in the prosperity of the age. Writing was available to a limited population, namely those benefiting from its use in commerce, thereby also contributing to establishment of an elite class, and there were more elaborate burials for some and more impoverished burials for others. Some areas of the delta at this time had relatively autonomous trading relations with Levantine trade and thereby exchange of ideas. While the complexities of Egyptian development overall suggest early trends to central control in the region, more generally there was prosperity and a variation of enterprise. A meaningful collation of medical experience previously obtained could now appear within a network of medical practitioners, although no evidence of this has been uncovered. They may have composed their medical treatises at the time, but it should be borne in mind that not only the earliest Egyptian medical writings but also those

¹⁷ See: Hikade, T., *Urban Development at Hierakonpolis and the Stone Industry of Square 10 N5W, in Egypt at Its Origins*, Dudley (MA), 2004, S. Hendrickx, et al., editors.

¹⁸ See: Stevenson, A., *The Egyptian Predynastic and State Formation*, in *J. Archaeol. Res.*, 24:421-468, 2016, the final paragraph. The basis for other statements in this and the preceding paragraph can also be found in this excellent scholarly review of the subject.

of Sumer emerged concurrently with the invention of writing not because it was necessary for their intellectual composition but because clinical knowledge had already been compiled in preceding centuries and, as oral testimony of an early science, may have just been awaiting the opportunity of more durable perpetuation.

This was followed by the Early Dynastic period, its urbanization and control of specialization of trades and crafts, but still with a degree of autonomy for lower classes. Pharaohs of the 1st Dynasty included Athothis (now considered to be Djer, the third Pharaoh) and Den, the fifth Pharaoh, reigning *ca.* 3000 BC and mentioned in the *Papyrus Ebers*. This supports the notion that the famed “internal medicine” papyrus, was composed no later than this date. Scholarly interpretation of this period is limited because of the obscurity of evidence, which suggests its pharaonic dynasties had yet to acquire the supreme authority over daily life that would be characterized by social stagnation and would last for two thousand years. Beginning with Old Kingdom Dynasties (2700 BC), however, the aura that medicine had acquired in the previous few centuries was transferred to Pharaoh’s offices and then his priesthood.

Thus, before the Proto-Dynastic period the populated settlements were too scant to support a network of medical practitioners, and after the 2nd Dynasty rigid State control of the population included identification of medicinal practitioners as part of the pharaonic bureaucracy. The likely location for compilation of the medical wisdom in the Ebers and Smith papyri was the flourishing city of Hierakonpolis. It may be relevant that ancient Egypt during the earlier part of this period was in significant contact with the Mesopotamian civilization of Sumer, Uruk in particular, but the idea that the medical wisdom of ancient Egypt might have been imported from Mesopotamia must at this time be considered pure speculation.

Summary Table for Hierakonpolis:

STAGE – proto-dynastic (Neolithic)
 POPULATION, LOCAL – 10,000
 POPULATION, TOTAL – 105,000
 PRIMARY AREA – 0.5 square miles (300 acres)
 URBAN DENSITY – 31 persons per acre
 PRODUCTION – ceramics, jewelry, ivory, beer
 GOVERNANCE – fading of kinship social organization as population increasingly joined local elites in urbanization and became involved in commerce (heterarchy), later developing bureaucracies and then rigidly hierarchical pharaonic dynasties
 EGALITARIAN ARCHEOLOGY – no (some elite burials)
 PROMINENT EGALITARIAN KINSHIPS - no
 WRITING – yes
 DISTANT TRADE – yes
 SPECIALIZATION – yes
 MONUMENTAL STRUCTURES – no; large walls or forts and the first (step) pyramids appear in the second dynasty or later
 DENOUEMENT – change in course of the Nile River, and then subsumed by dynastic Egypt as a religious center
 MEDICAL PRACTICE – presumed, but no artifacts
 FORMATIVE PERIOD – 1200 years (Naqada culture)

FLORUIT – 400 years (beginning of Proto-Dynastic [3300 BC] to end of Dynasty I [2900 BC])

CITY-STATE – yes (by the definition given on p. 21)

AVERAGE LIFE EXPECTANCY – 30 years

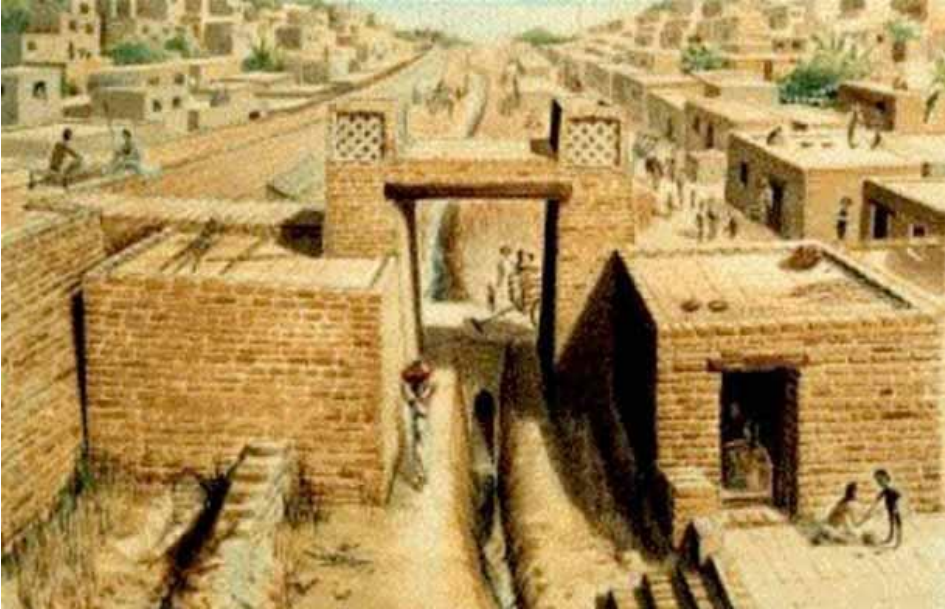


Fig. 4: Top: An artist's depiction of the gateway to the city of Harappa, a companion city to Mohenjo-daro in the Indus River Valley civilization, showing a facet of the drainage system as it may have existed about 2500 BC, the earliest urban waste management system known. The photograph, unattributed, can be seen on the Crystalinks website. Bottom: Photograph by Saqib Qayyum of the excavation site of Mohenjo-daro located in the present-day Sindh province of Pakistan, is available through Creative Commons Attribute-Share Alike 3.0 unported. Prominent in the distance is a domed Buddhist stupa, a much more recent construction.

CHAPTER FIVE

INDUS RIVER VALLEY CIVILIZATION

“In conclusion, significant discoveries of an empirical-rational nature were made in the medical practice of the Indian subcontinent, and perhaps Drs. Charaka and Sushruta were deserving as icons. But much of their medical knowledge was the product of peripatetic or village empirical practitioners many centuries earlier.”

The Natural State of Medical Practice, vol. 1, p. 129

Recent archeology has revealed the remarkable remnants of an Indus River Valley civilization that parallels in scope the Mesopotamian civilization. In contrast to Uruk, the minimal evidence of fortifications and social stratification provide traditional support for an egalitarian social organization in the region for much of its history. Over time it evolved extensive trade based on agriculture, pottery, sculpture, jewelry, timber, textiles, and ivory, quite different from that of Mesopotamia which was primarily based on agricultural products and trade. The Indus River Valley civilization had access to the Arabian Sea, to central Asia, east through the sub-Himalayan belt across the Indian subcontinent, and to the tropical south. New findings indicate the local culture, rather than an Indo-Aryan immigration, was the likely source of at least a portion of the Vedas that have guided Indian culture ever since. The principal relevance to medicine has been the *Atharva Veda*, the foundation of Ayurvedic medicine. There is controversial evidence of a written, non-cuneiform, language for the Indus River Valley civilization, as yet undeciphered. The *Charaka Samhita* and the *Sushruta Samhita*, roughly 2,000 years old, are the classic expressions of Ayurvedic medicine, and they contain a wealth of clinical material unfortunately rewritten over the ages to support a theocratic elite class. But the original objective observations in the two works probably derive from the period when the Indus River Valley civilization was commercially flourishing (2600-2000 BC), suggesting the presence during that period of a network of medical practitioners.

- A. Overview of the Indus River Valley civilization
- B. The Vedas
- C. The medical samhitas (collections): their origin
- D. Conclusion

- A. Overview of the Indus River Valley civilization

In contrast to the Mesopotamian civilization that evolved relatively quickly in a newly formed geographical region, an alluvial plain and delta north of the Red Sea, the Indus River Valley civilization is now considered to have encompassed an unbroken cultural prehistory extending back to at least 8,000 BC. For present purposes, however, interest is focused on the era and the locale that produced the Vedas, a group of four expansive spiritual-philosophical hymns that (1) were later integrated into Hinduism, and (2) were the prehistoric source of traditional Indian medicine, Ayurveda, first primitively expressed in the tract designated the *Atharva Veda*.

The early Indus River civilization was coeval with early Sumer in Mesopotamia and Proto-Dynastic and Early Dynastic Egypt along the Nile River. Its distance from

Uruk would have been about 1,800 miles, almost twice as far as Hierakonpolis in Egypt was from Uruk. Even in its earliest cities there is evidence of a progressive culture as manifested by its constructions, city planning, standardization of weights, and widely available in-house plumbing that included toilets. It seems appropriate to consider its waste-disposal system and water supply as true evidence of progress, for fired bricks that can last for centuries were devised for construction of wells and drains, and the onset of their use can be roughly dated to *ca.* 2600 BC. Dr. Kenoyer stated, “For the first time, we find widespread evidence of formally tiered settlement hierarchies complete with specialized craft settlements”¹ There may have been a contemporary logo-syllabic script, as yet undeciphered, with copper plates even suggesting intaglio printing, a few characters bearing resemblance to the later Brahmi script. The population of the Indus River Valley civilization at its peak has been estimated as high as five million.

When the Indus River Valley civilization is divided into phases the Vedas are often assigned to the Late Harappan era (Harappa was a major city of the Indus River Valley civilization), dated 1900-1300 BC, but an analysis of new data by Dr. Subash Kak offers 2000 BC as the latest possible date for the earliest formulations, or “*samhitas*,” of the Vedas and possibly much earlier.^{2,3} The dates are important, for during its existence the large Indus River Valley civilization changed dramatically, moving from egalitarian villages to an archeologically egalitarian city-state culture with no city centers, temples, monumental structures, or royal tombs, then through an urbanized culture with evidence of hierarchical organization to a period of decline as presumed environmental changes prompted a migration of many of the population to the east.⁴

The earliest cities appeared in the pre-Harappan phase of the civilization, *ca.* 3300 BC, with at least one city, Rehman Dhari, having a population of perhaps 10,000. But it was in the Harappan II phase (2800-2600 BC) that the civilization rapidly grew, and a major city was ancient Mohenjo-daro on the Indus River. It was settled in the early 3rd millennium BC and over several centuries is thought to have grown to a population of 40,000. Because of limited evidence of defensive protection, it has been proposed as a major administrative center for the surrounding region. Covering almost a thousand acres, it had, by 2300 BC, a central “citadel” on which was a large public “Great” bath, wells, a priest residence, and a marketplace. Its advanced system of urban planning with streets laid according to a grid, a remarkable system of sewage drainage including flush toilets in most houses, local wells, bathhouses with heated water, courtyards, and some

¹ See: Coningham, R., and Young, R., *The Archaeology of South Asia: From the Indus to Asoka, c. 6500 BCE-200 CE*, Cambridge, 2015, p. 172.

² See: Kak, S., *On the Chronological Framework for Indian Culture*, in *Indian Council of Philosophical Research*, pp. 1-24, 2000. The author notes that the *Rig Veda* may have been composed earlier than 3,000 BC if, as it states, the Sarasvati river emptied into the sea at that time. For the proposed Indus River Valley script see: Shinde, V. and Willis, R., A New Type of Inscribed Copper Plate from Indus Valley (Harappan) Civilisation, in *Ancient Asia*, 5:1-10, 2014.

³ There is great controversy not just over dates but regarding the nature of the Indus River civilization itself. Questions include: (1) was there an influx of Indo-Aryans from the Western Siberian Plain carrying with them the foundational concepts that would, over the next thousand years, determine the initiation and nature of Hinduism, or (2) was there instead an emigration of the same concepts out of the Indus River valley and into western Asia and the Middle East. All this bears on the dating of the Vedas. For a summary of evidence see *The Indo-Aryan Controversy*, Abington, 2005, E. F. Bryant and L. L. Patton, editors, especially chapter 11 by Michael Witzel.

⁴ Schug, G. R., et al., *Infection, Disease and Biosocial Processes at the End of the Indus Civilization*, 2013, PLoS One.2013; 8(12):e84814.

two-story houses. The egalitarian face of the city has been inferred from the similarity in dwellings and their contents, whether in the city itself or in the peripheral settlements, in the widespread access to water, sewage drainage, and in the absence of palatial structures. There is little evidence for social stratification or a ruling class, but it has been suggested that such a well-devised urbanization must have had elected officials. Indeed, the similarities among several of the Indus River Valley cities have been interpreted by some as supporting a central State-level authority for the region.

Importantly, Mohenjo-daro had an Upper and a Lower section, the latter being large and divided into “spatially discrete” neighborhoods based at least in part on commercial enterprise and probably kinship/ethnicity. Within each neighborhood there was a focus of larger dwellings for a small “elite” population, perhaps for those directing the commercial venture or a prominent family within that kinship-based neighborhood. Of note, a few prominent structures in each neighborhood bore resemblance to what are considered large public structures of the Upper section. This commonality is thought to have linked the various neighborhoods together, in doing so bridging the natural resistance that occurs between traditional kinship allegiances and those forces of centralization necessary to maintain a cohesive urban center.⁵ The planning necessary for the mature city of Mohenjo-daro suggests that, whatever its humble origin, it developed in such a way as to suit a population needed for commercial ventures. Neither an egalitarian nor an authoritarian governing structure is supported by the newest evidence. It is appropriate, therefore, to consider its social organization during the centuries of prosperity one of heterarchy, or perhaps corporatism, despite archeological indicators typically associated with egalitarianism. Economically it was a corporate city and its organization was an expression of convenience, efficiency, and an attempt to keep its citizenry content. Perhaps it can be likened to the corporate development of the Endicott-Johnson shoe manufacturing company in New York State in the early 20th century. George F. Johnson, the chief executive of this prominent business, initiated the *Square Deal* for company employees that involved profit sharing, healthcare, and home financing. City planning was involved. In a sense, it was a joint venture between company management and its employees, one term being applied to it being “welfare capitalism.”⁶ It was highly successful in every way. If a similar arrangement evolved in Mohenjo-daro and if the citizen employees were involved in shaping the urban environment, this would qualify for the term “corporatism.”

Another city, ultimately a city-state, was Harappa, for which the Harappan culture has been named. It had its origin about 3800 BC. A thousand years later it had the beginnings of craft specialization, *i.e.*, about 2800 BC. It was after this time that urbanization occurred, so that by 2600 BC it could be classified as a city-state for its hegemony stretched, like Mohenjo-daro, over many nearby small villages. It also flourished in the Late Mature Indus River Valley civilization phase (2200-2000 BC). At this time there was important trade with Mesopotamia and other distant regions. But studies of skeletal remains reveal, despite the suggestion of minimal social stratification, evidence of disease and violence against some of the community, as identified in remains of non-elite cemeteries but not in elite ones. Both Harappa and Mohenjo-daro went into a precipitous decline *ca.* 2000 BC.

⁵ See: Mosher, M. S., *The Architecture of Mohenjo-Daro as Evidence for the Organization of Indus Civilization Urban Neighborhoods*, Univ. of Toronto, Ph.D. thesis, 2017.

⁶ See: Zahavi, G., *Workers, Managers, and Welfare Capitalism: The Shoemakers and Tanners of Endicott Johnson, 1890-1950*, Urbana, 1988.

The major factor behind the growth of population centers in the Indus River Valley was commercial development, for extensive trade existed across the sub-Himalayan region of northern India, the southern tropical region of the Indian sub-continent with its spices and exotic animals, and central Asia with its ores and precious stones. Casting of metals, practical mathematics (standard weights and scales, use of a binary decimal system), an early form of writing, mass production of ceramic goods and textiles, seals such as occurred in Mesopotamia, and trade with Mesopotamia also provide documentation of its economic life. There also was river access to the Arabian Sea. A broad-based cultivation of crops with irrigation and the domestication of animals also developed, this probably being secondary to commercial development and trade in order to accommodate the increasing population. Although city populations might number in the tens of thousands, the region was flush with surrounding small settlements that interacted with commercial efforts in the cities and provided their sustenance. It is for this reason that Mohenjo-daro and Harappa are identified herein as city-states, for interaction with the peripheral settlements was not one of domination but of coordination, presumably by commercial networks, with overall governance of the region emanating from a heterarchy of commercial ventures.

The limited information on the Indus River civilization makes identification of the social context for any medical compilations uncertain, but it is clear that, for the agricultural arm of society, kinships were intact, their role in agricultural surpluses centering around water sources, with consensual kin-based management of water sources.⁷ This type of decision-taking would have been among leaders or patriarchs from the various kinships, and while they might assign a kinship to fulfill a specific role or task in water management the internal social structure of the kinship would remain unchanged, its egalitarian aspects retained.

Within the cities themselves, however, it is not easy to imagine a role for traditional small kinships given the many options and opportunities. Typically, this is the time when a nuclear family is able to assert its independence from the clan. Traditional ties of kinship are considered to have been especially strong prior to an urbanizing India, and there is evidence that in prehistoric times land ownership that often accompanied a kinship helped maintain its influence. It has even been proposed that the neighborhoods found within the boundary of Mohenjo-daro represent kinship holdings, in which case they may have been a real source of power.⁸ But over time the kinships of the more powerful that initially represented commercial interests would establish themselves in the city-state and become “oriented to the stabilization of new power structures,” whereas plebeian kinships that represented the majority of the population would have had a decrease in influence.⁹ Thus, because of urbanization both a loss of influence and a weakened hold over individual members diminished the kinship.

It must be remembered, of course, that early or primitive egalitarian kinships are not merely a matter of redistribution of assets; they represent assigned status and

⁷ See: Miller, H. M.-L., *Surplus in the Indus Civilization: Agricultural Choices, Social Relations, Political Effects*, in *Surplus: The Politics of Production and the Strategies of Everyday Life*, Boulder, 2015, C. T. Morehart and K. De Lucia, editors, chapter 4.

⁸ See: Ratnaga, S., *Townsmen and Tribesmen at Mohenjo-Daro* in *Annales Histoire Sciences Sociales*, 59:39-71, 2004.

⁹ See: Basant, P. K., *Urbanization and Society in Early India*, in *A Social History of Early India*, p. 81, Delhi, 2009, B. D. Chattopadhyaya, editor, volume 2 of *History of Science, Philosophy and Culture in Indian Civilization*, D. P. Chattopadhyaya, editor.

obligations to fellow members. As Dr. Jared Diamond has stated, the egalitarian component in these small societies may require redistribution of resources but it does not mean equal status. Rather, egalitarian leadership is informal and there is no formal stratification or monopoly on leadership, information, or decision-making.¹⁰ And should several kinships within a settlement jointly agree to initiate or participate in a commercial venture, that outcome could lead to a form of corporatism in which the kinships would not represent just employees but could actually contribute to the nature of that venture. In contrast, should there be an agreement to have a central storage for the kinships' grain for redistribution as needed, that would be an example of collectivism. Of the two scenarios, corporatism and trade would invite prosperity and collectivism would provide security. Equally of the two scenarios, corporatism would foster growth, whereas collectivism would contain it, for without commerce there would have been no inherent reason to enlarge. A growing city may be thought a desirable goal in modern times, but with primitive urbanization there would have been nothing of the sort. When considering the sources of power or influence in a developing city-state, collectivism is unimportant. This is not meant to reflect its desirability, but it is a reflection of its actual status. Simply put, a city-state could never exist without a successful commercial base unless coercion were involved. Just as early writing and mathematics were developed as tools for commerce, early cities also developed in response to commercial need. The commonsense conclusion must be that alliances within plebeian kinships gave way to alliances with commercial ventures as Indus River Valley city-states prospered. This attracted others who wished to share in prosperity rather than remain within traditional village kinship boundaries of obligations, customs, and status. The shift apparently was voluntary. It is, therefore, within the city of the city-state, not the surrounding settlements, that a network of medical practitioners might have initially evolved, the city a place of opportunity, the peripheral settlements a niche for stability and tradition.¹¹

The onset of the decline of the Indus River Valley civilization is usually dated *ca.* 2000 BC, its decline "asymmetrical over centuries. Thus the "first urbanization period" of the Indian subcontinent ceased. Then, for over a thousand years tribal kingdoms with clear class distinctions developed throughout the subcontinent. None became dominant until dynastic empires developed, the Mauryan Dynasty unifying most of India in the 4th C BC. With this came India's "second urbanization period." Thus, the Indus River Valley civilization did not decline because of incorporation into a powerful empire. But it is generally held the Vedas assumed their prominence early in that decline and that in later centuries Hinduism formally arose and its Laws promulgated.

¹⁰ Diamond, J., *Guns, Germs, and Steel*, New York, 1999, a paperback, chapter 14, p. 269.

¹¹ In: Mosher, M. S., *The Architecture of Mohenjo-Daro as Evidence for the Organization of Indus Civilization Urban Neighborhoods*, Univ. of Toronto, Ph.D. thesis, 2017, the following statement is found: "... lie at the heart of the motives by which people initially abandoned local autonomy for a more restrictive and asymmetrical social order." It is one conclusion of this volume that, when it comes to judging motives, the reverse seems more accurate. People were taking advantage of early urbanization for relief from the restrictive social order of egalitarianism, in the process preferring to accept the unknowns of urban life in hope of a better one. Nevertheless, Prof. E. A. Hammel (*Kinship-based politics and the optimal size of kin groups*, in *PNAS* 102:11951-11956, 2005) identified an inverse association between kin group size and inequality of such groups. This may have attracted kin groups to the better housing and goods found in villages surrounding Harappa.

B. The Vedas

The Vedas, four extensive hymns that provide the early scriptural base of Hinduism (The Rig Veda [hymns and their mystical exegesis], the Artharva Veda [procedures for everyday life], the Yajurveda [prose worship rituals], and the Samaveda [holy songs]), have been considered of divine origin and presented to humankind through the words of inspired ancient sages. From them the Vedic age has been so named, its chronology dated between the early waning of the Indus River Valley civilization (*ca.* 2000 BC) and 600 BC. In the past they were thought to have been introduced into India by an influx of Indo-Aryan populations from the Western Siberian Plain, people who entered northern sections of the country west of the Himalayas, their religion being superimposed on local religious practices as they displaced or integrated and then superseded the large population living in the Indus River Valley. But modern scholarship, based on new archeological evidence, has been shifting to a dramatically different interpretation, namely that events and findings previously attributed to foreigners can now be considered, at least in part, indigenous, especially those in the region of the Indus River Valley.¹² This, however, has led to controversy with regard to the origin of the Vedas, their actual presence previously being considered an Indo-Aryan linguistic marker. This issue will not be resolved here.

Relevant to present purposes, however, the early religion of the northwestern region of the subcontinent had some similarities to the earliest religious features of Egypt and Mesopotamia, but it included features that have been reasonably postulated to be early indicators of the Hindu pantheon. If the Vedas did not arrive from regions northwest of the subcontinent, the regional location for the proposed sages that saw the production of the Vedas may have ranged broadly across northern India, roughly covering the territory of the Indus River civilization and further east over the Indo-Gangetic alluvial plain, stretching sea to sea. Houses that have been declared to be Harappan in construction in the west have been found as far east as Uttar Pradesh.

Although the source of the Vedas may be uncertain, in this vast sub-Himalayan belt some think additional sections, or “mandalas,” were appended in an oral tradition that may date back thousands of years earlier than the Harappan culture. At some point, however, mention of datable events in the Vedas permit a frequently mystical work to become at one with a reality in the context of identifiable societies. It is here proposed that it was primarily in the Indus River region during the “mature” Harappan era (2600-1900 BC) that a prospering and urbanizing people formally integrated local concepts into the Vedas, for the region had by far the greatest population, highest population density, prosperity, dominant culture, and, central to present discussion, a proposed network of medical practitioners, an argument clarified below. It must be remembered that present discussion is about the Vedas and medicine, that the ancient treatises that entered the Charaka and Sushruta Samhitas are assumed to have derived from a group of medical practitioners, and that this would have required a practitioner network residing in a city. Thus, the *Atharva Veda*, which has the most pointed references and a rational descriptive

¹² Some findings previously considered to have been introduced by foreign invaders can be explained by Indus River civilization trade with other cultures/civilizations that included Mesopotamia and Egypt. These include cylindrical engraved seals for commercial and ritual use.

and diagnostic approach to medicine (despite its therapeutic magic), also originated in a city, its medical components probably incorporated into its text by city dwellers.¹³

The mention of physical events in oral Vedic tradition or manuscript, however, may refer to times much later than the original production. It is notable, for example, that some Dravidian terms are found among the *Rig Veda* Sanskrit, and a Dravidian language was used in parts of the Indus River Valley civilization.¹⁴ This also suggests that the original material was amended there as well. Furthermore, while much scholarship places Veda composition between 1500-600 BC, it has been pointed out that mention of courses of rivers (especially the Sarasvati river, which ceased to flow about 1900 BC) and events (astronomical mentions, the Bharata war, and genealogies) in the earliest Vedic compositions permit a much earlier date for their origin, at least for the *Rig Veda*, the first and foremost of the Vedas. Thus, Dr. Subhash Kak is able to propose that the early Vedic literature was composed prior to 2000 BC (footnote reference, p. 76). This information is important for it permits, in turn, an earlier date for the composition of the *Atharva Veda* and thereby the collection of the scientific clinical observations upon which is based Ayurvedic medicine as described in the two much later medical compilations, the *Charaka Samhita* and the *Sushruta Samhita*. It now seems likely that several extensive decades-long droughts led to the disintegration of the Indus River Valley civilization beginning ca. 2000 BC. The subsequent social disruption and decline of urbanization would make the intellectual production of the Vedas less likely to have occurred than during the preceding prosperous Harappan era. The prehistoric origin of the Vedas may never be accurately determined, but for present discussion the Kak estimate will be used with the understanding that the chronology, but not the sequence, of these early events may err by half a millennium or more. Extant manuscripts of fragments of the Vedas are chronologically unhelpful, the oldest being Nepalese manuscripts dated to the 11th C AD.

This confusing section can be summarized as follows. Like Uruk in Sumer and Hierakonpolis in Egypt, Mohenjo-daro arose among humble villages to become a major commercial and trading center. In the process, its central population traded a kinship-structured rural life for an urbanized society in which personal and family allegiances were now switching to stable and prospering commercial ventures. Living in neighborhoods, even clans or entire tribes may have agreed *en masse* to join in a commercial venture, suggesting a form of corporatism in which the workers helped determine the course that commerce and urban development would take. It is proposed that during this period, ca. 2600-2000 BC, networks of medical practitioners arose and objective and empirical observations of a medical and biological nature were made. A new and non-mystical way of viewing human life and its infirmities was then incorporated into the second oldest Veda, the *Atharva Veda*, and from there its logic, if not its implementation, into the *Charaka Samhita* and the *Sushruta Samhita*. This is not to say that all the wisdom in the latter two compositions was originally collected during this

¹³ It has been pointed out that the word “caraka” has been considered the origin of Charaka in the *Charaka Samhita*, and that it has been translated as wandering mendicant, suggesting peripatetic practitioners were the source of the *samhita*’s clinical material. This may be analogous to early Greek practitioners who traveled from city to city. While all this may be true as far as it goes, there would have been no *Charaka Samhita* unless there were a coordinated collation of data from many practitioners, and this could have occurred only in a populous area where practitioners had convenient contact with one another, most likely after shifting to a settled existence.

¹⁴ See: Parpola, A., *The Roots of Hinduism: The Early Aryans and the Indus Civilization*, Oxford, 2015.

earlier period, although that possibility exists. But the unprecedented objective perspective of illness and nature pursued philosophically in the *Atharva Veda* had to come from somewhere. While not wishing to detract from the role of venerable sages, a practical conclusion is that it originated in the free-thinking medical practitioners of the Indus River Valley civilization, practitioners who were neither peripatetic nor living in small villages and whose disciples would fade away with the civilization itself, leaving a trail of medical wisdom that somehow survived to be included more than a millennium later in the now revered medical classics of India.

C. The Medical Samhitas (collections); their origin

The philosophical and empirical foundations of modern Ayurveda and therefore the basis for the two classic works of Indian medicine, the *Charaka Samhita* and the *Sushruta Samhita*, are found in the Vedas. The *Charaka Samhita* has been dated to about the 1st BC and the *Sushruta Samhita* to the 5th C AD, with the latter representing the surgical arm of the profession of medicine in addition to being a restatement of much that is in the *Charaka Samhita*. In the 9th C AD more than one-third of the *Charaka Samhita* text was amended by Dridhabala, a non-physician who extensively edited the work and inserted Hindu tenets, and it is this version that has come down to the present day as authoritative. But it is current scholarly opinion that both the *Charaka* and the *Sushruta* samhitas contain medical wisdom collected many centuries earlier, perhaps beginning as early as the time of the composition of the early Vedas, with the knowledge that oral tradition may have preceded these dates by centuries. The wisdom in them need not comprise all the medical knowledge of their age, for once the principles of Ayurveda were pronounced in the *Atharva Veda* the collection of clinical data could have been in part cumulative over centuries until such time as they were collated and written down.

Of the four Vedas the one containing most medically related information is the *Atharva Veda*, considered the earliest but one of the Vedas. But the problem with postulating that work as the source of the good clinical information to be found later in the two medical samhitas is that most English translations of the Vedas do not support such a claim. Virtually all mention of disease is presented in simplistic, although poetical, descriptive terms of external clinical findings within a mystical context. One exception to this interpretation of the work comes from Dr. Chattopadhyaya, a prominent Indian philosopher who has demoted the mythological content of the Vedas by pointing out the scientific, and in his view, areligious nature of the early Vedas.¹⁵ He supports this with his reading and interpretation of both the *Atharva Veda* and the *Charaka Samhita*, thereby highlighting the underlying scientific and clinical astuteness of those works and the philosophical association between the two not previously inferable from other translations. He also is convinced that the wisdom from the *Atharva Veda*, a collection of 730 hymns, is the product of many authors. Finally, although specific clinical descriptions of diagnosable diseases cannot be found in that Veda, it is clear to him that its evidence for objectivity and for nature's physical laws has been transmitted into the *Charaka Samhita*, which would explain both the nonmagical aspects of that text and

¹⁵ The prevailing opinion, however, is that the Vedas represented religious scripture in their own right, a primitive form of religious devotion and instruction that was later subsumed and altered to become the foundation for Hinduism.

provide the factual basis for Ayurveda as it evolved into a clinical discipline.¹⁶ His argument is convincing, if for no other reason than his translations provide solid support for his conclusions, something that cannot be easily inferred from other translations.

Traditionally the source of Ayurveda has been attributed to the Vedic sage, Bharadvaja, and placed in the Vedic era. Compared to the other three Vedas the *Atharva Veda* has been criticized in its appeal for objectivity to the point of being considered by some religious authorities to not be a Veda. Dr. Chattopadhyaya (cited on previous page, chapter 3) has described it as an entreaty for an objective and even democratic approach to knowledge and to medical practice, to which he attributes the disdain of that Veda by the Brahmin caste of Hinduism. The principles of Ayurveda, as attributed to Bharadvaja, are: (1) a belief in causality, (2) acknowledgement of a disease as an entity rather than a status, and (3) acceptance that curability (of curable diseases) can reside in the actions of a physician. These principles, plus the clinical observations found in the two medical samhitas, underlie their great significance and reputation despite, as Dr. Chattopadhyaya states (cited above, p. 425), “the heap of intellectual debris eventually dumped on them.” Much of the discussion of the *Charaka Samhita* and the *Sushruta Samhita* that follows will find its support in the translations and references in the work of Dr. Chattopadhyaya and in the well-known translation of the *Charaka Samhita* by P. V. Sharma, famous Ayurvedic physician and scholar of Sanskrit and Hindi.¹⁷

Excursus on the *Charaka Samhita*

The opening quotation of this chapter raises for discussion the origin and medical credentials of the *Charaka Samhita*, a brief review of which is found in Book I, chapter 5, of *The Natural State of Medical Practice*, volume 1. A first consideration is whether the work itself is worth the effort of such a discussion, and to that point is the authenticity of translation. It was demonstrated in *The Natural State of Medical Practice* that at times ancient works were translated by persons with a level of technical knowledge that was inferior to the original authors. For fictional and entertainment works this is not of great concern, but for technical professions it is imperative that technical terms be accurately translated, for if accuracy is lacking much of a work’s imbued knowledge will not be apparent and may even seem absurd. It is for this reason that Hippocratic treatises in volume 2 and in Appendix B of the present volume, as translated by the author, are accompanied by a wordlist (see the Appendix to volume 2) and commentary that provide a degree of specificity of terminology that some translations have lacked.

The same problem with technical accuracy applies to the *Charaka Samhita*. The wording and implied meaning of the translation by C. Kaviratna in 1896 today make little sense to modern readers. And this is because scientific knowledge has made early translations functionally archaic. The translation of P. Sharma, updated in 2014, is much more understandable, and even when seeming obtuse the logic behind his discourse comes through. The optimal translations, however, as with Hippocratic works, are most often found in short journal publications on specific medical problems authored by specialists

¹⁶ Dr. Chattopadhyaya’s excellent book, *Science and Society in Ancient India* (Bangalore, 1977), is to a great extent an explication of this topic.

¹⁷ Sharma, P. V., *Caraka-Samhita*, published in 2014 (4th edition), Varanasi, 2 volumes.

in those fields.¹⁸ For present discussion, however, the Sharma translation will be used, with full knowledge that much of the wisdom underlying the text will be missed. What will not be missed, however, is its evidence that practitioners long ago were careful and insightful observers and that the subsequent course of medicine on the subcontinent would have been vastly advanced had they been permitted to build on initial successes. The transmitted wisdom reached its first stage in its mention in the *Rig Veda*.

The *Rig Veda*

The first and most revered Veda is the *Rig Veda*. In chapter 10, verse 97 is stated: “Oh bright herbs, you are like mothers. In your presence I promise to offer to the physician cows, horses, clothes and even myself ...”¹⁹ Another entire hymn is devoted entirely to a healing herb. Elsewhere it is stated that “the wise physician is one around whom the herbs gather... . He wages war on sickness of all forms.”²⁰ Dr. Chattopadhyaya has commented that the text of the *Rig Veda* is “totally unaware of the hierarchical society.” This plus other statements do not suggest an inferior status of physicians, proof that the Vedas predated their (the Vedas) accommodation into Hinduism, for with that association physicians became relegated to a relatively lowly status. But the key point is that physicians are identified as worthy community specialists. Thus, the foremost and earliest Veda sets the stage for an already evolved medical profession.

The *Atharva Veda*

That next stage is found in the *Atharva Veda*, the Veda most concerned with the profession of medicine. It has received the greatest criticism from religious teachers for its attention to care of the body at the expense of caring for the soul. Not surprisingly it contains lines that provide philosophical support for the physician’s work. At that early stage it relies on magic and incantations to rid a patient of demons. But the descriptions of disease and the specificity of the herbal remedies are clearly rational despite the chants and charms. A medical history and physical examination of some sort was surely performed by someone. The effective use of herbs, in effect living amulets, must have instilled some sense of dependency on the botanicals themselves. Furthermore, some villagers would have known local lore about the value of certain plants passed down to them from generations preceding the Vedas. The distinction between magical use and empirical use is clear; both being intended.²¹ And that distinction may have been what prompted Brahminic writers to attack the content of this Veda in carefully chosen ways,

¹⁸ An example is: Kokate, K. K., and Kulkarni, N. G., *Endometriosis in Ayurvedic Perspective*, in *J. Homeop. and Ayurv. Med.*, 2:142-3, 2013. While not fully consistent with modern allopathic medicine, the clarification of “yonivyapat” as a clinical description of endometriosis (but not of its pathological features) and the explanation of terms given to its different clinical presentations makes the original Charaka description understandable, logical, and, given its archaic nature, remarkable.

¹⁹ Chattopadhyaya, D., *Science and Society in Ancient India*, Bangalore, 1977, p. 235.

²⁰ This, like the previous reference, is a translation by Dr. Chattopadhyaya of *Rig Veda* X, 97, 4 and 6, a section of the *Rig Veda* clearly laudatory of the physician and praising his ability to use botanicals to return people to health.

²¹ See: *Hymns of the Atharva Veda*, Oxford, 1897, M. Bloomfield, transl., book V, 22ff.

one being the forbidding of gathering “roots” for treating disease and the statement that “he who practises [sic] for the multitude is pronounced impure.” Democratic process was not in the plan for Hinduism’s priests.

Despite the opposition to an empirical-rational approach to managing sickness, those who provided the clinical basis for classics of medicine that would include the Charaka Samhita, the Sushruta Samhita, and others somehow managed to retain earlier, and forge newer, wisdom.

The Charaka Samhita

With similarities to the Cnidian (symptom-oriented rather than patient-oriented medicine of the ancient Greek colony of Cnidos) and Egyptian approach to medical diagnosis, the Charaka Samhita primarily uses specific symptoms as a basis for understanding and dealing with a medical problem. In its theoretical construct, an aberrancy or imbalance in factors that maintain health produce various symptoms, and treatments are needed to realign them. For example, vomiting can be caused by neurologic disease, vestibular disease, gastric irritation, bowel obstruction, and as a side-effect of drugs and toxins, yet it is approached as a specific aberrancy, a singular disease in itself. If a person has vomiting, fever, diarrhea, and a skin rash, each symptom or sign is thought to have a specific and different explanation. Thus, the treatments are designed to counteract the various causes of the various signs and symptoms of a disease rather than pursuing a primary treatment that, by treating a single diagnosis, will control the basic cause of the disease and leave symptomatic treatments as a separate goal. There is an inadequate effort to develop the concept of a “syndrome” that would group signs and symptoms and permit true identification of causation. If this were done and if the basic disease process is thereby controlled, ancillary symptomatic therapies in most instances would not be necessary for long. This is not to say that there is no attempt at a unifying model of disease. In Book 2, chapter, 3, it is proposed that something enters the “mouth of the uterus” that causes a “tumor” or mass to develop. But the development of the concept stops there. For this reason, Book 5, “Signs of Life and Death,” is here explicated early because causation of signs and symptoms are less diffuse. In this excursus, unless otherwise noted, all quotations are taken from the Sharma translation of the Charaka Samhita.²²

Book 1:

Of special interest, as pointed out by Dr. Chattopadhyaya, is chapter 11 of Book 1, for in verse 55 is described the span of surgical procedures to be used: “excision, incision, puncturing, rupturing, scraping, extraction, scarifying, probing, and application of alkali and leeches.” This indicates the readership was intended to be a “full-service” and hands-on medical professional. Unfortunately, that would not be countenanced by many generations of physicians that followed, for Brahminic additions to the text would turn it into more a religious than a medical text that would greatly restrict the profession’s ability to gain new information and to develop the field of surgery.

²² Sharma, P. V., *Caraka-Samhita*, published in 2014 (4th edition), Varanasi, 2 volumes.

Book 2

Chapter 4 -

There is much written about the diagnosis of diabetes mellitus in ancient Indian texts, and the Charaka Samhita does indeed describe sweet urine in a variety of situations for which glycosuria undoubtedly was the cause and diabetes mellitus the diagnosis. But when sweet, viscous, urine is present in a patient with diabetes mellitus the disease is distinctly out of control and rapidly heading toward ketoacidosis which will, if untreated, be fatal. This association, a strong one, is not mentioned, even though its distinctive pattern of deep (Kussmaul) respiration is alarmingly obvious. There is also a distinction to be made for an excessive urinary volume which is clear, odorless, and watery (“hydruria” in the translation by Yasuko Takamine of the Charaka Samhita edition of P. Sharma),²³ for this likely represents a completely different disorder, diabetes insipidus, of which there is a variety of causes. The range of descriptions in Book 2, chapter 4, on urinary abnormalities, while unrealistic today in its theoretical pathophysiology, was nevertheless a valid attempt of nascent clinicians at defining diseases, an essential first step that will lead to identifying syndromes, inquiring into causation, and judging effectiveness of therapy.

Book 5:

Chap. 1 - Two significant observations: (a) the phenomenon whereby the lower part of the body becomes more livid as the upper (higher) part becomes more pallid shortly after death (*livor mortis*) as gravity causes blood to settle downward promptly after blood circulation ceases, and (b) the deep purple that can be seen in cyanosis associated with some deaths, especially on the lips, as indicated by the cited color of the black plum (jamun) found in India.

Chap. 2 – The smell of a patient’s breath associated with lethal diseases is described using the metaphor of “flower.” This physical examination finding could include *fetor hepaticus* in liver cirrhosis due to thiols, a fruity smell present in diabetic ketoacidosis due to ketones, and *uremic fetor* due to ammonia present in advanced uremia. Such a relatively subtle physical finding is not likely to make an impression on anyone except a person who is specifically looking for evidence to objectively characterize or diagnose disease.

Chap. 3 – The response to touch at approaching death includes discussion of palpating the pulse, observing the respirations (deep respirations indicating severe metabolic acidosis, shallow indicating neural unresponsiveness to oxygen lack or carbon dioxide excess), observing lack of response to a painful stimulus (tested by pulling of a hair), the presence of sweating despite the body being cool, and stiffness of the body.

Chap. 4 – Loss of senses were noted, with unresponsiveness to sound, a general diminishing of senses, the patient hearing no “heart sound” on plugging the ears (a remarkable, if irrelevant, observation), sudden darkness of vision, and illusions and delusions that commonly occur with approaching death.

²³ This interesting reference, found on Internet search, was printed in Jamnagar, India, in 1949 by The Ayurveda Mudranalaya.

Chap. 5 – Poor prognostic signs were described, including opisthotonos (tetanus was always lethal), the attraction of flies to land on the body (a clinical dictum in the past that indicated imminent death), onset of delirium (a common acute finding in severe systemic disease such as sepsis), vivid end-of-life dreams and visions (not hallucinations), and certain skin rashes.

Chap. 6 – Physical abnormalities often superimposed on the cachectic patient included constipation plus thirst, anasarca, “viscous” urine (high specific gravity usually indicating recent poor fluid intake), and the combination of fever and diarrhea (not uncommon in terminal infectious disorders).

Chap. 7 – This chapter discusses color and “luster,” usually relating to approaching death: a patient who faints every time he is lifted upright (orthostatic hypotension), cachexia with excessive urine or stool, losing weight while eating satisfactorily, shallow respirations with twitching (the latter probably indicating myoclonus, a common sign *in extremis*), advanced cachexia, and mania. (Note that there is frequent repetition of events, phrases, and descriptions among chapters.)

Chap. 11 – In sections 25 and 26 is found the statement that when a patient refuses both treatment and the physician’s assistance, he has “moved under the control of God of death” and is not to be treated.

Chap. 12 – There is mention here that a powdery substance sometimes appears on the head as death approaches. This might mean terminal uremia, except that uremic “frost” is white, whereas the powder described in the Charaka Samhita looks like powdery cow dung. Medicinal cow dung is presently purchasable as formulated into a substance that is purported to have anti-infective qualities.

At the conclusion of this Book it is stated that the patient can be advised of his impending demise if he requests it, but the physician should not do so if it is thought it might cause earlier death or if it would cause affliction to others. It also states that some of the signs and symptoms mentioned do not mean inevitable death, and that there may be moderating effects if certain omens or portents are observed. But it is clear that close observation of a great many end-of-life circumstances was required to provide the confident and mostly correct interpretation of signs and symptoms presented in these chapters. It was not arrived at by random anecdotal experience, and it was not derived from a great list of observations over centuries that had been added to, one by one, by generations of practitioners who felt obligated to add their jot of information to a greater pile. It certainly did not come from one man or sage. It could have only come from professional procedures laid out by some person or group, its final form representing their considered opinion. The reasons for this have been discussed in detail in *The Natural State of Medical Practice*, volume 1, Bk. 2, chapter 5, as relates to Hippocratic medicine, and a similar opinion was expressed by Dr. Chattopadhyaya.²⁴

Book 6:

Chap. 10 – Epilepsy

²⁴ See: Chattopadhyaya, D. P., *Science and Society in Ancient India* (Bangalore, 1977), p. 28.

Epilepsy as described in the *Charaka Samhita* begins with an aura and loss of consciousness, loss of control of muscles which lead to collapse with twitching of facial muscles and generalized convulsive contractions, and excessive salivation, from which the patient awakens as from a sleep. There are four kinds of convulsions described: a generalized seizure, a seizure associated with fever, a seizure associated with cold and goosebumps, and seizures occurring in wasted or elderly persons that are incurable. Other adjectives are added that are supposed to further distinguish these four from each other, but with modern knowledge they are not helpful. It is now known that there are many types of seizures. The seizure disorders identified in this chapter are solely associated with grand mal convulsions or with metabolic derangements that might mimic such convulsions. The description, therefore, is apt, except for the statement that the patient “respires excessively” in the first type of seizure. In fact, breath-holding is involuntary because of sustained muscle contractions, and some degree of cyanosis can be seen before the seizure ends. The grouping probably represents, in sequence as given above, (1) an idiopathic epilepsy, one that can recur over time, (2) a seizure associated with fever, which might be due to an inflammatory central nervous system disease, infection, or childhood febrile seizures, (3) a seizure associated with coldness, which might represent the seizure as a complication of hypotensive shock, and, finally, (4) a seizure associated with debilitation, which might indicate an advanced malignant or metabolic abnormality. There is limited information given, and the therapies are not understandable to modern readers. But it is significant that nothing is prescribed for ending a seizure, and, as convulsions end by themselves as a consequence of hypoxia, doing nothing except protecting the patient from aspiration and from injury is all that is needed. The absence of any recommendation for immediate attempts to stop the seizure indicates these physicians recognized that. Although this may seem obvious, it is not, for doing anything, e.g., a few words or a chant, will automatically be associated with ending the seizure, and great would be the gratitude of friends and family if a priest or mystic were to seem to control seizures. As a parting recommendation the author indicates the epileptic should avoid risky situations where a seizure could lead to death from injury. The great number of therapies for seizure given in this chapter might be taken as indicating there was no satisfactory drug therapy, but the bizarre nature of most of them, if the translation by Sharma is accurate, is incomprehensible. On the other hand, that at some early age, perhaps 2000 BC or before, someone would have even pondered the origin and therapy of a seizure disorder is sufficient to confirm the presence of a true professional(s).

Chap. 19 - Worms

The first Book of *Charaka Samhita*, chapter 19, and Book 2, chapter 7, state there are twenty kinds of “worms.” (1) Of these, two are “external,” and it is accepted that one represents head lice, the other possible “worm” being a species of tick or mites. (2) Six arise in mucus, and these are located in the stomach and move up. This indicates they were visible in vomitus. One is like an earthworm and must be *Ascaris lumbricoides*, commonly vomited, one is like a ribbon and must be a tapeworm such as *Taenia solium*, uncommonly vomited, and one was threadlike and may be *Strongyloides lumbricoides*. Another mentions a worm coming from mucus is found in the heart. This sounds fanciful, but *Dirofilaria immitis* causes heartworm in dogs, and the worms would have been visible if for some reason the dog’s heart was exposed through a traumatized chest. This type of filarial infection seldom is seen in man, but seeing it in a dog might have suggested to the observer that the same thing must occur in humans. (3) Seven are found in feces, and therefore are considered to have moved down, thereby being sometimes visible in feces.

One, which causes anal itching, must be *Enterobius vermicularis*, the well-known pinworm. *Ascaris*, mentioned above, can also sometimes be seen in the stool. *Trichuris trichuris* is a colon-inhabiting nematode about 2-3 centimeters in length, and hookworm, about a centimeter long, is found in the small bowel and can be seen in feces on occasion, as can the aforementioned *Strongyloides*. Flatworms of the *Schistosoma* genus, 1-2 centimeters in length, are lodged in blood vessels associated with the bowel and bladder, and it is conceivable but highly unlikely that they would have been considered a feces-related worm. (4) Five types of “worms” are stated to arise in blood, and of these some are said to be invisible, a point that invites speculation about magnifying lenses and filarial or trypanosomal infections. Another type is found in wounds and “eats away” the skin after being brought to the wound via blood. It is unlikely that maggots would be considered such, so this category defies analysis unless the observer postulated worms so small as to not be visible to the naked eye, a reasonable consideration. By and large, the variety of “worms” and variety of symptoms, while they are minimally identifiable from the *Charaka Samhita* description, do suggest knowledgeable persons made the original observations. Importantly, they attributed the associated symptoms, which would necessarily be wide-ranging and indeed are, to the parasites, a conclusion that had to require observations of many patients with parasitic infestations.

In addition to specific reference to signs and symptoms that indicate the *Charaka Samhita* to be the dedicated work of true clinicians, the philosophical orientation of those ancient physicians is highlighted by Dr. Chattopadhyaya. He translates verse 36 of Book 3, chapter 3 as: “Now, of all types of evidences, the most dependable ones are those that are directly observed by the eyes. Here are some of our views based on the observation of thousands of instances. (See p. 81 of preceding citation, for the author indicates this is a “loose translation.”) He finds numerous statements throughout the work that “placed the ancient doctors among the pioneers of the materialist outlook in Indian history.” Spiritual connotation is “scrapped.” Prior to development of class and professional hierarchies he considers ancient doctors “the scientists par excellence of the age,” pointing out at the same time that “pioneers of science are to be judged not by the actual success of implementing their programme but by the success of their formulation of the programme.” Dr. Chattopadhyaya’s work is especially valuable for he is able to provide a living translation that detects, rather than ignores, the objectivity and the respect for physical laws that are not obvious to those unfamiliar with the language. The original formulation of their “programme” is thereby rendered visible and preserved for the ages.

Tracts in both the *Charaka* and *Susruta Samhitas* advise the physician to be personally familiar with medicinal herbs, to know how they are to be grown and harvested. This work with the soil, as well as the physical touching and manipulation of patients and their wounds and sores, is what made the profession of medicine a very menial, even detestable, endeavor to the upper classes for centuries. Manu, the giver of laws, prohibited high-caste Hindus from accepting any food from doctors because that food “is like pus and blood.”

The attention directed at the body at the expense of the soul was the source of the criticism by the upper classes, a criticism Dr. Chattopadhyaya says is joined by Plato. This is a bit unexpected, for Dr. Chattopadhyaya, a philosophical devotee of communism, would have been expected to admire Plato because of many aspects of Plato’s ideal city. In

conclusion, the stamp of greatness can be applied to the original wisdom of the *Charaka Samhita*, if not to those who subsequently edited and manipulated it to their own ends.

End of Excursus

D. Conclusion

The metrics of the Mohenjo-daro civilization were similar to Miletos, but the absence of monumental structures and lack of evidence for social stratification suggest an egalitarian civilization. The absence of large municipal works also might be consistent with an overall egalitarian social management of the city, for physical coercion in building monumental structures was not needed. But given the size of the population this would have been without precedent. The two most viable options are (1) an early form of corporatism with workers/members as a group involved in aspects of management of a specific commercial interest (the city was divided into neighborhoods, and there were some large assembly spaces in the city center), or (2) a heterarchy of commercial production interests in which a significant part of social control was not just over those affiliated with specific types of production but was also included within the entire network of commercial ventures affecting the overall course of city life, a corporate structure instead of traditional hierarchy. Perhaps (1) evolved into (2), with late development of elite or politically hierarchical groups. Those involved in managing the many commercial products may have made most decisions related to the population and could have dominated the city. This would not have interfered with small peripheral agricultural settlements or their egalitarian kinship traditions. For those within commercial neighborhoods, however, their association within either a heterarchy or commercial corporatism would have greatly weakened any kinship allegiance. As a part of the apolitical settlement hierarchy that developed as the city population enlarged, specialties useful to commercial and private interests must have developed, including medical practitioners. Nothing relevant to medical practice has yet been uncovered, but a sizeable city with an architecture that incorporated bathrooms and city-wide drainage/sewage systems must have had practitioners providing clinical care for perceived basic health needs. We await their discovery.

Based only on circumstantial social evidence, it is tentatively proposed that at the time the Indus River civilization flourished the objective medical wisdom to be found in later Ayurvedic tracts was first collected in its cities such as Mohenjo-daro. It is also likely that, as proposed by Dr. Kak, it was at this time the formal collation of the Vedas took place. The *Atharva Veda*, therefore, may in the future be found to attribute its perspective of objective science to the stimulus of the work of networks of medical practitioners. This proposed scenario accommodates aspects of the philosophical orientation of the Vedas as primarily a creation of the subcontinent.

Summary Table of Mohenjo-daro, but also similar for the city-state of Harappa:

STAGE – Bronze Age

POPULATION, LOCAL – 40,000

POPULATION, TOTAL – unknown, but total Indus River region population was *ca.* 5,000,000 divided among about 70 cities = 71,000 per city and its environs

PRIMARY AREA – 1.6 square miles

URBAN DENSITY – 56 persons per acre

PRODUCTION – pottery, agriculture, jewelry, textiles, ivory, extensive distant and local trade

GOVERNANCE – social stratification within neighborhoods, probably based on commercial leadership; but municipal coordination can only have come from agreements among commercial operations (a heterarchy) or from corporatism within neighborhoods and with workers approval

EGALITARIAN ARCHEOLOGY - yes

PROMINENT EGALITARIAN KINSHIPS – in peripheral villages for control of resources and coordination of agriculture

WRITING – uncertain, but possibly an early form with only a few hundred symbols, so far undeciphered

DISTANT TRADE – yes

SPECIALIZATION – yes

MONUMENTAL STRUCTURES - no

DENOUEMENT – possibly environmental changes, but uncertain

MEDICAL PRACTICE – so far no evidence

FORMATIVE PERIOD – 800 years

FLORUIT – 500 years (2500-2000 BC)

CITY-STATE – yes

AVERAGE LIFE EXPECTANCY – 35 years²⁵ (for the better off)

²⁵ Based on statement that “almost half” of the population from the R-37 cemetery reached their “mid-thirties.” See: McIntosh, J., *The Ancient Indus Valley: New Perspectives*, Santa Barbara, 2008, p. 253. It seems that neonatal and early childhood deaths were not included in the estimate, and that the buried population may have been more affluent than the general population, although modestly so. If all this is so and the better off population had an average life expectancy approaching 35 years, the mass of the population would have been less well off, and their life expectancy on average would likely have been significantly less. All this is consistent with life expectancies similar to those found in most other late Neolithic and Bronze Age cultures.

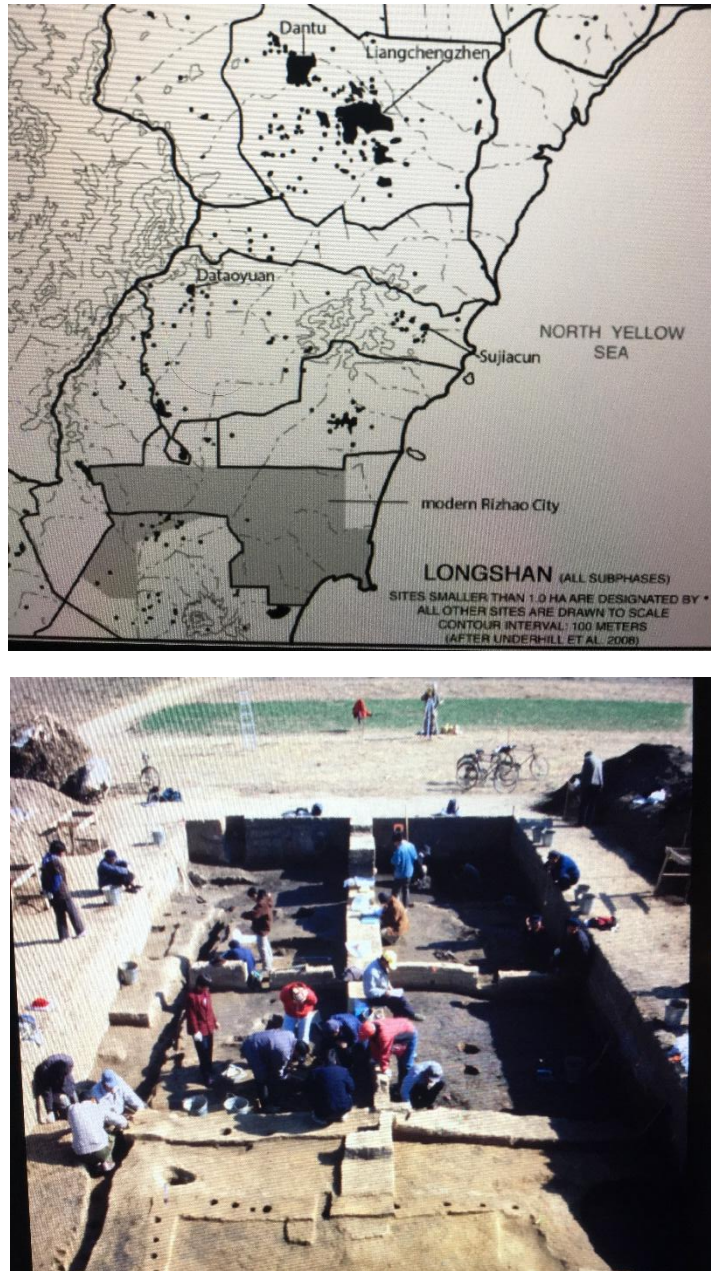


Fig. 5: Top: Topographical location of the ancient Shandon city of Liangchengzhen and its environs. Bottom: As an artistic rendering of the city is unavailable, a photograph of the archeological excavation site taken by Dr. Anne Underhill is available on the Internet through courtesy of the National Science Foundation. Located in the Shandong region of the Longshan civilization, it was relatively isolated from other developing cultures in that the region was swampy, rendering access difficult if by land.

CHAPTER SIX

YELLOW RIVER VALLEY CIVILIZATION

“... whether Huang Ti, the Yellow Emperor, was real, legendary, or mythical is unknown, and perhaps in predynastic times an element of individual and group freedom permitted a rational medical environment to transiently surface, much as the Ebers papyrus may represent the same phenomenon in ancient Egypt.”

The Natural State of Medical Practice, vol. 1, p. 110

Legend holds that it was in the time of the Yellow Emperor (*ca.* 2400 BC) that the Chinese medical classic, the *Huang Ti Nei Ching Su Wen*, a dialogue between the Yellow Emperor and his ministers, was composed. The location was Shandong Province in what is now northern China. An example of a contemporary Shandong city-state is Liangchengzhen, a prominent coastal commercial center flourishing at that time. Although no medical presence has so far been uncovered from archaeological sites, it is proposed that the medical observations in the *Huang Ti Nei Ching Su Wen* may have first been made in such an urban environment. As the clinical contents of the composition, such as have been handed down to us, reveal much that is objective and insightful, it is suggested that at the time of its writing, or prior to it, there was a small network of medical practitioners who shared their medical expertise that ultimately made its way into the received text. Over the centuries substantial new content was amended, such that it now contains discussions of acupuncture and Yin and Yang. But underneath the “new age” additions and the heavy editing in the 8th C AD by Wang Bing, the practical, and sometimes acute, observations made by those ancient practitioners can be detected. These, the true authors of the authentic portions of the *Huang Ti Nei Ching Su Wen*, will remain unknown, but we can opine about the social world in which they worked.

- A. Longshan civilization and the Yellow Emperor
- B. The city-state of Liangchengzhen and its demography
- C. Commentary on the *Huang Ti Nei Ching Su Wen*
- D. The *Huang Ti Nei Ching Su Wen* and the social circumstances surrounding its origin
- E. Conclusion

- A. Longshan civilization and the Yellow Emperor

In the early history of medicine in China the famous *Huang Ti Nei Ching Su Wen* (one translation being the *Inner Canon of the Yellow Emperor*, the title of the standard English language translation by Dr. Ilza Veith) eclipses in prominence all other ancient manuscripts as a guide to clinical practice, a position it still holds today in Traditional Chinese Medicine.¹ Although modern Western analysis of its content finds most to be irrelevant or fanciful, three elements confirm its significance: (1) it has no mystical component, (2) it is patient-oriented in that its focus is the individual patient and each patient is considered unique, and (3) it contains fragments of clinical description that clearly represent attempts at accurate clinical assessment and evidence the practitioners

¹ The companion work to the *Huang Ti Nei Ching Su Wen* is the *Huang Ti Nei Ching Ling Shu*, an acupuncture treatise. As acupuncture was first mentioned in 1st C BC Chinese documents, it does not, as a relatively recent addition to Traditional Chinese Medicine, directly bear on the present discussion.

who wrote them had experience with other patients having a similar problem. The modern version of the *Huang Ti Nei Ching Su Wen* provides no important insight to modern practitioners, but it is necessary to determine how its practical features were derived, for they contrast markedly with the rest of the work.²

As the recent documented estimate for the earliest date for composition of the *Huang Ti Nei Ching Su Wen* is the 1st C BC rather than 2400 BC, what could have been the source of its fragmented wisdom? Was it merely a compilation of observations by contemporary practitioners of the Eastern Zhou (770-256 BC), Qin (221-206 BC) or the Han Dynasty (206 BC – 220 AD), or did that work represent the residuum of dispersed clinical fragments of a school of medical thought that had existed in much earlier, perhaps even prehistoric, times? Legend and myth suggest the latter, for authorship of the *Huang Ti Nei Ching Su Wen* has been attributed to the Yellow Emperor (reigned *ca.* 2400 BC) of the Longshan Culture (2900-1900 BC and 2600-2000 BC are proposed dates), declared the formative era of a distinctive Chinese culture. The Yellow Emperor is considered the source of numerous examples of beneficence to mankind, a functional parallel to that ascribed by ancient Greeks to Prometheus, the mythical Titan overthrown by the Olympian god, Zeus, for stealing fire and giving it to mankind. An important difference is that the Yellow Emperor is claimed to have united, by carrot and by stick, much of the Central Plain of China. Like Prometheus, however, many consider the Yellow Emperor to be myth rather than legend. What is the place of Longshan Culture in Chinese history?

There seems to be general agreement that the proximal Neolithic culture preceding the Longshan, the Yangshao (*ca.* 5,000 to 2,500 BC), was an early agricultural culture associated with somewhat mobile populations periodically seeking more bountiful harvests and returning to sites they previously had occupied. Their distinctive pottery was not made with a potter's wheel, and descriptions of their "round wattle-and-daub huts, each with reed roof and plaster floor and an oven in the center" closely mirror Bronze Age huts of Flag Fen in Cambridgeshire, England, the latter being proposed as seasonal dwellings for a more distant but dispersed population in approximately 1500 BC (see Fig. 19, p. 245).³ The Yangshao people had neither central government nor a temple culture and lived in villages covering perhaps 10-50 acres with estimated populations averaging about 300.⁴ There is no evidence of martial effort, the small peaceful villages often being surrounded by a ditch considered insufficient to protect against human invasion. The later years of Yangshao Culture saw deterioration and a degenerative decline in quality of workmanship traceable in its pottery. This apparently egalitarian society was then replaced by the Longshan people.

Whether the early Longshan people were indigenous or had migrated from the north down the coast to settle in the lower Yellow River valley is debated. It was during this age, one characterized by a rapidly growing population, greater competition for available resources, and strong defensive and offensive military postures, that the Yellow Emperor is thought to have unified the Chinese people, preparing them for the postulated Xia dynasty of a confederation of states (2100-1600 BC) and the Shang dynasty (1600-

² The *Huang Ti Nei Ching Su Wen* contains some acupuncture and much theory derived from the 3rd C BC concept of Yin and Yang, again both probably late additions to a set of pre-existing clinical observations.

³ Sullivan, M., *The Arts of China*, 4th edition, Berkeley, p. 5.

⁴ See: Maisels, C. K., *Early Civilizations of the Old World*, London, 2001, p. 271; Wang, J., *Population Pressure and Growth of Chinese Primitive Agriculture*, in *Agricultural Archaeology*, 3:58-73, 1997.

1046 BC) that followed. Population estimates of Neolithic China are sparse and mere guesses based on things like village size and characteristics of dwellings, but pursuant to present discussion, the average size of a sample of Longshan villages is calculated to have been 43,000 square meters (about ten acres) for an average population of 640. This contrasts with the average village population of the antecedent Daxi and Dawenkou cultures estimated to be in the range of 300 or less, but with notable larger exceptions.⁵

The Yellow Emperor is one of several sages and demi-gods of Chinese prehistory traditionally placed in the Longshan Culture, a late Neolithic culture notable for its distinctive pottery and development of the pottery wheel, rammed earth walls, advances in agriculture and domestication and herding of animals, and an early silk industry. Jade, metal tools, and rice as the dominant grain appeared. Some suggest an early form of writing was developed, although supposed inscriptions on bone have yet to be translated.⁶ Dr. Li (see preceding reference) has described ancient Longshan communities as follows:

“The flow of raw material, finished goods, and knowledge among them [the Longshan communities] created a well-integrated Longshan world. The political experimentation in the late third-millennium BCE proto-urban centers, the formation of large religious and political networks, and the expansion of technologies and knowledge in animal, plants, metallurgy, and religious communication mark the Longshan period as a time of unprecedented social and cultural transformation in early China.”

The early rapid expansion of the Longshan population led to numerous small agricultural communities rather than a few large ones, those that were large tending to be located in more isolated regions, the many smaller ones (with areas of roughly 5-20 acres) distributed throughout the flat Central Plain, the region now considered the heartland of Chinese culture. Clusters of small communities then began to surround a central larger one. Over time many communities became fortified, with population estimates for the larger central sites ranging from 15,000-50,000 protected behind imposing walls. To the earlier advances now came the practices of ancestor worship, divination using scapular bones of animals, and an element of human sacrifice.

B. The city-state of Liangchengzhen and its demography

The observation has been made that of the total area that might be considered the Longshan eastern region, where the Yellow River empties into the China Sea and identified as Shandong, was the region least involved in militarization and which displayed the least disparity in wealth. Perhaps pertinent is the local geography, for the Shandong area was relatively isolated and thereby protected from proximal cultures by extensive marshes, only later opening to other areas when climate changes led to drying of wetlands. The clustering of settlements in conjunction with an apparent social integration, rather than segregation, of a communal (commercial?) hierarchy has been

⁵ Extracted from: Min, L., *Settling on the Ruins of Xia: Archaeology of Social Memory in Early China*, in *Social Theory in Archaeology and Ancient History*, Cambridge, 2016, G. Emberling, editor, chapter 13.

⁶ Dematte, P., *Longshan-Era Urbanism: The Role of Cities in Predynastic China*, in *Asian Perspectives*, 38:119-153, 1999.

taken as evidence of a functional network for crafts and trades that provided regional social cohesion distinct from any vertical hierarchy that may have existed or was imposed. Indeed, the development of this pattern has been proposed by scholars as an attractant for movement of smaller settlements and individuals toward an urban environment.

The Longshan civilization is considered to be the opening phase of a united Chinese polity and culture from which is derived its subsequent intellectual heritage. The evolution toward unification may not have resulted from rivalry between chiefdoms but from aggregates of walled villages that organized around a political center for the purpose of defense and maintenance of autonomy, a “city-state” organization that, along with other city-states, would later fuse by a natural cohesion of social identity and permit a mutually acceptable confederation to evolve into dynastic China.⁷

An important and typical Longshan city, some might say a “city-state,” is Liangchengzhen, located in Shandong province.⁸ It developed in a sparsely populated area *ca.* 2600 BC, and by 2200 BC covered *ca.* 700 acres (slightly more than a square mile). Liangchengzhen was centrally located within a cluster of communities that diminished in size according to distance from the center, an organization indicating commercial/economic integration of a region covering perhaps 200 square miles, somewhat less than the size of New York City. Travel by foot to most of its peripheral settlements probably could be made in a day or two. In the absence of information on its population and using 200 square meters as an average size devoted to a city household in studies elsewhere, the city population may have included 14,000 households, and a recent analysis based on regional sustenance suggests the regional population was *ca.* 70,000. Based on archeological findings it is thought that the city was the central distribution point for the region’s communities, and both utilitarian and prestige goods were produced there, presumably to be commercially exchanged for commodities obtained from outlying villages.

Between the early and middle phases of the Longshan civilization the population of Liangchengzhen increased probably because of movement of villagers from peripheral settlements into Liangchengzhen itself. With this in mind the recent report of marked local variation in components of clay used for ceramics in urbanized Longshan regions implies an absence of centralized control of production, but it leaves in place the need for

⁷ See: Dematte, P., *Longshan-Era Urbanism: The Role of Cities in Predynastic China*, in *Asian Perspectives*, 38:119-153, 1999. Relevant to this discussion is the concept of “city-state,” and M. E. Lewis, among others, has cautioned that Chinese city-states must not be considered similar to Greek city-states, for the former were always governed by a strict hierarchy and the concept of equality among its citizenry was never contemplated in city-state operation. But this interpretation of data may not apply to predynastic China, a period prior to the formation of a culturally unified collection of larger city-states with a strong sense of cultural identity and class hierarchy that could contain disharmonious activity. Dr. Dematte even uses the term “koine” in describing the earlier pattern, and *κοινή* is the term used by Aristotle for confederations of city-states and for “mutual advantage.” This change in organization would have occurred in the Longshan era, probably during its earliest stage, although the Shandong region, with a large area being relatively isolated geographically, might have avoided this transition until a later date. The Shang cities have been classified as territorial, by which is meant they were larger and with a strong hierarchy, whereas late Neolithic cities were “city-states.” For a discussion of this point see: Trigger, B. G., *Understanding Early Civilizations: A Comparative Study*, Cambridge, U.K., 2003, p. 92ff.

⁸ See: Yates, R. D. S., *The City-State in Ancient China*, in *The Archeology of City-States: Cross-Cultural Approaches*, Nichols, D. L. and Charlton, T. H. (eds.), Washington, D. C., 1997, p. 77. Dr. Bruce Trigger (see above footnote) has an opposing view regarding city-state status.

a social apparatus in marketing of the product. This pattern, found elsewhere in the Yellow River region (as well as in other Neolithic and Bronze Age civilizations around the world), suggests a commercial heterarchy existed, functioning in parallel with in four-tiered settlement hierarchy as urbanization proceeded, and would remain evident centuries later in the Shang Dynasty.⁹ As in many other city-states the surrounding communities functioned as suburban neighborhoods and provided specialized products and services to the other communities by using the organizational resources of the central city revolving around commercial products, thus also suggesting heterarchical organization. Importantly, Liangchengzhen was located within a few miles of the Yellow Sea and thereby was also a commercial center for trade with distant populations. Given its size, population, duration of occupation and importance there would have been local medical practitioners providing basic medical care to both the central city and surrounding communities, but there is at present no information on this point.¹⁰

It is thought that in its earliest stages Longshan culture may have been egalitarian in that evidence of hierarchy in dwellings and burials is minimal. Liangchengzhen is thought to have less evidence for social stratification than most other sites. But as time passed social stratification appeared contemporaneously with an increasing population, movement of people from peripheral settlements to cities, shamanism, and a more intensive farming with re-use of land. Dr. Li Liu identified social rank in burial sites and stated “kinship-based Longshan communities were internally and externally stratified ...”¹¹ On the other hand, Liangchengzhen was not one of the studied populations cited, and some of the recognized hierarchy may merely have involved settlement hierarchy that naturally occurs as a centralizing population increases in size.¹² Probably relevant is the opinion that the size of the polis increased in the Middle phase of Liangchengzhen development (2400-2200 BC), and that this was associated with a decrease in size of peripheral settlements, suggesting something was triggering urban immigration. That “something” most likely was commercial activity. At this time archeological study

⁹ See: McIntosh, R. J., *Ancient Middle Niger: Urbanism and the Self-Organizing Landscape*, Cambridge, 2005, the section in Chapter 6 discussing the coexistence of heterarchy and hierarchy in ancient China; also: Lanchart, R. E., *et al.*, *Dietary Adaptation during the Longshan Period in China: Stable Isotope Analyses at Liangchengzhen*, in *J. Archeol. Science*, 38:2171-2181, 2011.

¹⁰ For a recent updating of archeological findings in the Yellow River area see: Son Bo, *The Longshan Culture of Shandong*, in *A Companion to Chinese Archeology*, Chichester (UK), 2013, A. P. Underhill, editor, chapter 21.

¹¹ See: Liu, L., *Mortuary Ritual and Social Hierarchy in the Longshan Culture*, in *Early China*, 21:1-46, 1996.

¹² The association between nuclear population size, its natural pattern of organization, necessary agricultural support and the number of services available has been one way to look at urban growth. In this scheme medical practice could be considered one of the services likely to appear as a centralized population reaches a certain size. The otherwise generally close relation of population size with variety of services suggests the form of governance and social structure should be relatively unimportant in determining when medical practitioners will appear to serve the population, its size being the major determinant. But a service based on providing wood for fires within a city is quite different from provision of a service with which a culture has had no prior experience. For present purposes population size is considered one possible determinant for a network of medical practitioners, but only inasmuch as it represents opportunity, not causation. Nevertheless, this would be an interesting area of study. See: Ortman, S. G., *et al.*, *The Pre-History of Urban Scaling*, PLoS ONE 9(2): e87902, 2014.

indicates the city was a four-tiered settlement hierarchy.¹³ A wide panoply of goods and services would have evolved within the polis to support commercial ventures, and this should have included medical practitioners. All this supports the conclusion that a commercial heterarchy was guiding the development of the city. Furthermore, a search for dietary evidence of an elite population has provided no more than suggestive evidence of its existence. As for overall social control, the study of ceramic production technique in Liangchengzhen mentioned above concluded that the production and distribution of ceramics was managed through “flexible, self-organizing systems” and a multiplicity of production sites with no evidence of centralized control, even for high quality products, and this organization was found at several other Longshan sites up through the middle of the Longshan period.¹⁴ This also suggests there were other functioning commercial heterarchies. Finally, in contrast to the flagrantly hierarchical contemporary city of Liangzhu to be discussed later, the burial sites in the Shandong region that includes Liangchengzhen have provided no clear evidence that would suggest a hereditary elite class.¹⁵ The point to be made is that for a significant part of its predynastic existence Liangchengzhen appears to have been a commercial center utilized by various commercial enterprises and traders and unencumbered by a meddling political hierarchy. In this environment the strong kinship alliances that existed weakened as a kinship-based community evolved into a commerce-based city, at least in its formative years. Elitism probably existed within the leadership of commercial ventures but its function and significance was probably limited to particular types of production rather than a hereditary or social class power base, at least initially.

It is not argued that a notable feature of Chinese history is that kinship played a formidable role in state formation. In its prehistory kinships were, as everywhere, the basic structure of society. To this was added ancestor worship, a manifestation of the importance of lineage within a kin group and “a reflection and extension of kinship behavior.” This was essential to State, religious, and political associations beginning with the first Chinese dynasty. Characteristically, therefore, the focus of ancient Chinese society was on kinship rather than the individual, that a person’s worthiness was not based on individual accomplishment but on the adherence to, and support of, his or her function within the larger kinship group, whether at the family or State level, a social obligation with a religious orientation, an extensive ritual and a goal of living up to the expectations of one’s predecessors. With such sweeping social saturation involving kinship, a weakening of kinship ties usually occurring during urbanization would not be expected.

In response, it may be that the one time there was a weakening of kinship structure was during the phase of settlement hierarchy of urbanization when allegiances shifted from the local kinships in peripheral communities to commercial deployment. The frequent association of nuclear families with heterarchical societies has been observed in other cultures, to the point that city neighborhoods were composed of nuclear families whose social ties were with non-kinship peers. The outcome of all this is that scholarly

¹³ For a recent review of the status of Liangchengzhen see: Lanehart, R. E., *Patterns of Consumption: Ceramic Residue Analysis at Liangchengzhen, Shandong, China*, 2015, Graduate Theses and Dissertations, Graduate School at Scholar Commons, especially chapter 2.

¹⁴ See: Druc, I., et al., *A Preliminary Assessment of the Organization of Ceramic Production at Liangchengzhen, Rizhao, Shandong: Perspectives from Petrography*, in *J. Archaeol. Sci.: Reports*, <https://doi.org/10.1016/j.jasrep.2017.12.050>.

¹⁵ See: Barnes, G. L., *Archaeology of East Asia*, Oxford, 2015, especially chapter 7, Emergence and Decline of Late Neolithic Societies (3300-1900 BC).

opinion considers egalitarian kinship of small groups is weakened as they are incorporated within a larger body, with allegiance of each nuclear family shifting to the group that is most important to its well-being. This does not require that kinship lose its meaning, and kinship-based burial sites and other common features can continue to be observed. But it is likely that the assigned status, duties, and obligations of kinship would have to make room for the anti-egalitarian and self-serving nature of the nuclear family.¹⁶

It was during this period, roughly 2500-2300 BC (the middle Longshan period), that the Yellow Emperor is reputed to have lived, the grand descriptions of his accomplishments presumably accounting for or in response to the dramatic proliferation of the population and cultural achievements at that time.¹⁷ This culture would be expected to include his acquisition and dispersion of medical wisdom. About 1900 BC the city and its dependencies were gradually subsumed by the social changes that would lead to the 1st Chinese dynasty.

But what medical wisdom was there? Evidence of trepanation in the Dawenkou Culture and the pre-Qiang people that preceded the Longshan Culture has been discovered, the skull indicating long-term survival of the recipient of the procedure.¹⁸ Other Neolithic findings include evidence of tooth extraction that is postulated to have been a social custom, and a comparison of burial sites of hunter-gatherer vs. agricultural eras in the Yellow River region, ca. 6000 vs. 3000 BC, reveal skeletal remains in the latter

¹⁶ Discussions of the nuclear family often focus on its egalitarianism and the destructive changes in it brought on by the modern world. But gender, age, and physical size guarantee limited success in enforcing equality beyond being helpful. Also, definitions of the nuclear family tend to be specific, whereas in prehistoric settings definitions are not available: grandparents were rare, one parent often deceased, and the “nuclear” family could be non-affinal, nonconjugal, or “nonnuclear” (the latter by circumstance rather than by choice). In roving bands the nuclear family might change according to circumstance, the mother in charge of her children as communal property. Despite this, individual prehistoric dwelling sizes commonly accommodated perhaps four or five persons, estimates of a prehistoric city’s population is sometimes based on an estimate of five persons per dwelling, and anthropological descriptions of prehistoric communities often use the term “nuclear family.” So the point to be made is that the family by whatever name has always existed because its focus is children and their propagation, and the adjective “nuclear” comprises the children and those immediately responsible for their well-being. Finally, the idea that the egalitarian entitlements of tribal members would voluntarily supersede the needs of a “nuclear” family’s children is inconceivable. The “crop” of new members born into a prehistoric society was essential to its survival, and to permit want in one’s children so that another family’s children could benefit would have been a source of conflict. Thus, the linking of nuclear family with egalitarianism, whether intra- or extrafamilial, is immaterial to present discussion. See also p. 249.

¹⁷ In the past it was popular opinion that the Han Chinese as an ethnic group could trace their origins to the Yellow Emperor, and a recent article provides genetic analysis as support for a Central Plain origin for the Northern Han Chinese, although epidemiological specifics, particularly the randomness of the ancient samples studied at the Hengbei site, is unstated. And there is today a grand mausoleum dedicated to the Yellow Emperor located in Shaanxi Province that claims to exhibit his footprint. This site is about 600 miles west of Liangchengzhen. See: Zhao, Y-B., et al., *Ancient DNA Reveals That the Genetic Structure of the Northern Han Chinese Was Shaped Prior to 3,000 Years Ago*; PLoS ONE 10(5): e0125676. doi: 10.1371/journal.pone.0125676. Published May 4, 2015.

¹⁸ See: Han, K. and Chen, X., *The Archaeological Evidence of Trepanation in Early China*, in *Indo-Pacific Prehistory Association Bulletin* 27, pp. 22-27, 2007, and Yang, S., et al., *Trepanation during the late Neolithic Age*, in *Internat. J. Osteoarchaeology*, 33:70-82, 2022. Notably, legend states the pre-Qiang people were subdued by the Yellow Emperor, Huang Ti.

to be smaller, with more evidence of osteoporosis, degenerative joint disease and anemia (criteria for these conclusions unstated), but skeletal ages were older, suggesting the agriculturalists were less healthy but somehow longer-lived. Beyond this type of fragmentary information there is no information on the health status of the region under discussion, and nothing on available medical care. There is abundant modern medical literature claiming an ancient origin for acupuncture and Traditional Chinese Medicine, but despite frequent comment on the venerable nature of those practices there is a lack of objective evidence of such an archaic beginning. At the present time, therefore, it is impossible to identify a late Neolithic medical practice or practitioner.

Thus was the social circumstance surrounding the age of the legendary Yellow Emperor, and it was this time of territorial contests among autonomous city-states that has been proposed as the time he came to head a confederation of them. Today a monument located in Shou Qiu, Shandong Province, is said to mark his birthplace, about 150 miles inland from Liangchengzhen. Confucius came from the same region.

Liangchengzhen and many other Longshan settlements declined, some disappearing, *ca.* 2000 BC, their place taken by a developing Bronze Age territorial state with centralized commercial and social controls. Most prominent was Erlitou, a large city with palatial buildings and a walled section behind which the elite lived. Ceramics now revealed a uniform pattern of production. Central control was now in place. It is postulated that this new arrival in the region represents the legendary first dynasty of China, the Xia.¹⁹

C. Commentary on the *Huang Ti Nei Ching Su Wen*

Excursus on the *Huang Ti Nei Ching Su Wen*

The Yellow Emperor's Classic of Internal Medicine,²⁰ or *Huang Ti Nei Ching Su Wen*, is first mentioned in the *Hanshu* (the *Book of Han*, written in 111 AD, is a history of the early Han Dynasty, 206 BC to 23 AD). It is one-half of a work entitled *Huang Ti Nei Ching*, the other half being the *Huang Ti Nei Ching Ling Shu*. As the latter is said to refer only to acupuncture, and as acupuncture cannot be identified as a therapy prior to the 1st C BC, it is not discussed here. The *Huang Ti Nei Ching Su Wen*, in contrast, was stated in the *Hanshu* to contain medical wisdom from ancient times. As such it is important to add a confirmatory note that the Han dynasty has never been cited as the source of the wisdom in the *Huang Ti Nei Ching Su Wen*, merely its composition/collation, thus also confirming the existence of a reputable medical profession at some point prior to 206 BC, the onset of Han rule.

¹⁹ See: Liu, L., *On the Chronology of the Three Dynasties*, a Special Report found on *The Ancient East Asia Website*; Liu, L., *Urbanization in China: Erlitou and Its Hinterland*, in *Urbanism in the Preindustrial World*, Tuscaloosa, 2006, G. R. Storey, editor, p. 161.

²⁰ This is the title of the book by Dr. Ilza Veith that is considered a key work informing Westerners about ancient Asian medicine. See: Veith, I., *The Yellow Emperor's Classic of Internal Medicine*, Baltimore, 1949. Veith's translations used herein are placed in quotation marks. Her work included only 32 of the 81 chapters of the *Huang Ti Nei Ching Su Wen*.

There are differing accounts of the authorship and editing of the *Huang Ti Nei Ching Su Wen*, but the principal editing, which all concur has provided the most authentic version, is that by Wang Bing in the 8th C AD. Wang was a minor functionary of the Tang dynasty and there is no evidence that he was a physician. He nevertheless revised the work, heavily annotated it, and added to its content (just as more than one-third of the ancient Ayurvedic work, the *Charaka Samhita*, was written by Dridhabala, a non-physician, in the 9th C AD (p. 82), and major editing of the *Medical Treatise of Prognosis and Diagnosis* in ancient Mesopotamia was undertaken by another non-physician, Esagil-kin-apli, in the 11th C BC), and in doing so made it more consistent with contemporary theories of physiology that authenticated acupuncture, moxibustion, and their relation to the cosmos. Notably, there is much in the *Huang Ti Nei Ching Su Wen* that involves acupuncture, both its theory and its actual performance. It is therefore certain that those sections mentioning acupuncture are not the ancient part of the *Huang Ti Nei Ching Su Wen* referred to in the *Hanshu* bibliographical entry, for the earliest mention of acupuncture and the earliest evidence for its practice is during the 1st C BC, not long before the *Hanshu* was written. The following interpretation of parts of the *Huang Ti Nei Ching Su Wen* expressly omits references to acupuncture. Many authors were involved in transmitting its fragmented wisdom, but conceivably it was derived from a single source. A few academics ultimately enfolded that wisdom into a philosophical unity consistent with respect for authority demanded by China's bureaucracies. That unity, that "onto-cosmological whole" with its profound effects on anatomical and physiological theory, beclouds the deeper truths in the *Huang Ti Nei Ching Su Wen*.

There are several aspects of the *Huang Ti Nei Ching Su Wen* that are in accord with Hippocratic teachings: (1) recognition of the uniqueness of the individual patient, (2) the absence of mystical components in diagnosis and therapy (although there is acknowledgement of pre-existing religious handiwork in formation of the cosmos and its order), and (3) attempts at prognosis. Another area that might yield parallel wisdom with Hippocratic medicine involves a glimpse into the clinical acumen and observational skills of the practitioners upon whom the Chinese treatise is based. To obtain that glimpse, knowledge of the Chinese language, modern and archaic, is essential. The preferred English translation used for the present explication was made by Dr. Ilza Veith in 1949. With foreknowledge that the *Huang Ti Nei Ching Su Wen* was written in archaic Chinese in the original and unable to be adequately translated even today,²¹ its original content buried under "heaps" of glosses, theories, errors, and personal amendments and preferences, and its authorship and even its original internal organization totally unknown, the Veith translation provides the most readable and realistic presentation of the work for the average reader, whether a medical professional or not. A more literal translation is that of Dr. Unschuld, one that provides additional chapters and greater detail than that of Veith.²² Although no more helpful in clinical interpretations, it was used to verify, or not, an occasional translation by Veith.

Similarities with Classical Greece and Hippocratic medicine include:

²¹ See the 2002 reprinting of: Veith, I., *The Yellow Emperor's Classic of Internal Medicine*, Berkeley, especially the Introduction by Kenneth Rose regarding the work's difficult translations.

²² See: Unschuld, P. U., *Huang Di Nei Jing Su Wen*, Berkeley, 2003.

Chap. 1 – In ancient times “the people had temperance in eating and drinking, regular hours of sleep, orderliness, and exercised restraint.” In ancient Greece it was “nothing too much.”

Chaps. 2, 3, and intermittently throughout the Su Wen – “Great Treatise on the Harmony of the Atmosphere of the Four Seasons with the (Human) Spirit” is the title of chapter 2, and the content of it and the other sources is consonant with Hippocratic references to climate and season and the afflictions that tend to be more common therein, especially sections of the “Constitutions” that are present in the Hippocratic works, *Epidemics* I and III, translated in volume 2 of *The Natural State of Medical Practice*.

Chap. 4 – The final line of this chapter states a learned practitioner “should not teach it to the wrong person,” meaning the proper way to understand and implement medical wisdom. This is reminiscent of the Hippocratic dictum in the Oath: “to impart precept, oral instruction, and all other instruction to my own sons, the sons of my teacher, and to indentured pupils who have taken the physician’s oath, but to nobody else.”

Chaps. 5,6,7- These three chapters discuss Yin and Yang and might be likened to the Hippocratic work, *Nature of Man*, in which several sections are devoted to humoral theory, a medical theory that invokes an element of balance of forces/substances in health maintenance. And in chapter 7 there is mention of phlebotomy of one to three pints of blood, the latter a dangerous amount unless spread out over a day or two, although two pints of blood removal was permitted by the Hippocratic physicians. In contrast to ancient Greece, however, phlebotomy is thought to have rarely been performed in ancient China, and the Unschuld translation is quite different from that of Veith in that blood in the amounts stated were released in the stool rather than withdrawn from a vein.

Chaps. 8-11 – The Hippocratic work, *On the Number Seven*, is evoked in these four chapters that recount the theory of the five viscera and interrelated numerical systems.

Chap. 13 - A sentence giving the reason treatment was unnecessary in “ancient times” is translated by Veith as: “Hence it was sufficient to transmit the essence and to invoke the gods,” which is similar to Hesiod’s Golden Age of man found in his poem, *Works and Days*.

Chap. 14 – “Thus distress can move into the lungs (center), and the entry of life-giving force is impeded from within” can be at least superficially equated with the Hippocratic concept of “pneuma,” meaning breath, spirit, soul, and sometimes, in modern terms, oxygen.

Chap. 17 – “When the pulse beats are all light and floating and not hasty ... they indicate fever.” This statement, which seems incorrect, is nevertheless similar to ancient Greek medicine in that Greek physicians, and many who followed them in subsequent centuries, tried to use the pulse to determine the presence of mild fever, even developing clocks to do so, for a high fever was easily detectable by palpation, but milder fevers less so. Furthermore, (1) some diseases such as typhoid fever may exhibit pulse-temperature dissociation where the fever may be high but the pulse normal or slow, and (2) the “light and floating” pulse may reflect a significant drop in blood pressure.

Chap. 22 – The *Su Wen* identifies five categories of taste: pungent, sour, sweet, bitter, and salty. The tastes mentioned by Aristotle (in *On Sense and the Sensible*) include sweet, harsh, pungent, astringent, acid, and salty (bitter). This chapter states that the universe was created for “the greatest achievement: Man.” This might be considered similar to the claim of Protagoras (490-420 BC) that “Man is the measure of all things,...,” although some would have its meaning be that “a man” is the “measurer” of all things. The *Su Wen* also states “Man draws life from Earth, but his fate depends on heaven.” Hippocratic Greece was influenced by the worldview of Hesiod regarding gods and mankind’s fate.

Chap. 25 - Here is mentioned the theoretical association of body elements (earth, fire, wood, metal) in a way reminiscent of a theory of humoral balance as commonly attributed to the ancient Greeks. In the Chinese theory each element is able to overcome actions of the other elements in a “rock, paper, scissors” mechanism for maintaining internal balance.

Selected clinical descriptions include:

Chap. 16 – This chapter concludes with terminal clinical manifestations of classes of lethal diseases:

Great Yang (fire) – fever, convulsions, disconjugate gaze, perspiration; this is a description of a septicemic death, including those with meningitis or other central nervous system involvement.

Lesser Yang (wood) - coma; with no fever or jaundice this could represent a description of a metabolic death, *e.g.*, end-stage renal disease, myxedema (severe hypothyroidism).

Bright Yang (“sunlight”) – alert but delirious, jaundice, not febrile or septic; consistent with death from liver failure.

Lesser Yin (metal) – abdominal distention, foul breath and teeth (chronicity), constipation, possible superior vena cava obstruction; consistent with death from liver cirrhosis with ascites.²³

²³ Medical background: In addition to health problems and threats common to all societies such as abscesses, cuts, sprains, fractures, epistaxis, childbirth, etc., there will be those problems unique to geographic locale, lifestyle, occupational spectrum, population size, isolation, differences in flora and fauna, and human conflict. A major health problem for the most part restricted to Asia is caused by *Schistosoma japonicum*, a common cause of liver cirrhosis and ascites. It is more common in warmer, wetter, regions, usually near rivers, ponds, and lakes, although it is widespread. With a life cycle that is similar to other schistosome species around the world, it is unique in that it produces a massive number of organisms within an infected individual, and a lethal infection can be obtained with just a brief one-time exposure to contaminated water. A popular descriptive diagnosis of a patient with liver cirrhosis from schistosomiasis in modern Asia is “potbelly or “big belly disease,” an appearance resulting from ascites, large amounts of fluid in the abdominal cavity. Another common manifestation of *S. japonicum* is neurological, including seizures, focal paralyses, spinal cord damage, etc. *S. japonicum* has been diagnosed in an early Han dynasty burial.

Great Yin (water) – abdominal distention, shortness of breath without cyanosis (initially), vomiting, no passage of stool; suggests death from small bowel obstruction or perforation, although pain is not mentioned. Alternatively, ascites could also be so associated.

Terminal Yin (“absolute”) – inflamed pharynx, protruded tongue; suggests death from retropharyngeal abscess or diphtheria.

Chap. 17 – Clinical aspects of sphygmology (examinations of the arterial pulse) are mentioned here:

The pulse “is the storehouse of blood,” indicating blood is somehow made to pulsate, a conclusion derived from watching pulsatile bleeding following arterial incisions.

A peripheral pulse that is “small and fine, slow and short” and feels like “scraping bamboo with a knife” might be similar to the pulse in cardiac tamponade, especially when associated with uremia or hypothyroidism or if the tamponade is sufficient to make a weak peripheral pulse even weaker during inspiration. This specific abnormality is mentioned here because it “indicates that the heart is irritated and painful,” and inflammation of the pericardium (the tough but thin membrane covering the heart), one cause of tamponade, if present, can indeed be very painful.

In one section it is stated that if the complexion is abnormal but the pulse is satisfactory there is chronic disease; if the complexion is normal but the pulse is small (diminished, rather than slowed; Dr. Veith translates the term as “reduced”) there is acute disease; if the complexion is abnormal and the pulse is small there is chronic disease. If the author is referring to pallor this would be a reasonable assignment of chronicity, for the anemia of chronic inflammation, of iron deficiency, pernicious anemia, congenital anemias, and many other causes will have a normal pulse because the cardiovascular system will have had time to adapt to the anemia, whereas acute blood loss will increase the pulse, as will fever and other manifestations of acute illnesses.

In response to the idea that at some early date physical diagnosis to ancient clinicians was not limited to complexion and pulse, the latter being a point repeatedly made in the *Su Wen*, the following aspects of examination are identified: the front, the back, the thorax, the pharynx, abdomen, joints, lower back, and feet. It is submitted that this list does not refer to sites responding to acupuncture points, instead being a remnant of what was once part of a true physical examination.

Lastly, it is stated that the head, rather than the heart, is the center of intellect. This, of course, was the conclusion of the Hippocratics.

Chap. 18 – Assessment of health in a man

Here the ratio of pulse rate to respiratory rate is discussed. Importantly, both expiration and inspiration require pulse assessment. If a normal respiratory rate is 14/minute, then

5 pulse beats per respiration gives a minute pulse rate of 70, which is indeed normal.²⁴ “Warm” sickness is indicated when the pulse is 6 per respiration (inspiration plus expiration), the result being a pulse of 84, upper normal being about 90/minute. Associated with lethality is a pulse of 8 per respiration, or 112/minute. These seem far too modest rises upon which to predict dire results. But it must be remembered that in most diseases the respiratory rate also increases, so that if the respiratory rate is rapid, e.g., 20 per minute, and the pulse is 8 per respiration, the calculated pulse rate is 160/minute, an alarming value and very possibly dire. If the patient has a fever and a respiratory rate is 18, then the calculated pulse rate per minute would be 108, consistent with moderate fever.²⁵

“When the motion of the pulse of the neck (is abundant) coughing and troubled breathing occur... .” Jugular vein distention, an indicator of elevated filling pressure of the heart, often accompanies congestive heart failure or heart valve lesions, pericardial effusions, and superior vena cava obstruction from chest diseases. The examiner here is describing the visible pulsation of the jugular veins, and probably the external jugular vein, for the external jugular vein is readily visible, the internal less so. The carotid artery pulse in the neck is not the issue here.

“When the motion of the pulse is great she is with child.” The pulse is indeed more full during pregnancy as the maternal blood volume increases to accommodate the developing fetus.

“Even when there is a disease and fever, the pulse can nevertheless be quiet and still.” This phenomenon, pulse-temperature dissociation, might suggest certain diseases, such as typhoid fever, Q fever, and Dengue fever, or a toxic effect on the heart and its rhythm by diphtheria and other infections.

“Even when there is a leakage and much blood is lost the pulse can nevertheless be full and large.” A recent affirmation of this is: “In contrast, an approximately 30% reduction in central blood volume, whatever its cause, elicits a concomitant reduction in heart rate and blood pressure by a Bezold-Jarish-like reflex.”²⁶

There is the suggestion of auscultation of the heart in the following statement: “The pulses of the regions of the lesser Yin sound near at first, but then they change abruptly to more distant sounds;” The translation of Unschuld, however, is at variance with this translation.

There is the suggestion of palpation of the heart in the following statement: “At the point of death the pulse of the heart flows in front but is faulty and feeble in back, and then it stands still...” As with the preceding, the Unschuld translation is at variance.

²⁴ The Veith translation in the first paragraph of chapter 18 indicates an error: “When there are five respiratory movements to one pulse beat,...” must mean five pulse beats per respiration.

²⁵ Liebermeister’s Rule states the pulse will increase 8 beats per minute for every degree Centigrade the body temperature increases above normal. This is now an irrelevant 19th C dictum.

²⁶ See: Secher, N. H. and Van Lieshout, J. J., *Heart Rate during Haemorrhage: Time for Reappraisal*, in *J. of Physiol.*, 588:19, 2010.

Chap. 19 – In this chapter is a section suggestive of a developing pneumonia with subsequent pleuritic chest pain and fever, cough, dyspnea, and hemoptysis.

The description includes: “... and below one can perceive the typical sounds of illness.” This suggests the use of auscultation, presumably by applying the ear to the patient’s chest. The Unschuld translation is similar to Veith’s on this point, but the footnotes suggest, among other things, that the sound may be “groaning.” Chest sounds in pneumonia could include crackles and a friction rub, which might be interpreted as “groaning.”

“If breath comes like the snapping of fingers upon stone one would call this excess, and disease would arise upon their exterior. But if the breath comes too frequently, then it is inadequate; it means that the disease has reached the interior of the body.” These sentences suggest two phases of a pulmonary infection, the first being something like a bronchitis with upper airway secretions and resulting tracheal sounds as air passes through mucus secretion and sometimes makes a “popping” sound, the second reporting fast respirations and thus suggestive of pneumonia. The possibility that the snapping of the fingers on stone is a metaphor for dullness to percussion seems unlikely. Nevertheless, conceivably the “exterior” does not mean “superficial” but refers to, for example, an empyema (a collection of pus in the chest cavity) with redness and some swelling of the overlying chest wall. In this case, there would be stony dullness in that area on percussion. The next event in this section is a worsening of the patient to the point that he is very anxious and unable to speak because of dyspnea. There is severe pleural pain and decrease in urine output as the end approaches. Overall, this section may have had considerably more clinical information in its original form, now mostly lost or replaced within a narrative of seasonal disease characteristics.

Chap. 20 – Near the end of this chapter on the pulse is found the following: “When the (pulses that indicate the state of the) upper part of the body are solid and full and those of the lower part are empty and hollow, the body is unequal in its compliance; one must search for a coagulation within the veins so that the blood can enter and the circulation can become apparent.” This might mean that the *dorsalis pedis* pulse of the foot is not palpable or barely palpable relative to pulses of the arm. In some people there is normally no *dorsalis pedis* pulse, but to have full pulses above the waist and absent in the feet can indicate arterial occlusion, perhaps by an embolic clot or occlusive atherosclerosis. In the Veith translation the word “circulation” is used, indicating there is normally blood flowing in vessels rather than being static. In the Unschuld translation bleeding by piercing of a blocked vessel can relieve the problem, but interpreting this in the context of circulation of blood is not possible.

Chap. 25 – In a discussion of inner organs and acupuncture the following is stated: “Poisons and medicines cannot cure these shortcomings, the needle cannot extract all of them; therefore one must cut the skin and wound the flesh, and the blood which is attacked by the (incoming) air is of black color.” When blood is exposed to air it always becomes red (there are very rare exceptions). As vomiting and belching are part of the problems being discussed it is possible that the black blood is indeed black blood, perhaps upper gastrointestinal bleeding or swallowed blood that has been partially digested by gastric acid, producing a characteristic “coffee-grounds” vomitus. As for therapy, it states the

practitioner must implement the last resort, surgery or cautery, although just what that means in this context is unknown.

Chap. 28 – Included in this chapter is limited commentary on aspects of sepsis: “When the pulse is full and complete and when hands and feet are chilly while the head is hot (feverish), what can be done?” And shortly thereafter: “The so-called order means that hands and feet are warm. The so-called disorder means hands and feet are cold.” “If hands and feet are warm then it means life, when they are cold it means death.” Taken together, this suggests the practitioner was describing what the Hippocratic physicians would have termed ἀναθερμαινόμενος (anathermainomenos), meaning “unable to be warmed up.” To a clinician this can mean the patient has profound peripheral vasoconstriction due to the body’s attempt to raise core temperature or that the blood volume has acutely and severely diminished. Attempt to warm the cold areas is difficult because peripheral blood flow is profoundly restricted by the vasoconstriction and cannot get to the skin surface to warm it or to acquire warmth from applied heat, a sign of a very sick patient.

In the next two paragraphs it is stated that an infant with fever, troubled breathing, and wheezing “while resting its shoulders” had a “large and full pulse.” Ch’ i Po then said if the pulse was slow it meant life, but if it was rapid it meant death. It is possible that “while resting its shoulders” indicates the child was not using its accessory muscles of respiration, the use of which is a clinical indicator of severe respiratory distress in asthma. This child was either not in severe respiratory distress or was in such severe respiratory distress that lung function was lethally impaired or the accessory muscles of respiration were so fatigued that it was impossible to maintain adequate oxygenation and removal of carbon dioxide and was about to succumb. A slow pulse would indicate the former; a fast pulse would indicate the latter.

In the next two paragraphs is described a patient with blood in the stool. This can have many causes. If there is no fever, infectious processes are unlikely, and the most common cause of the blood would be hemorrhoids. On the other hand, hemorrhoids are more common with aging and should have been seen infrequently if life expectancy averaged 35 years. If there were a fever, infection is likely the cause of the bowel disease and the outcome would be much more grave.

Later in the chapter there is this: “When an ulcer develops without one’s knowing its exact location (root) within the body, and when the physician then examines it with his hands, he is not able to achieve a result....” Here the lesion cannot be localized by history or superficial examination of the patient, but the physician then palpates the abdomen, chest, and any tender area to locate the suspected lesion. The term “ulcer” may be better translated as “lesion.” The same can be said of the next paragraph, where the “ulcer” is underarm, meaning in the axilla. Both instances suggest the better translation would be “abscess,” and in the former instance an occult abscess is not rare. The exact meaning of “ulcer” is not resolved, but at a minimum it indicates the physician was truly performing a “complete” physical examination of the patient.

Chap. 31 – This chapter has been postulated to describe typhoid fever. Here it is seasonal, occurring more often in the summer and early autumn, which is true of typhoid in some areas but with monsoons in others, and improvement from nonfatal disease is under way

after two weeks, also true of untreated typhoid fever. Sensorineural hearing loss, sometimes irreversible, is well-described prior to the antibiotic era and was a bad prognostic sign in typhoid fever. A headache, a dry, cracked, or coated tongue, and marked anorexia are very common, almost characteristic of the disease. Abdominal signs and symptoms often dominate the clinical picture. Duration of symptoms of uncomplicated and untreated typhoid fever is about two-three weeks. Relapse is common, and delirium is an ominous sign. It can be concluded that the Veith translation is fully consistent with the diagnosis of typhoid fever, although the description is not a complex or sophisticated one.²⁷

Chap. 32 – Acupuncture is the purpose of this chapter and is not relevant to present discussion. But there are several minor clinical points. (1) The opening paragraph describes jaundice and fever, but the appearance of jaundice preceding the fever indicates this is not a viral hepatitis, but resembles more biliary tract obstruction, perhaps by a gallstone, with superimposed biliary tract infection and sepsis. An associated pancreatitis is not likely because that type of pain makes a patient prefer to sit motionless and bent forward; thus the limited information given in the text still indicates clinical observations that permit a narrowing of the differential diagnosis. (2) “All [the hot diseases] which must be cured by perspiration should be cured on a special day by much perspiration.” Since perspiration is typical of a resolving fever of almost any type, the writer is making a statement that has limited logic behind it, but should the patient perspire and then improve the practitioner would have been considered a hero. The underlying disease process is, of course, unaffected by this, a totally different matter. (3) “When the illness of the heat is located in the heart, there is no joy; after several days there is fever.” Here the practitioner has identified the prodrome of “malaise” that precedes overt clinical disease in many illnesses. It is part of a group of symptoms that reflect the body’s response to release of pro-inflammatory cytokines. The vagueness of the symptoms and absence of physical evidence of illness led Western medicine to declare it a real identity only in recent centuries, but here it is properly identified by ancient medical practitioners as pathological.

Chap. 33 – In this chapter the ominous nature of delirium is identified. There is also the following interesting section beginning: “The troublesome wind affects, as a rule, the place beneath the lungs....” The evil wind brings illness that begins with saliva and mucus production and chills.²⁸ About a week later the secretions have decreased but now the

²⁷ For a comprehensive review of typhoid fever as clinically diagnosed prior to knowledge of its bacterial origin see: Bartlett, E., *The History, Diagnosis, and Treatment of the Fevers*, Phila., 1856, p. 33ff.

²⁸ See: Dharmananda, S., *FENG: The Meaning of Wind in Chinese Medicine*, October, 2010, on the Institute for Traditional Medicine website. The proper interpretation of many words of the *Su Wen* is critical to its full understanding, but experts are divided on meanings, either of a word in context or even the basic word/character itself. The result has been an incomprehensible mixture of theory and practice that in many areas seems to be gibberish. In part this has been due to its editing in centuries past, and the editing and commentary by Wing Bang, the basis for the modern text, is even more unintelligible. In a sense this is what happened to Hippocratic texts where there is no doubt that the ancient Greek texts were, over centuries, edited by persons who knew less about the subject than the author(s). And this basis for misunderstanding is further compounded by the archaic

mucus appears in a green and yellow clump that seems purulent. This could be an attempt at describing a common scenario for the onset of pneumonia following a viral upper respiratory tract infection or perhaps influenza. Next in the chapter is a description consistent with increasing ascites associated with periorbital edema and probably pleural effusions as the patient cannot lie down. He breathes with mouth open, has what might be early satiety from intra-abdominal pressure, in part due to tense ascites, on the stomach. The conclusion states that, in worsening, the breath can no longer get into the lungs and “circulate,” which may mean that all areas that are supplied by blood will not be carrying sufficient “breath” (*i.e.*, oxygen) and will not function.

Chap. 34 – Near the end of this chapter is a description that might be congestive heart failure or some other cause of fluid overload and pulmonary vascular congestion.

The *Huang Ti Nei Ching Su Wen* has now been shown to contain snippets of good clinical information, many of which would not have been made had not the original observer been somewhat knowledgeable about a personal medical history, physical examination, and pathophysiology. It can be further inferred that the practitioner had seen several patients with a specific disorder and that he had enough respect for the accuracy of his observations and their relevance to the care of the sick to write his findings and interpretations down, for he would not have done so had he not wished to broadcast his findings to other practitioners. The importance to present discussion, therefore, does not concern so much the correctness of his observations and inferences as the method used to obtain that knowledge during the era in which he lived. Under existing circumstances these ancient physicians must be highly praised for their effort and for the astuteness of their findings. They blazed a trail. It was, unfortunately, a trail that would not be followed. A discussion of the subsequent course of Chinese medicine is provided in volume 1, Bk I, chapter 4 of this work.

End of Excursus

D. The *Huang Ti Nei Ching Su Wen* and social circumstances surrounding its origin

The range of medical information in the *Huang Ti Nei Ching Su Wen*, while superficial, is broad, as is the variety of medical problems that are described. Comments on management of diseases, while often bizarre to Western physicians, are presented in an authoritative way that suggests the authors had a breadth of experience. Note that the plural of “author” is used here, for it is unlikely that the range of valid clinical descriptions in the *Huang Ti Nei Ching Su Wen* was collected within the practice of a single person. How does this bear on the origin of a nascent medical profession in ancient China?

That a physician’s history and physical exam underlay many of the clinical descriptions is apparent both in their factual nature and in the sensitive and perceptive metaphorical imagery of physical signs recognizable by today’s clinicians. It can be

characters found in the text. It would be most valuable if a short dictionary or wordlist were made available that would place medical terms from ancient writings into modern linguistic context. This has been done by the author in limited fashion for many Hippocratic terms, and the method used and the wordlist thus compiled is found in the Appendix to volume 2 of this work.

concluded that at least some medical care in the original writing of the *Huang Ti Nei Ching Su Wen* was not perfunctory. Although it is conceivable that only one person was its author, that person must have been privy to the experience of a large number of practitioners.²⁹ This probably required those practitioners to agree among themselves to pool their medical wisdom, for if profit incentive were important the individual practitioner may have resisted sharing personally acquired knowledge, and merely canvassing a neighborhood's practitioners for their occasional interesting cases seems an unlikely mechanism for their collection. What social setting would have tolerated or supported that effort?

One difference between Liangchengzhen and Miletos may have been the use of slaves. In ancient Greece, slaves were usually foreigners and the conquest of war. Depending on circumstance, a slave could become a valuable member of the Greek community and able to obtain his or her freedom. Physicians had assistants, and some were slaves. If sufficient medical therapies were learned by the slave assistant, he was permitted to treat other slaves. The availability of services of slaves as a way of extending the usefulness of medical practitioners may not have existed in Liangchengzhen, at least in the period under discussion, for there is no evidence that this non-militaristic city-state had slaves.

It is probable that there were no local medical practitioners in the small peripheral settlements, for they had to support themselves through agriculture or crafts just as did other villagers. There needed to be some attraction within large population centers for those who would provide full-time medical care. Thus, the knowledge found in the *Huang Ti Nei Ching Su Wen* must have been derived from a large population center. If a city of 50,000 persons included 100 practitioners, such a number could have provided over time a handful of interested practitioners willing to work together to collect the type of objective clinical information that would have been included in the original *Huang Ti Nei Ching Su Wen*.³⁰

From demographic considerations it can be postulated that organized medical knowledge was unlikely *prior* to the Longshan era, but with the evolution of autonomous city-states, an opportunity existed for individual entrepreneurial medical practitioners to organize collegially. Being of a common mind, these practitioners could, over time, have collaborated in an organized network for collecting and sharing medical experiences, their names unknown but their heritage encompassed by and ascribed to the legendary Yellow Emperor.

It can also be postulated that the original *Huang Ti Nei Ching Su Wen* was unlikely to have been composed *after* the Longshan era:

²⁹ A similar conclusion based on similar but much more specific and accurate clinical examples is described in *The Natural State of Medical Practice*, volume 1, Book II, chapter 6, where evidence is provided showing that the works of Hippocrates represented not one man's brilliance but was instead the combined wisdom of many clinicians affiliated with a regional network.

³⁰ For example, the ancient regional center of Liangchenzhen in Shandong was at the center of a cluster of perhaps thirty small villages and the grouping may have represented a political unit. In the preceding Dawenkou culture there was no clustering of villages and therefore a population of size/density insufficient for the study required to support the descriptions of the *Huang Ti Nei Ching Su Wen*, whereas the population of Liangchenzhen and its outlying villages may have been sufficient. See: Shelach-Lavi, G., in *The Archeology of Ancient China: From Prehistory to the Han Dynasty*, Cambridge, 2015, p. 130, and Liu, L., *The Chinese Neolithic: Trajectories to Early States*, Cambridge, 2004, p. 199.

a. The post-Longshan period is vaguely defined, and some postulate it was the time of the Xia dynasty. If so, that interval may have been commanded by the central bureaucracy of Bronze Age Erlitou culture that would merge into the Shang dynasty. But the uncertainties of this period of four hundred years resist for the moment any conclusions about the formation of a territorial state. Scholarly opinion, however, cites a deterioration of Longshan culture and its replacement with the Yueshi culture, one of lesser technical achievement; no large cities are identified.³¹ If features of social organization of the region are so nebulous as to be undescribed and if an apparent deterioration of culture occurred over the four centuries, it is difficult to imagine a network of medical practitioners emerging during this time.

b. The later successor to the Longshan Culture, the Shang dynasty (1600-1046 BC), was a hierarchical society with highly regarded military and political classes, and it has been classified as a territorial state. During this era an early form of writing appeared. A dynastic focus of control of the region was strengthened by the rise of ancestor worship, a tool promoted by an obsessed elite kinship for distributing regional power to its family members. Evidence of a controlling central bureaucracy is nevertheless said to have been minimal. But significantly there is nothing of a medical nature in the vast trove of inscriptions found on animal scapulae collected from Shang dynasty sites that suggest any association with medical practice. Instead, the vast majority of scapular inscriptions that bear on illness are oracular and seek the cause and prognosis of symptoms in responses from ancestral spirits as part of a strongly shamanistic culture. The complexity of the written language progressed over time and it has been postulated that it may have reached 3,000 characters by the end of the Shang dynasty.³² With writing well-developed, had a mass of medical knowledge been acquired by Shang practitioners some of it would surely have been preserved in writing and at least the existence of a medical practice or medical composition would have been mentioned in a few of the inscriptions among the tens of thousands of scapular inscriptions so far translated. A separate scholarly review of ancient Chinese medicine concludes that the Shang dynasty was saturated with ancestral worship, oracular diagnosis and prognosis, and mystical wu-shamans that dealt with spirits and demons.³³ Shamanism is absent from the *Huang Ti Nei Ching Su Wen*.

c. The subsequent Zhou Dynasty (1046-256 BC) also has no record of medical accomplishment. The *Rites of Zhou*, composed in the 3rd C BC, is usually mentioned in discussions of ancient Chinese physicians, for it specifies, in effect, a medical department of 22 physicians, including physicians for animals, within a clearly defined hierarchy. As pointed out in *The Natural State of Medical Practice* (volume 1, chapter 4), this indicates that even at such an early date State physicians were there to serve the leaders and elite class, leaving the local practitioners unnamed and unrecognized. This is not surprising, given the rigid hierarchical and feudal system imposed by a Zhou family monarchical system that, considering itself morally justified by divine right, was perpetually at war. During the Zhou dynasty writing improved and medicine was recognized as a vocation. But medicine's primary function was to rid a sick person of demons or to prevent sickness by warding off demons. So pervasive was the demonological concept that all medical illness was considered to be the consequence of a single disease, namely the nasty work

³¹ See: Liu, L., *The Archaeology of China: From the the Late Paleolithic to the Early Bronze Age*, Cambridge, 2012, p. 275.

³² The number of characters in modern monolingual Chinese dictionaries can exceed 50,000.

³³ See: Unschuld, P., *Medicine in China: A History of Ideas*, Berkeley, 1985, especially chapter 1 (Shang) and chapter 2 (Zhou).

of a demon who could manipulate its manifestations so as to range from arthritis to famine. There is nothing in the historical record of the Zhou Dynasty that suggests any association with *Huang Ti Nei Ching Su Wen*, even though the later years of that Dynasty saw the age of many of the great philosophers and thinkers, including Confucius, and produced profound books and treatises on many subjects, including the principal text of Daoism and the *I Ching* (Book of Changes). With such august intellectual company, why would no profound medical work have emerged at this time. Scholars have identified peripheral commentary and anecdotes of a medical nature among a number of compositions done during or after the Zhou dynasty, but none were written by physicians or for physicians and thus shed no light on clinical practice of the time.³⁴ It is nevertheless irrefutable that at least a small medical profession existed and was held in good repute during latter years of the Zhou Dynasty, shortly before the earliest mention of the *Huang Ti Nei Ching Su Wen* but many centuries after the Yellow Emperor.

d. Following the Zhou was the short-lived Qin Dynasty (221-206 BC) when all of China was unified under one master. This supremely authoritarian regime was responsible for some monumental undertakings and for significantly diminishing the population of the region as it attempted to stamp out any menace to the centralized state and the authority that existed between the supreme leadership and the mass of plebeians. In doing this there was a period of purging of intellectuals and a ridding of literary works that were not consonant with official policy. Perhaps treatises on medicine from earlier dynasties were burned or otherwise lost during this destructive era.

A Chinese script was used for divination (oracle bones) during the Shang dynasty. Divination was used to predict the course of specific illness with responses to sacrificial offerings described. But writing is expected in early urban commercialization. Prof. Dematte reviewed third millennium evidence of shared graphic signs. Convincing evidence of writing comes from Dinggong site, two hundred miles from Liangchengzhen. Longshan culture early script is increasingly recognized generally, as is early urbanization in Liangchengzhen.^{35,36,37} Thus, (1) the erudition in the *Huang Ti Nei Ching Su Wen* is unlikely to have been collected prior to the Longshan culture for there was insufficient population to support medical specialization, (2) the Shang, Zhou or Qin dynasties posterior to the Longshan culture provide no evidence of availing themselves of medical wisdom found in the *Huang Ti Nei Ching Su Wen* even though writing had been invented and was used in oracle bone notations, and (3) when mentioned in the *Hanshu* of Han dynasty it was already considered ancient. It can, with a certain looseness of logic, be assigned to its traditional place, the Longshan era of the Yellow Emperor. Even in Han dynasty documents which reference the ancient nature of the *Huang Ti Nei Ching Su Wen*, a similar status has been ascribed to another famous Chinese work, the *Shen Nong*, a

³⁴ See: Gwei-Djen, L., and Needham, J., *Records of Diseases in Ancient China*, in *Am. J. Chinese Med.*, 4:3-16, 1976. Perhaps most relevant for present purposes are the anecdotal descriptions of a medical nature found in the *Tso Chuan* that recount events in mid-Zhou, but they are social descriptions rather than medical ones.

³⁵ Dematte, P., The Third Millennium BCE: Late Neolithic Sign systems, in *The Origin of Chinese Writing*, Oxford, 2022, pp. 149-224.

³⁶ Guangkuo, Y., Pictographic Writing Decodes Genesis of Chinese Characters, in *Chinese Social Sciences Net*, 11-11-25.

³⁷ Underhill, A., et al., Urbanization in the eastern seaboard (Haidai) area of northern China: Perspectives from the late Neolithic site of Liangchengzhen, in *J. Anthropol. Archaeology*, 62: article 101288. June 2021.

pharmaceutical and agricultural treatise also written in the late Han Dynasty but stated to be a summary of knowledge obtained prior to that dynasty. Shen Nong, the purported author, has been described as related to the Yellow Emperor, thereby suggesting the origin of that literary work also is from the Longshan period. Just how early wisdom was passed down over two thousand years to be rediscovered during the Han dynasty is unclear. Epic tales have been handed down using poetical mnemonics, and there is rhyming in the *Huang Ti Nei Ching* (so stated in the *Memory of the History of the World*, a UNESCO organization), although whether this was in the original is unknown.³⁸ Perhaps the *Huang Ti Nei Ching* is a compilation of scraps of knowledge from many sources, but the cohesiveness of the work suggests an originally coordinated assemblage of knowledge.

Having covered many circumstantial social aspects surrounding the *Huang Ti Nei Ching Su Wen* that support its origin in the Longshan period, it is but fair to state that modern scholarship puts its authorship during the Warring States period, roughly 475 to 220 BC. Dr. Robin Yates (see footnote, p. 96) has stated that shamanism was discredited and disappeared at this time. Perhaps this reflected the appearance of medical practitioners shortly before the time of the composition of the *Rites of Zhou*.

E. Conclusion

It is proposed that two of the most famous productions of medical literature in Chinese history may well be of prehistoric origin as popular tradition and opinion suggest, perhaps prior to dynastic China.³⁹ Why should a medical enterprise arise during the Neolithic but not in later city-states or in the more complex dynasties that would immediately follow. The answer may lie in the observation that those of the Longshan civilization such as Liangchengzhen remained relatively autonomous in their commercial undertakings and operated in a heterarchical environment. They were unique in that they retained autonomy even during the formation of confederations, whereas all others, which can be principally ascribed to the late Longshan Culture and the Xia, Shang and Zhou dynasties, were territorial states of a cultural system that at all levels incorporated a rigid hierarchical authority and would become tributaries to centralized government.⁴⁰

³⁸ There has been a legend in the oral history of a Native American group (the Heiltsuk Nation) on the west coast of Canada that mentions a coastal area that was a climatic sanctuary for its predecessors during the last glaciation. The *Smithsonian Magazine* (Smithsonian.com, April 5, 2017) has reported archeological confirmation on Triquet island. This suggests that the oral history of this extraordinary population has maintained an element of accuracy for as long as 14,000 years. It has also been pointed out that oral tradition has perpetuated down to the present day herbal remedies found in ancient Egyptian papyri, a 3,000-4,000-year passage, among individuals with no access to those papyri.

³⁹ There were many city-states in ancient China, but within dynastic China cities ranged greatly in size and were without exception tributaries to a central authority, *i.e.*, components of a territorial state, rather than being autonomous.

⁴⁰ For a scholarly review of Chinese city-states see: Yates, R. D. S., *The City-State in Ancient China*, in *The Archeology of City-States: Cross-Cultural Approaches*, Nichols, D. L. and Charlton, T. H. (eds.), Washington, D. C., 1997, chapter 5, pp. 71-90. It is pertinent that the author sees a common thread centered about ritual that would permit merging of local, but always hierarchical, societies into larger ones. This would permit some degree of non-destructive autonomy for the individual city-state aggregation of villages, but the degree of autonomy permitted to citizenry is open to

The metrics for Liangchengzhen were similar to those of Miletos, and Liangchengzhen, like Miletos, was close to the sea and therefore had trading options and communications unavailable to most Longshan cities. Protected by its environment for centuries, also like Miletos, its artisanal production could develop regional networks that permitted commercial networking without coercion of a hereditary or political hierarchy.

The power of kinship in the Longshan culture, however, is apparent from mortuary studies that revealed internal and external stratification.⁴¹ All levels of kinship were invoked by elite and plebeian classes alike. Study of ceramics, however, indicates there was no central control over production and no uniformity in manufacture of Liangchengzhen products. Components of pottery clay in houses where they were produced varied directly with local clays. It may be, therefore, that it was nuclear families that worked within a larger heterarchical commercial network. Nuclear families resist kinship obligations and duties. Corporatism may have been involved if family units worked within trading ventures to distribute their wares.

The deterioration of Liangchengzhen that was under way by 2000 BC is unexplained. The weakened Longshan region ultimately came under the aegis of the centralized State control of the Bronze Age city of Erlitou (1900 – 1500 BC), thereafter permanently affixed to the Chinese dynastic kinship system.

Summary Table of Liangchengzhen:

STAGE – late Neolithic

POPULATION, LOCAL – 50,000 (Liangchengzhen city)

POPULATION, TOTAL – 70,000, based on estimates of agricultural sustainability

PRIMARY AREA – 1 square mile (hegemony: 200 square miles)

URBAN DENSITY – 78 persons per acre

PRODUCTION – lithic tools, jade, mass production of ceramics, aquaculture, jewelry from imported turquoise and jade, rice, trade center function for the region, maritime trade

GOVERNANCE – a settlement hierarchy supporting a trading heterarchy of a commercially prosperous elite; commercial interests linked the central urban area with peripheral settlements inland and distant regions by coastal trade

EGALITARIAN ARCHEOLOGY - no

PROMINENT EGALITARIAN KINSHIPS – a later development among elite classes

WRITING – probably early forms, *e.g.*, at Dinggong site, Shandong province

DISTANT TRADE – yes

SPECIALIZATION – yes

MONUMENTAL STRUCTURE - no

DENOUEMENT – uncertain, but replaced by Bronze Age settlements and cities

MEDICAL PRACTICE – none identified to date

FORMATIVE PERIOD – 500 years (Longshan; 3000-2500 BC)

FLORUIT – 500 years (2500-2000 BC)

CITY-STATE – yes

AVERAGE LIFE EXPECTANCY – n.a.

debate, for classes of citizens included those of lower status who provided manpower for military ventures and for construction of the huge rammed-earth walls of later Longshan and Shang dynasty centers of power.

⁴¹ See: Liu, L., *Mortuary Ritual and Social Hierarchy in the Longshan Culture*, in *Early China* 21:1-46, 1996. But the four cemeteries studied did not include any from Liangchengzhen.

CHAPTER SEVEN

REVIEW AND SUMMARY OF THE FOUR GREAT CIVILIZATIONS AND MILETOS

“A review of selected ancient societies suggests that several had evidence of a transient period in their earliest histories consistent with a rational medical practice.”

The Natural State of Medical Practice, p. 150

A distinction is made between so-called “great” civilizations and primary civilizations, the former being a sequence of civilizations that depreciate over time but their apparent longevity is viewed as a manifestation of “greatness,” whereas the latter can lay the groundwork for subsequent prosperity and progress. Urban examples from the four primary civilizations of the “great” civilizations, all city-states previously discussed, are then compared to the ancient Greek civilization city-state of Miletos, along with their chronological relation to the great medical classics associated with them. Then the results of all five civilizations are combined and metrics averaged, followed by a discussion of cities and urbanization.

- A. The “great” civilizations
- B. The significance of city-states and an introduction to heterarchy
- C. Overview of the four primary civilizations in comparison to Miletos
- D. Comparison and integration of data from the four primary civilizations and Miletos

A. The “great” civilizations

A summary of the early status of the four great civilizations at the time they developed specialization in trades and crafts, including a nascent medical profession, will now be compared with the Ionian city of Miletos. But first it is necessary to define “civilization” and “great civilization.” Included among the many orthodox definitions of “civilization” is a population with self-sufficiency in agriculture, a government, trade, cities, a form of written communication, and an established religion. Modern definitions of “civilization” include “a high level of cultural and technological development” and “a culture characteristic of a particular time or place,” but the former is too restrictive and the latter too vague for present purposes.¹ For this volume, inasmuch as it analyzes the earliest stages of urbanization, the definition presented on p. 21 is sufficient in that it specifically identifies two interrelated characteristics inevitably underlying the formation of all civilizations: a surplus production of food and the presence of specialization. This simple definition can be applied to prehistoric and historic population centers of any culture. The immediate consequences are analyzed herein to identify factors affecting the early development of a civilization.

There is no consensus as to what constitutes a “great civilization.” Geographical size, duration, and relevance to the modern age are often implied. But do any civilizations merit the praise usually reserved for something truly great? Modern popular history

¹ Webster’s New Collegiate Dictionary, 1979.

agrees they do: “Today’s civilizations owe an immense debt to the powerful empires and mighty cities of antiquity.”² But it is one of the lessons conveyed in volume 1 of this work that, on the contrary, “the powerful empires and mighty cities of antiquity” have been devastating to the mass of humanity and the cause of mankind’s Sisyphean attempts at progress. Despite the hubris of modernity by which we seem to justify the atrocities of ages past as merely the inevitable path to our present greatness, we owe to those mighty empires and cities little but thousands of years of ignorance, want, and wars. Even the origin of cities is suspect, for, as this volume will show, early urbanization was not sought because it was so good but because the egalitarian kinship life of the band or tribe was so bad. People were leaving something rather than going to something, escaping rather than arriving.

As a first step in understanding “great civilization,” a succession of minor civilizations may incorrectly suggest a single long-lived civilization. Unless this is realized, any analysis of the origin of progress may be misattributed to the whole rather than the essential part. To avoid this mistake, the term “primary civilization” will be the focus in this volume, *i.e.*, a civilization that has not been “shaped by substantial dependence upon or control by other, more complex societies.”³ Using this as a guide the selection of the early cities of Uruk, Mohenjo-daro, Hierakonpolis, and Liangchenshen discussed in the previous four chapters qualify as major settlements of “primary” civilizations. It is relevant to note that the four primary civilizations were not particularly long-lived, ranging approximately 600-800 years for their evolution from tiny settlement to prominent city-state, whereas the full extent of the four regional civilizations that succeeded them is often viewed as spanning the entire settlement period of their respective regions, from the earliest times even up to the present day, a conflation that equates civilization with geography. Reckoning from the earliest date of cultural identification of the four regions, the span of the Chinese civilization has been stated to be 4,000 years (to the present), the Egyptian civilization 3,000 years (ending with the conquests of Alexander the Great), the Mesopotamian civilization 3,300 years (ending with conquest by the Romans), and the Indus River civilization 2,000 years (from early-Harappan to the post-Harappan phases). Except for the latter, much of their physical existence and perceived greatness was a reflection of military conquest. For purposes of the present work militarization counts for little, and assuredly not for “greatness,” as a measure of quality.

How did each of the four primary civilizations end? Uruk was superseded by Akkadians who promptly established an empire and a “secondary civilization” that included most of the Sumerian cities; Hierakonpolis was promptly subsumed by Dynastic Egypt and transformed into a religious center; and Liangchengzhen, perhaps diminished by climate change, was subsumed *ca.* 1600 BC by either the territorial state of Erlitou or the Shang Dynasty, a familial dynasty that established hegemony over the Longshan culture and is considered by some as the first Chinese dynasty. The Indus River Valley civilization is different in that an imposed yet cohesive governance over the entire riverine region is not known to have occurred if the theory of an Indo-Aryan influx is in error (see p. 80). The course of local conflicts and rulers in that region is only beginning to be understood. In general, however, the procession of three of the four “great” civilizations can be viewed as a succession of secondary civilizations, at least in their early phases, rather than a singular expression of a logical continuum of cultural maturation. Indeed,

² See: *Ancient.eu* for the *Ancient History Encyclopedia*, “Ancient Civilizations.”

³ See: Trigger, B. G., *Understanding Early Civilizations*, Cambridge (UK), 2003, p. 19.

perhaps all human prehistory and history is being viewed through the wrong end of a telescope in a subconscious attempt to concentrate on and justify events that have led us to where we are today. But looking through the right end of the telescope may permit our better judgment to come to bear on causation of specific events and losses rather than just victories, on sentences of a book rather than its chapter headings. In the final analysis, the reason that the great civilizations came to be considered “great” is not that they became better but because they became bigger, either in size, population, or duration. And they became bigger because they were crueler. They became bigger rather than better, they acquired rather than invented, they socially deteriorated rather than progressed, and, relevant to present discussion, they copied rather than conceived. Nevertheless, in this process the great civilizations managed to retain elements of successes of their forebears, *i.e.*, their primary civilizations, and thus fragments of earlier medical progress have been somehow dragged even into the modern age. Just why that happened is of course a story already told.⁴

But why is this important for present discussion? If the interpretation expressed in the preceding paragraph is accepted, at least for sake of argument, a comparison of lesser civilizations to the “great” ones becomes less like comparing “apples and oranges,” for the “great” ones were merely the physical progeny (but not the posterity) of primary ones. It also simplifies analysis. For example, the 11th C BC extensive 4th Babylonian dynasty editing of the *Medical Treatise on Diagnosis and Prognosis* is no longer a variable to be considered in assessing the qualities of Sumerian medicine. What is being evaluated is its quality at the time the clinical material was obtained, at the latest 2350 BC, rather than what was added, if anything, between 2350 BC and 1100 BC. The focus is no longer Mesopotamian medicine; it is Sumerian medicine.

B. The significance of city-states and an introduction to heterarchy

It was explained in volume 1 of *The Natural State of Medical Practice* that all four “great” civilizations subsequently incorporated the good practices of early medical practitioners in such a way as to enhance central power over the general population. It is also apparent that they impressed into duty the good reputation of those early practitioners. For many centuries, credit for the early medical wisdom described in classical writings has been popularly ascribed to the secondary civilizations that followed, to the point of being used to define and then exaggerate the intellectual prowess and humanity of authoritarian empires. Sumerian medicine is now usually presented as Babylonian or Mesopotamian medicine; Egyptian medicine has been declared the foundation of Western medicine; the principles of Ayurvedic medicine are taught as being the work of inspired Hindu Sages, with Hinduism being the dominant religion of India; and Traditional Chinese Medicine is ancient wisdom accumulated by the work of its unique Chinese Sages and tirelessly carried on by a formal coterie of physicians recognized by the Chinese State. Credit is being given where credit is not due. It should go instead to those early practitioners of the primary civilizations. The successful use of rhetoric to improve the image of one society (*i.e.*, the secondary civilizations) at the expense of another (*i.e.*, the primary civilization) is to be ignored as evidence of progress.

⁴ *The Natural State of Medical Practice*, volume 1, analyzes the course of medical practice over millennia in different regions of the globe and points out the distortion in medical practice introduced under authoritarian governance.

A large and powerful militaristic State that parasitizes other States for its survival is impotent in effecting true progress. It is not surprising, therefore, that the earliest evidence of medical progress is traceable to a phase of human social development preceding the authoritarian territorial State. This section of the present chapter is intended to invoke a sense of patent protection for those early practitioners.

Archeological and literary studies of the cultures of the four primary civilizations have suggested that at an early stage of urbanization a nascent form of an effective medical practice existed. In each instance its presence and quality have been expressed or implied in ancient medical documents. In each instance there is reasonable circumstantial evidence that traces the origin of some of that medical knowledge to Neolithic or Bronze Age medical practitioners. In each instance there is a chronological association of that accretion of medical knowledge with practitioners affiliated in some way with early city-states as defined herein. In tabular form the associations, roughly approximated, are:

Primary civilization	Documents	Earliest extant version	Phase of society
Uruk Culture Jemdet Nasr	<i>Medical Treatise on Diagnosis and Prognosis</i>	11 th C BC	Predynastic (3100 BC)
Naqada Culture	Ebers and Smith papyri	16 th C BC	Proto-dynastic/1st Dynasty (3100 BC)
Harappan Culture	<i>Charaka samhita</i>	8 th C AD	Predynastic (2200 BC)
Longshan Culture	<i>Huang Ti Nei Ching</i>	9 th C AD	Predynastic (2500 BC)

Progress to improve the lot of society's members is not intended just for an elite class of an urban population. It should instead comprise the total population, including dependent settlements and domiciles in its proximity. To this end, some view the structure and functioning of cities throughout history, and now prehistory, as fairly similar even when those cities have been completely independent in their development. An important mechanism in this process has been described by Dr. Monica Smith as "the use of networks to increase information transfer," which means that networks developed within populations in which networking members were often at a distance from one another.⁵ On this point Dr. Smith has concluded that a hierarchical system with an elite class is inherently limited in its power to change the course and momentum of urban development unless it is able to enlist the cooperation of citizenry simply because the multitude of networks of groups operating on different levels throughout the city population will propel development in a way that more closely serves the whole of the citizenry rather than a closeted hierarchy. Indeed, the ability of a city to flourish at all is

⁵ Smith, M. L., in *The Social Construction of Ancient Cities*, Washington, D. C., 2010 (paperback), M. L. Smith, editor, Introduction, p. 7. This recent book is of special interest in that it highlights the dynamic nature of cities and their effects on proximal communities.

a function primarily of such networks that foster cooperation in economic activities (Smith, cited on previous page, pp. 24-27).

A term for the system that guides an organization or community by autonomous networks, each of which having its own sphere of influence/power and unable to avoid interacting with other networks because of proximity, is “heterarchy,” the antonym of “hierarchy.” A heterarchy has no central hierarchical system to organize society; there are instead many foci of authority, autonomous and fluctuating in influence. It would not be surprising, therefore, that the first glimpses of the existence of professional medical organization would be found in some early independent city-states in the absence of an elite class. In ancient Mesopotamian cities a picture of its inhabitants going about their daily tasks can be easily imagined from archeological remains of neighborhoods, private houses, a variety of workshops, bakeries, mills, taverns, commercial shops, and barbershops. Unless specifically targeted by elites, the day-to-day functioning of most of a city-state’s enterprises would have been more affected by the weather than by city-state dictates, in part because if commercial ventures were to cease for any reason there would be no “city.” In this environment the idea of medical practitioners could be recognized by citizens as a useful service. This was elaborated in volume 1 of *The Natural State of Medical Practice* when discussing the koinon, a small democratic group of like-minded persons proposed to have been organized by Hippocratic physicians for the networking of their medical practitioners to improve their functioning and effectiveness. The transformation of the local or itinerant medical practitioner into a member of a network of practitioners is the consequence of not only population size and density (as will be discussed later) but also of a shift in professional paradigm, *i.e.*, from the limited knowledge of the individual to the arithmetic increase in knowledge that can result from the group. This group would develop spontaneously because of need rather than by direction, and it would remain independent as long as the social setting was amenable. As the archaic medical practitioners in all four of the primary civilizations previously described were not shamans, instead being merely local persons who drained abscesses, pulled teeth, set fractures, and bandaged wounds, such unpleasant tasks would unquestionably have been carried out by those of lower class, whereas the shaman was of the elite. But in a heterarchy the plebeians were both the source and the recipients of an embryonic form of medical care.

Features that support a distinction of city-states from other polities, collectively the “territorial” states, have been summarized by Dr. Bruce Trigger: territorial states are often larger, but because leadership elite and their retainers concentrate in the urbanized areas the central population is smaller. They also typically have monumental architecture and other large projects made possible because of greater excesses of products, especially foodstuffs, that can support a large labor force. Distribution of command and control, especially as pertains to the economy, remains in the hands of relatively few people, and centralization of power, by redistributing the population according to changing circumstance, permits focus on efficiency, a factor that increases the wealth of the upper class at the expense of the farming class.⁶

⁶ See: Trigger, B. G, *Understanding Early Civilizations*, Cambridge (UK), 2003, pp. 110-113 and 266-270. Another intriguing difference between city-states and territorial states was suggested in which the latter, because of absolute controls on production, produced artistic products that conformed to a specific ideal that was not disposed to change over time. The art that was produced for the elite class, therefore, was of higher quality than for lower classes and tended to become

City-states, in contrast to territorial states, generally have a centralized city surrounded by many smaller communities. Sometimes these communities provide a particular service or commodity needed by the general population, in return for which they might receive commodities produced in another village. The central city tends to contain the bulk of the population, including those with specialized trades and services and many of those involved in agriculture who would leave the city daily to tend their lands. The city's central location makes it accessible to those living in the surrounding villages. In the early stage of development there was an opportunity for a broader representation in governance when outlying citizens could walk to the central city in one day, and it has been pointed out that in southern Mesopotamia the city-states were separated by about twenty miles and often visible to each other, an observation supporting the practicality of the suggestion that even the peripheral population could represent a political force. Finally, with the central city in a city-state representing more a marketplace and central storage facility than an elite enclave for ruling the territorial state, there is broader exposure of the general population to a greater variety of goods and services. Regional city-states can share a culture but are often autonomous and distinctive.

Although there is differing opinion about the validity of differentiation, or even the need for differentiation, of city-states from territorial states in explaining the development of subsequent great empires, this is not relevant to present purposes. Whether city-states were a prerequisite for, an alternative pathway to, or a regression from, a territorial state does not alter the social consequences of an autonomously organized coalescence of small groups within a central locus for maintaining unity, security, and stability. It is proposed, therefore, that it was in the archaic city-state that an opportunity presented itself for development of a form of medical care that surpassed in effectiveness the primitive empirical care that had been available from a family member or neighbor in other archaic forms of social organization. The function of the local adept at wound care, tooth extraction, and draining of abscesses could, by networking with similar health-care practitioners, now be expanded to include prediction and management of illnesses hitherto a mystery; the adept was now a primordial practitioner. His status, however, was to change if city-states became integrated into a greater political structure such as an empire. In Egypt the most powerful and prominent medical presence became an arm of the State and the State religion; in China it was an additional branch of an elite class with allegiance to, and at the service of, the State; in Mesopotamia it was the victim of State-promoted mystics and was destined to disappear; in India it came under the hegemony of an authoritarian religious sect and subsequently demeaned by its incorporation into religious canon. The consequence of these demotions of the true medical practitioner is detailed in volume 1 of *The Natural State of Medical Practice*.

But this evolution in medical care permitted by the city-state structure, while it would be expected to have occurred at a time when a form of writing was available to permit longitudinal transmission of knowledge, may have been accumulating in the minds of some prehistoric practitioners who would then have passed on their wisdom to their progeny or interested persons by example or by recitation. This would have been a different form of networking, one that crossed ages rather than boundaries. This one-way transmission of knowledge would have greatly limited the rate of medical progress, but at least it provided protection against its loss, although such a postulation would be difficult to prove. For example, the knowledge in the *Huang Ti Nei Ching Su Wen*, if

rigidly distinctive, but in city-states the nascent individualistic enterprise fashioned a greater variety of product based on the common experience.

composed in the early Longshan era, may have been transmitted orally for perhaps five or six centuries before writing was developing during the Shang Dynasty and into the Zhou Dynasty. Similarly, Ayurveda, as practiced according to the Charaka and Sushruta samhitas, might have been passed through generations for perhaps twice that, a thousand years.

To summarize, an early form of empirical/rational medicine occurred in all five civilizations described so far, in two of which a mature form of writing did not exist. A list can be proposed of characteristics and metrics associated with such evidence of progress as existed in a major city selected from each of the five. They include the structure of an autonomous city-state arising from an agricultural base, then becoming a commercially prosperous heterarchy with a spontaneously formed governance of convenience (a settlement hierarchy) existing during the transition from egalitarian to authoritarian governance.

C. Overview of the four primary civilizations

The common measure of progress can be acquired by evaluating a society's state of medical practice, for medical need is a universal need, and strength of the motivational stimulus for better medical care is expected to be equivalent in all societies, large and small. A problem for small societies may merely be a numerical limitation in talent about which there is little that they can do. Miletos may have been of sufficient size to see the birth of medical professionals. As analyzed in the preceding four chapters, the other primary "successful" civilizations had the beginnings of a nascent medical profession. What was the touchstone that permitted the early step in progress in medicine posed on p. 119? Three assessments will be used: (1) analysis of similarities among the four primary civilizations, (2) comparison of the four to "successful" Miletos, and (3) integration of the data from all five "successful" primary civilizations for use in analyzing a group of twelve primary civilizations to follow.⁷

All five successful civilizations shared certain traits: as city-states their urban center and peripheral communities were integrated and situated amid a large alluvial plain, commercial success and population size were associated with predynastic or early dynastic development and a location convenient to trade routes, all had specializations that included, or are proposed to have included, medical practitioners, and stable day-to-day functioning for the population at large was possible because of commercial heterarchies. Related details and similarities include the following:

- a. Central and peripheral populations: The Sumerian, Indus River, and Yellow River populations were large, with core populations in the range of 50,000 persons living within an area of approximately 1-2 square miles. Populations in the large surrounding territory from which were drawn those who supported or interacted with the central populations numbered in the hundreds of thousands. The Egyptian populations, however, were smaller by 80% because of the limited

⁷ The definition of a "successful" primary civilization as used in this work refers to the ability, either demonstrated or circumstantially implied, to develop a network of medical practitioners. The justification for identifying the five civilizations as "successful" is based on the medical treatises associated with each of them. The logic of "successful" is based on the assumption that if evidence of a medical practice is found, so will other specializations, and specialization is required for progress.

narrow strips of fertile land bordering the Nile available for agriculture. As all four primary civilizations survived long enough to have medical professions capable of medical progress, the minimum total, or “integrated,”⁸ population required for a network of medical practitioners based on their combined experience can be as low as the Egyptian population in and under the hegemony of Hierakonpolis (*ca.* 100,000). Other factors, of course, would modify that result, such as geographical features or a higher population density of the central population.

- b. Production and specialization for vendable benefit: All four areas evolved from small agricultural communities that unified in efforts to increase food production, the primary effort in all instances being water management and irrigation. With the resulting food surplus, market towns initiated internal and distant trade that extended to other commercial ventures. Production of utilitarian and luxury items benefited from the emergence of specialization in crafts and trades. A large alluvial plain would have permitted an expansion of food production needed to support the growing urban population.
- c. Intellectual advances: Writing, like mathematics, made necessary by commercial interests, developed in both Sumer and Egypt. It originally functioned as a tool of commerce, only later as a tool of intellect. With some scholarly opinion to the contrary, an untranslated “script” has been found in the Indus region, and commercial and identity seals were produced with inscribed characters. No treatises have been uncovered. And early inscribed figures suggesting Chinese characters have been found on oracle bones from the late Longshan culture, although nothing has been identified that would permit communication of ideas or instruction. At present, therefore, only three of the five primary civilizations (including Miletos) can be considered as supporting literacy. Nevertheless, the need for a permanent record in writing was making its appearance in the other two primary civilizations. Art forms are not considered here as an intellectual advance for they have been found at many human habitations of far greater age. Artistic expression is a basic human intellectual heritage, whereas a medical profession results from fine-tuning of the motivation for survival. Although literacy is a nonessential convenience in development of medical progress, it is co-respondent with medicine as a marker of societal progress.
- d. Evidence of a medical practice: This is well-established for Sumer and it probably existed in Egypt at this early stage, although this is an inference derived from later medical papyri. The earliest specific mention of the *swnw*, considered the term for “physician,” is from the 3rd Dynasty (*ca.* 2700-2600 BC), by which time these “physicians” had been firmly impressed into government service; *i.e.*, they must have already existed for centuries. Miletos left no trace of medical practice, but it surely had medical practitioners, and it was proposed in volume 1 of this series that Hippocratic medicine had its origin there. Nothing on this point is known from the Indus and Yellow River primary civilizations. Although presumably there were medical practitioners, the evidence is far more indirect than for early Egyptian medicine, being based on legend, status of society, and

⁸ By “integrated” is meant the interaction between a population center, or nuclear population, and peripheral populations that cooperate commercially to sustain each other, a feature often associated with city-states.

medical knowledge from manuscripts that is of uncertain, but surely archaic, origin. The clinical material transmitted down to later medical classics from the Indus and Yellow River regions must, however one may view its origin, have been the product of astute and collegial practitioners at some point in regional prehistory. Here is a summary listing proposed for the collation of medical wisdom found in the regional classics of medicine:

	Mesopotamia <i>Medical Treatise and Therapeutic Manual</i>	Egypt <i>Papyrus Ebers</i>	China <i>Huang Ti Nei Ching Su Wen</i>	India <i>Charaka Samhita</i>
Proposed origin	3100 BC	3100 BC	2400 BC	2000 BC
Disassembled	yes*	yes*	yes*	yes*
Manuscript, extant	1050 BC	1550 BC	8 th C AD	9 th C AD
Extensive redaction	yes (11 th C BC)	yes (previous)	yes (8 th C AD)	yes (9 th C AD)
Extraneous concepts	yes (mysticism)	yes (mysticism)	yes (theory)	yes (religion)

*Evidence suggests multiple authorship, perhaps an assembly of fragments.

- e. Political status and governance: All four cities considered archetypal for their primary civilization were to varying degrees autonomous city-states as defined on p. 21. Three of the four were, at least in their formative years, classified as “protodynastic:” Uruk as Uruk IV/Jemdet Nasr prior to Early Dynastic period in Mesopotamia, Hierakonpolis as Naqada III/Proto-Dynastic prior to the Early Dynastic Period in Egypt, and Liangchengzhen as Longshan culture prior to the 1st (Shang or Xia?) Chinese dynasty. Mohenjo-daro was but one city-state of an extensive Indus River civilization with many city-states that apparently had no political unification. All four had, at least during their proto-dynastic existence, archeological evidence of egalitarian systems of social management, and consistent with this is the absence of monumental structures in three (Indus River, Nile River, and Yellow River). Burial sites have revealed limited evidence of elite populations. In Mesopotamia it has been proposed that a theocratic structure with central temples for collection of produce and crafts existed in many city-states that provided a redistribution of items to contributing settlements as needed. Nevertheless, in all four civilizations the prominence of commerce and distant trade in the absence of centralized political organization are evidence that, as prosperity and population increased, internal order was maintained at least in part by such management as was integrated within the commercial ventures themselves. The archeological evidence of egalitarianism can be otherwise interpreted as the absence of an elite class, which is quite a different thing. It is important that urbanization occurred at a time of no central bureaucracy or other preexisting hierarchical structure; the format for urbanization in each of the five had to be worked out internally as prosperity and population grew. Physical coercion was apparently unnecessary.⁹ The strategic

⁹ In Uruk this statement is true only for free citizens. Slaves/debtors were at the service of the more powerful groups or families. But the existence of slavery in early Hierakonpolis, Mohenjo-daro, and Liangchengzhen is not documented, so the contribution of slavery to their initial commercial success, if any, was not great. As for Miletos, for there was no identifiable slavery in Ionia prior to the 6th C BC and when it did appear it was quantitatively a very small part of the work force.

governance that sustained these commercial patterns, given the size of the involved population and lack of evidence of use physical coercion, could hardly have been egalitarian. Most likely a heterarchical system of commercial enterprises or perhaps commercial consortiums of a corporatism nature that were not centrally regulated. Although peripheral communities may have had egalitarian kinships and a degree of hierarchical control may have been present within the commercial operations themselves, the larger force at work was that of a heterarchy, with coordinated commercial power rendering decisions affecting urban prosperity and growth.

- f. Duration and denouement of the civilization: Of the four primary civilizations the end of Sumer is clearly defined with the bureaucratic takeover of the city-states by the Akkadian empire, for power was transferred from temples to the palace, a process completed during the temporary return of Sumerian control when temples were placed under secular supervision. Mohenjo-daro began its decline around 2000 BC along with many other Indus River Valley cities. Climate change is proposed as the reason, but the cause is unknown. The Yellow River city of Liangchengzhen deteriorated as the population emigrated. Perhaps this was because of changing climate, although during the dominance of the Erlitou culture and then the Shang dynasty Liangchengzhen was ultimately integrated into their confederations. Hierakonpolis ceased being a bureaucratic and commercial center as the Nile changed its local course and Egypt was unified within a dynastic empire with its capitol elsewhere. Thus, the dynamic endpoints of prominent cities from each primary civilization under discussion are reasonably pinpointed despite uncertainty of the immediate cause. As for total duration of their status as prominent centers of primary civilizations with the structure of a city-state, it is similar among the four, approximately 600 years.
- g. Quality of life: An estimate of life expectancy or, more precisely, the frequency with which an older age was obtainable is a crude estimate of quality of life, but it is also a valuable statistic because wisdom of older members obtained from experience would be expected to facilitate progress in a society. From limited information in published reports estimates, especially those that use age at death for estimating life expectancy, are: Hierakonpolis – average life expectancy of 28 years for working populations; Uruk (data of Kish), 31 years; and Mohenjo-daro 35 years. Liangchengzhen is unreported.¹⁰ These values are consistent with most estimates for other Neolithic and Bronze Age civilizations and cultures (see listing, p. 206), although ideally such data should reflect the status of plebeians rather than the elite, for reasons to be discussed. One conclusion is that the quality of life for the greater population was not good. Note that the data are limited and can in no way be chronologically related to medical practitioner networks or their contemporary state of society.
- h. Another possible contributor to progress and perhaps a more accurate and easier one to estimate than duration of the period from formation of a civilization to its denouement, is duration of a flourishing economy. Using this measure, the average duration for the four was about 500 years.

¹⁰ The value of 28 years for Hierakonpolis is derived from: Podzorski, P. V., *Their Bones Shall Not Perish*, New Malden, 1990, a study of pre-dynastic skeletal remains from Naga Ed-Der, Egypt. It represents age at death of a non-elite population that had reached 15 years of age, meaning deaths in infancy and childhood are not included in the calculation.

D. Comparison and integration of data from the four primary civilizations with Miletos

The following Table compares individual metrics of the four “successful” primary civilizations alongside the prime example of a successful city-state, Miletos. As part of the greater Archaic Greek civilization, Miletos is obviously not a civilization unto itself, its early development being representative of the greater Hellenic culture rather than a derivative. Its founding, however, was autonomous and early, and its subsequent course, historically relatively well documented even though archeological information on its early years is poor, mirrors the other four city-states surprisingly well.

Table 1: Comparison of metrics of the five “successful” primary civilizations.

	Miletos	Uruk	Hierakonpolis	Mohenjo-daro	Liangchengzhou
POP., LOCAL	65,000	50,000	10,000	40,000	50,000
POP., TOTAL	200,000	1,000,000	105,000	70,000	70,000
PRIMARY AREA	1 sq. mi.	2.3 sq. mi.	0.5 sq. mi.	1.6 sq. mi.	1.0 sq. mi.
POP. DENSITY	100/acre	33/acre	31/acre	40/acre	78/acre
HEGEMONY	700 sq. mi.	3000 sq. mi.	500 sq. mi. ⁶	1000 sq. mi. ²	200 sq. mi.
GOVERNANCE	heterarchy	heterarchy corporatism	heterarchy	heterarchy corporatism	heterarchy
WRITING	yes	yes	yes	?	?
DISTANT TRADE	yes	yes	yes	yes	yes
MONUMENTS	yes	yes	no	no	no
SPECIALIZATION	yes	yes	yes	yes	yes
DENOUEMENT	destroyed	subsumed	transformed	abandoned	subsumed
MEDICAL PROF.	yes, <i>ἰατρός</i>	yes, <i>azu</i>	yes, <i>swmw</i> ⁴	?	?
FORMATIVE	250 yrs. ³	900 yrs.	1200 yrs.	700 yrs.	500 yrs.
FLORUIT ⁷	300 yrs.	550 yrs.	400 yrs.	600 yrs.	500 yrs.
CITY-STATE	yes	yes	yes	yes	yes
LIFE EXPECTANCY	n.a. ⁵	31 yrs.	28 yrs.	35 yrs. ¹	n.a.

¹ Based on cemetery R37, the population judged “better off.” ² Crude estimate based 1-2 days travel from city, radius = 20 mi. ³ Estimated as the time needed to achieve (1) excess agricultural production, (2) specialization in manufacture, and (3) a local population of 5,000-10,000. ⁴ The term for “physician” is derived from extant papyri, especially the Papyrus Ebers, and the otherwise earliest inscription is from the 3rd Dynasty (2670-2617 BC) as applied to Hesy-ra. ⁵ n.a. = no proposed or estimated data available. ⁶ Crude estimate of 50 miles in length along the Nile plus 5 miles in width on each side of the river. ⁷ FLORUIT estimates the years of relatively stable prosperity, and it is during this period that it is proposed that specialization could occur, including the medical observations were made that found their way into the medical classics associated with the four “successful” civilizations. The duration of Floruit is upper limit.

The mean size of the local population of the four primary civilizations and Miletos is 43,000 with a standard error of the mean of 9,165, indicating, assuming a Gaussian distribution of data, the range comprising 95% of similar populations would be

25,000 – 61,000.¹¹ For “total population” the mean is 111,000 with a standard error that includes 95% of similar populations being 51,000 – 171,000. This calculation does not use the Uruk datum because (a) it is far in excess of the others, and (b) the focus of interest is the minimum rather than the maximum size of population necessary for progress. For a city-state’s primary location the mean area is 1.3 sq. mi., with a standard error to comprise 95% of similar populations being 0.7 – 1.9 sq. mi. Other important conclusions are:

- a. The time from small settlement to a population capable of initiating specialization (set when possible at an urban population approaching 10,000), was 250 years for Miletos, whereas the mean for the other four was 825 years with the range of standard error as above being 530 – 1,100 years. This reflects the preexisting culture that may have facilitated the path for the founders of Miletos, one already advanced in comparison with the *de novo* evolution of the other four civilizations from small agricultural settlements.
- b. For duration of established prosperity (Floruit) the mean is 470 years with a standard error as above of 360-575 years. Miletos was 300 years and for the other four it was 510 years with a standard error as above of 430-600 years. The total time for both the formative and prospering periods for Miletos was 550 years, whereas the mean for the other four was 1,330 years, with the standard error as above being 1100 - 1600 years. For convenient recall the rounded mean values and their standard errors are repeated here:

Nuclear population: 43,000 with range of 25,000 to 60,000

Total population: 110,000 with range of 50,000 to 170,000

Area for nuclear population: 1.3 square miles with range of 0.7 to 1.9 sq. mi.

Duration of Formative period:

Miletos – 250 years

Others - 825 years with range of 530 to 1,100 years

Duration of Floruit period:

Miletos - 300 years

Others - 470 years

Total time to mature specialization (using acquisition of medical wisdom later found in medical classics as endpoint marker):

Miletos – 550 years

Others – 1,330 years with range of 1,100 - 1,600 years

Regardless of the deficiency of hard facts and justifiable scholarly disagreement about many of the metrics presented in Table 1 and thereby their statistical derivations, it is in anticipation of improved data that the following tentative conclusions are proposed more as an example than an argument:

- (1) The total socially integrated population that can be expected to support the initiation, *de novo*, of a network of medical practitioners may be at least 50,000,

¹¹ The assumption of a Gaussian distribution is without scientific foundation in this instance, its justification not being the distribution of the actual population but instead being the consequence of the myriad of external factors that would come to bear on that population, so many and so varied in each case that the end result would have been an equalizing effect just as the averaging of a multiplication by a series of random numbers might have an equalizing effect.

and that includes an urban component of at least 25,000, these numbers being at the low end of the standard error, although if only Hierakonpolis is used (which it will be) the latter figure can be lowered to 10,000.

- (2) The geographic area that can accommodate the density component of the demography, a probably irrelevant statistic given archeological uncertainties, is nevertheless interesting because mean and standard error of urban population density of the five civilization was 56 persons per acre (95% confidence limits: 29-84), perhaps more consistent than one might expect.
- (3) The total integrated population can vary hugely, although if a minimum value exists it might be that population found in the area around the nuclear population within one day's travel, perhaps a radius of ten miles, approximately 300 square miles.
- (4) A degree of social stability was required for specialization to develop and mature, the average period for the four primary civilizations approximating 1,330 years. This in turn was composed of two components:
 - (a) the time for a population of sufficient size and density to urbanize and begin specialization (825 years).
 - (b) the time for specialization to develop to the level of a profession (470 years), indicated herein as Floruit.

It is with an eye to the findings presented in these summary paragraphs that the next chapter will analyze a dozen lesser civilizations apropos their ability to specialize. But it may be helpful at this point to relate the above conclusions to the development of modern Western civilization. In volume 1 of *The Natural State of Medical Practice* the date by which Western medicine matured to become a proper profession was estimated to be about 1750 AD. If 1300 AD is picked as an average date for a Europe emerging from the Medieval period (cities with populations greater than 10,000 were then appearing), then 450 years was the Floruit for Western civilization to produce a mature profession of true physicians (*i.e.*, practitioners basing their decisions on objective findings rather than Hippocratic writings as interpreted by medical "scholars"). Again, for ease of comparison:

- a. Miletos – 300 years
- b. Other four "successful" primary civilizations – 510 years (note that for Mohenjodaro and Liangchengzhen the presence of a network of medical practitioners is merely proposed for reasons cited in the text)
- c. Modern Western civilization – 450 years

Interestingly, the Floruit intervals for the more ancient civilizations and for modern Western civilization emerging from the Dark Ages are similar. Miletos, of course, was part of a preexisting civilization. The estimate for Western civilization may also be affected if one considers it a product of the preexisting Roman civilization. On the other hand, if the Dark Ages are considered an impedance to development (which is true) and the onset of Floruit is given to be the Reformation, the value of almost 250 years (1517 to 1750 AD) is not so different from Miletos.

The speed of evolution of progress within a civilization may not depend heavily on the upper limit of population size, for the circum-Aegean population in the 5th C BC was *ca.* one million, whereas 13th C AD Europe had a population of *ca.* eighty million. Details are needed, however, because medieval Europe contained numerous locales where progress might have been initiated based on the minimum requirements postulated from

Table 1, namely self-sufficient city-states encompassing a total population of 10,000 or more. Nevertheless, in 1087 England had only 18 towns with populations above 2,000, and by 1377 the population of London was 23,000, with all others containing far fewer than 10,000. The population of medieval France, which had 25% of the entire European population, numbered 17,000,000 in 14th C prior to the plague epidemics, but had only ten cities larger than 10,000, and Paris, by far the largest city in Europe with an estimated 80,000 population, would not have been much larger than ancient Miletos.

However fanciful the above statistical inferences may be based on the quality of the data, they can now be compared to twelve lesser civilizations that are well-known to scholars of anthropology, archeology, and related fields. The reason for this comparison is found in the contention made by the author in volume 1 of *The Natural State of Medical Practice*, namely, that human ingenuity is ubiquitous and perpetual. It is at the core of the stratagem for implementation of a *Natural State*, which should under natural circumstances lead to an improvement in mankind's circumstances by discovery and invention as executed through that stratagem, namely "progress." The question of "Why did it take so long?" posed on page 24 may receive a preliminary answer by this analysis.

CHAPTER EIGHT

SETTLEMENT, DEVELOPMENT AND DISAPPEARANCE OF TWELVE OTHER ALLUVIAL PLAIN CIVILIZATIONS

“Empirical medical knowledge, as handed down by nomadic societies, did not constitute a medical practice, the essence of which has been described as “a consultation of a sick person with a compassionate medical scholar.” There could have been no such consultation prior to the accumulation of sufficient medical knowledge that the average person had neither time nor ability to comprehend, an amount sufficient to require a ‘scholar’.”

The Natural State of Medical Practice, vol. 1, p. 152

After locating and defining a “lesser” civilization there is an explanation for the inclusion of the twelve civilizations in this chapter, including a discussion of the significance of alluvial environments, geography, reasons for non-selection, and issues related to identifying form of governance. A precis of the twelve lesser civilizations is then given, along with a list of metrics and other characteristics for each. A summary of those characteristics relevant to present purpose and an overview of the group of twelve with names of prominent population centers concludes the chapter.

- A. Geography and population size relevant to civilization development
- B. Definition and selected characteristics of twelve lesser civilizations
- C. Precis of twelve lesser civilizations
 - 1. Marajoara (Os Camutins)
 - 2. Norte Chico (Caral Supe)
 - 3. Poverty Point
 - 4. Cahokia
 - 5. Terramare
 - 6. Catalhoyuk
 - 7. Sintashta (Arkaim)
 - 8. Shahr-i Sokhta
 - 9. Djenné-Djenné
 - 10. Liangzhu
 - 11. Anasazi (Chaco Canyon)
 - 12. Cucuteni-Trypillia (Maidanets)
- D. Overview of the twelve primary lesser civilizations

- A. Geography and population size relevant to civilization development

The five primary civilizations analyzed in the preceding chapter shared a common geography: they developed in broad river valleys, the reason usually given being that agriculture was favored by a predictable water supply, fertile soil of flood plains, readily plowable fields (sod, with its thick mass of intertwining roots of grasses that can reach a depth of several feet, depending on the type of grass, is difficult to plow), and fewer physical obstructions to farmed spaces. Alluvial plains and their antecedent or associated flood plains created by the deposit of sediment from rivers draining higher

elevations best filled the needs of early agriculturalists. The land platform of Mesopotamia, the Indus River Valley, and the North China Plain surrounding the Yellow River are alluvial and the Nile river valley is an alluvial flood plain with periodic inundations. Miletos developed in the alluvial plain produced by the Meander River.

There are innumerable alluvial plains worldwide. Sizes of those of the preceding paragraph and of lesser civilizations to be discussed below are presented in Table 2. The issue addressed here is the process by which cultural progress was initiated and the circumstances that sustained it, rather than geographic size obtained. Alluvial plains guarantee freshwater access, and water is the most critical natural resource for agricultural development. Cultivable alluvial plain size, however, parallels population size and thereby might be a factor in determining success or failure of potential civilizations.

Table 2: Sizes of alluvial regions relevant to text.

Region	Size in square miles
Mesopotamia lower alluvial plain	51,000
Punjab alluvial plain	35,000
North China plain	160,000
Nile River valley	15,000
Po River valley	18,000
Mekong delta	24,000
Mississippi alluvial plain (in Louisiana)	5,000
Congo River alluvial plain	spotty
Amazon River basin	vast
Western Siberian plain	vast
Marajoara	700
Norte Chico	700
Miletos	700
Cahokia (in present-day American Bottom)	175
Anasazi (local alluvia from Paleozoic Colorado Plateau)	----
Catalhoyuk (Carsamba river alluvial)	200
Djenne-Djenno (inland Niger delta)	10,000
Liangzhu (Yangtze delta)	30,000
Shahr-i Sokhta (Sistan Basin)	6,000
Cucuteni-Trypillia (Dnieper Catchment)	200,000
English Fens	1,500

The importance of the alluvial environment in human social evolution resides in the accessible productiveness of its soil. Regions heavily forested, mountainous, tropical bush and jungle, and other harsh geographic features would support only small roaming bands, not settled communities. Variations in geography affect not only population size. They also modify its distribution. Based on agricultural fertility three general categories of environment can be proposed relevant to population distribution and density: (1) unsafe regions with limited fertile terrain for agriculture will tend to support only small, usually mobile, bands; (2) areas that are both safe and abundantly fertile will support settled small

groups, nuclear families and their dependents, and their small settlements will be dispersed (Bronze Age Europe is an example discussed later); (3) areas that are unsafe but fertile can provide an agricultural base capable of supporting an urbanized population, but safety must be found in numbers. The relevance of these divisions of local geography to personal choice will be discussed later, as will their role in early stages of urbanization.

It is increasingly recognized that many pockets of settled populations that developed stable unaggressive cultures were small. In small dispersed human groups survival required a common effort; an individualist who preferred to go his own way would have been unwanted baggage for the remainder of the group and would not have lasted long if he did leave unless he took others from the band with him. The smaller the group, the greater the need for cohesion and the greater the facility of social coercion. An individualist in modern society cannot be viewed as the equivalent of a Neolithic individualist whose claim to individualism was the personal decision not to leave the safety of the band, so the temperament of individualism would have existed in prehistoric society but was contained. Now many great works of intellect have found their origins in a prison cell. Why could not progress occasionally have begun in primitive bands?

A tribe or other traditional kinship is not necessarily opposed to new ideas and discoveries, and those who conceive of a useful mechanism or process might find it well-received even in a rigidly authoritarian society. The essential feature of this interaction is that the tribe or its chief also view the discovery as useful. A particular finding might seem elegant to the finder and brilliant to his or her parents, but if it is of a low priority in the list of factors needed for survival there will be little motivation by others in the tribe to act on the finding and credit the discoverer, and the discoverer's effort may even be viewed as an undesirable waste of time and effort. The invention of the wheel in a mountainous Central American community may end up as a toy, whereas in the Eurasian Steppe with its nomadic peoples it would inspire horse-drawn wagons. It might be useful, therefore, to extend the search for mankind's intellectual achievements to smaller groups rather than to concentrate on large dynastic reliquaries, or, to repeat the words of the medical historian, Dr. Fielding Garrison, the great long-lived civilizations that were "the cold storage plants of knowledge acquired in the past." And the present search is not only for evidence of past successes, but also for the reasons for their failures.

In recent decades remarkable archeological discoveries have been made in every corner of the globe. Scholarly assessments of Neolithic and Bronze Age cultures have opened to us an exciting panorama of our ancient heritage, one that confirms the often sophisticated nature of so-called "primitive man." Especially relevant to present discussion, archeological assessments of communities have found little evidence of social stratification in many early or primitive cultures, a feature that would diminish with more efficient agriculture, the introduction of metallurgy, and acquisition of larger herds. In some, such as the Olmec, there may have been a governing hierarchy in a few of the larger communities, but overall it is claimed that an egalitarian system existed because (1) in a primarily agricultural economy there was little motivation, and therefore no mechanism, for developing regional control of dispersed populations, thus leaving households and tiny settlements free to pursue their own egalitarian practices, and (2) survival required an element of communal cooperation for distribution of necessary commodities and for completion of large communal projects for irrigation or defense. In analyzing the twelve lesser civilizations below, special attention will be given to population size, distribution, and governance and their effects on development.

B. Definition and selected characteristics of twelve lesser civilizations

The common features of early civilizations necessary to be included in this chapter are (1) archeological recognition, (2) some knowledge of both origin and denouement of the civilization, (3) no association with a dominant culture (*i.e.*, must be a primary civilization), (4) presence of sizeable settlements, (5) association with an alluvial plain, and (6), as with all civilizations as defined on page 21, evidence of agricultural surplus and specialization of labor of some segments of the population. They are termed lesser civilizations merely because they would have remained unknown but for the fine efforts of modern scholars.

They were selected from among hundreds of civilizations/cultures now recognized around the world that have received scholarly study. There were certain selection preferences in mind in addition to those mentioned above: evidence of durability, inhumation practices that permit estimation of life expectancy and social organization, evidence over time of specialization of tasks and improved lifestyle, self-sufficiency, and absence of evidence that the culture developed or was sustained by conquest rather than agriculture or commerce. For example, alluvial plain environments tend to be more amenable to agricultural development and a settled lifestyle, but isolated settlements of a few hundred people could represent a population of insufficient size to support specialization, a short-lived settlement would be unable to sustain generational passage of knowledge and, in the absence of writing, it could not accumulate wisdom. A civilization that grew by conquest rather than productivity might limit its specialization to offensive ends and thereby be merely a parasitic culture, its growth and improvements not being a manifestation of intrinsic maturation. Finally, a settlement that was a fringe extension of a larger centralized culture would probably retain aspects of authoritarian population control used by the parent culture. On the other hand, contact with other cultures and evidence of distant trade and imported products is not a basis for exclusion because it is becoming clear that late Neolithic and Bronze Age cultures were so numerous in most regions that almost all had contact with or knowledge of proximate, and often distant, cultures. Some degree of awareness of novel ideas practiced or entertained elsewhere was in most situations unavoidable.

The twelve lesser civilizations were also selected in part to provide a broad geographical coverage, and when added to the five successful primary civilizations the distribution of the total of seventeen is as follows:

North America	-----	Cahokia, Anasazi, Poverty Point
South America	-----	Marajoara, Norte Chico
Africa	-----	Egypt (North Africa), Djenne-Djenno (sub-Sahara)
East Asia	-----	Liangchengzhen, Liangzhu
South/Central Asia	-----	Mojendro Daro (Indus River), Sintashta
Europe	-----	Terramare, Miletos
Middle East	-----	Sumeria, Shahr-i Sokhta
Eastern Europe	-----	Cucuteni-Trypillia, Catalhoyuk

Another consideration was chronology, for a range of values was desirable, although some concentration on ages approximating the dates of five successful primary civilizations was also favored.

Examples of cultures not selected because the above requirements were not met included, but were not limited to, the following:

- a. In the Mekong alluvial region there was an extensive complex of settlements connected by waterways permitting both local communication and access to the sea and distant commercial targets. But the earliest large settlements described so far (Funan, 1st C AD) are considered by some scholars to be Indian in name and culture, implying that their formation was subsequent to early Indian script and therefore an extension of a pre-existing Indian civilization (*e.g.*, Mauryan).
- b. A different situation arose in the region of the upper Nile River with the Kerma culture. Distinct from dynastic Egypt further downstream, it emerged from a herding society that in the 4th millennium BC settled near the Nile in response to climate change. From 2500 to 1500 BC it was a flourishing kingdom, at times rivaling Egypt in power. It had no written language, however, and the archeological remnants are so far very limited. Little information is available except for what is mentioned in Egyptian texts. There is no information on medicine. Skeletal remains suggest inequality of hard labor, but the major remains appear to represent retainer sacrifice, and thus not relevant to the age and social status of the population at large.¹ With so little information at hand about some of the key parameters being followed in the present work and because of the proximity of and interactions with the Nile River civilization downstream it was not included as a lesser civilization.
- c. The Australian aborigines might seem an ideal group for evaluation, especially as they have been the object of two centuries of much social and scholarly attention. But there have been, despite uncontested access to an entire continent for 50,000 years, no settlements. This may seem remarkable, but considering that permanent settlements elsewhere did not evolve until the Late Glacial Period receded 11,000 years ago, and even then evolving hesitantly, perhaps the Australian experience is not so unusual. Its uniqueness is discussed further in chapter 9 in the context of the role of motivation in social change. But as there were no permanent settlements the Australian aborigines are not relevant to present analysis.

Form of governance was not a consideration in selection of a lesser civilization. But upon deliberation it was thought, despite limited data, to be a most important category, and standard definitions were needed for a consistent analysis of early development. Most were a mixture of types, but the principal categories used are: hierarchical, egalitarian, heterarchical, and corporatism. Their definitions are found on p. 21, and what is considered the primary governance providing guidance and cohesion for the community at large has been selected for the Summary Table given for each lesser civilization. It will be seen that there is a pattern to social evolution over time. For convenience, an anticipation of that pattern is herewith previewed.

The scheme often begins with egalitarian agricultural domiciles and settlements, small and sparse, each organized by family tradition. Agricultural success then breeds surpluses which can be either stored centrally or traded in a conveniently evolving market

¹ See: van Dijk, J., *Retainer Sacrifice in Egypt and in Nubia*, chapter 7 in *The Strange World of Human Sacrifice. – Studies in the History and Anthropology of Religion*, vol. 1:135-155, Leuven, 2007, J. N. Bremmer, editor.

town, essentially an agricultural cooperative, for tools, essentials unavailable locally, and luxury items. The market town enlarges and becomes more important as trade increases, now featuring trade in both agricultural surpluses and those needs available through specialized production by a workforce within the central polis (urbanized citizens). Those few individuals involved in directing and coordinating their own specie of trade become more important and prosperous than other members of society because they are essential in that (1) they cannot be easily replaced by novices (whereas small farmers and manual laborers abound), and (2) they also work to make certain that they are not replaced. The relatively few commercial leaders become more powerful, but their influence is limited for the most part to their areas of production. Specialization in production is assigned for convenience and efficiency to specific neighborhoods within the polis, and interdependence between peripheral settlements and polis become essential. The enlarging polis is segmentally managed by commercial interests that interact to organize essential needs for the population. The next phase is a gradual takeover of the entire mercantile city-state system for political purposes, sometimes being an issue of physical defense of the polis and its property, sometimes being personal aggrandizement, and sometimes being the installation of a traditional leader, perhaps a hereditary one, to prevent social disruption. Over time what initially was a hierarchy of convenience or a naturally developed settlement hierarchy becomes overtly authoritarian and thereby a hierarchy of inconvenience to development and innovation.²

During the course of these changes a profound social change takes place as the group loyalty of kinship is traded for personal choice within a sodality. And it is at this stage, *i.e.*, heterarchy, that the relatively unhampered and unregulated small groups arise to provide support services for commercial ventures and their labor force. But with further growth and prosperity the politics of power appear that lead to a political hierarchy. Interests, opportunities, and threats replace commercial sodalities with political ones. The damping effects of egalitarianism and hierarchy will receive much attention in later chapters.

It is within the pattern of social evolution just described that a small group might emerge as a network of medical practitioners. There is one important difference, however, between medical practice and the other services. As an example, a person who sees that wood is necessary for the polis (a term defined here as the urban area of a city-state) or for a commercial operation can decide to not only collect wood for his family fire but also to initiate a small commercial venture on his own by collecting extra wood and selling it. A medical practice at the early stage of civilization under discussion, however, would have had no precedent and would surely take more time to be initiated and developed. Furthermore, the location of the practitioner network must lie within a polis rather than among the peripheral settlements, although intimate exchange of knowledge and networking between the two could take place.

One particular social pattern will receive special attention: the kinship. Although egalitarian kinship affiliations are universal, the importance attached to kinship in the present work is in part based on its dominance among the plebeian class, the source of medical practitioners. Laboring units are usually found in the peripheral settlements and in the urban neighborhoods housing kin groups engaged in particular aspects of

² This is not a new idea. Lao-Tzu (6th C BC) is said to have commented:

The more restrictive the laws,
The poorer the people.

(Chapter 57 of the *Tao Teh King*, translated by Dr. Isabella Mears, Glasgow, 1916.)

production. In both situations, kinship obligations and commercial operational requirements would probably conflict and dominate personal decisions, with the kinship affiliation thereby weakening. It is the moderating of egalitarian ties that would ultimately facilitate the formation of a medical practitioner network.



Fig. 6: Artistic rendering of inhabited mounds, clusters of which made up the population centers of the Marajoara civilization located at the mouth of the Amazon River. One, Os Camutins, comprised forty mounds containing a population of about 10,000, suggesting an average population per mound of about 250, consistent with a modest sized kinship grouping such as a clan.

C. Precis of Twelve Lesser Civilizations

1. The Amazon River Basin civilization of Marajoara

Pre-Columbian America continues to amaze as its early civilizations/cultures are being rediscovered.³ One region now receiving attention is the vast (2.7 million square miles) Amazon River Basin. The veracity of reports by the first European explorers of flourishing settlements along rivers and in plains drained by the Amazon River is being confirmed. This new information is opening a broad area for research into historic and prehistoric America, for it is postulated that the large area under consideration once was home to an estimated eight million people and that what has been considered to be pristine rainforest is now being viewed as having been pocketed with inhabited and partially man-made open regions or savannahs in ancient times, the present rainforest being to a significant extent secondary growth, some of which originated with botanicals domesticated in those early settlements. Raised bed agriculture was used. But with the arrival of Europeans and the introduction of diseases never previously encountered in the region, it is now thought that there was great attrition among the populations of villages and cities, although this conclusion is open to debate.

In some areas, particularly those in proximity to rivers, unbroken settlements extending for miles had been reported by early European explorers, and cities with populations in the tens of thousands may have existed in late pre-Columbian times. Roads between settlements linked cultures, and linguistic families covered broad areas. Some settlements may have been multi-ethnic. One of the more prominent ancient civilizations in Amazonia was the Marajoara, located on the large alluvial island of Marajo and its seasonal floodplain near the entrance into the Atlantic Ocean of the Amazon River.⁴

Marajo is a sizeable island, and the area assigned to the Marajoara civilization covers about 7,000 square miles, somewhat larger than the State of Connecticut. With inhabitation dating from the early 1st millennium BC the island population would grow over the next thousand or so years to perhaps 100,000 during its prominent period, from 800-1300 AD. As there were no igneous rocks in the region, hard stones were imported, and utilitarian ceramics were an early product. Stability of the culture was provided as follows: over centuries numerous hillocks developed as the inhabitants enlarged existing elevations by adding construction and debris, and in this way the mounds, already sizeable, became sufficiently large and high to permit communities a safe haven in event of flooding by the Amazon River.

Many of the resulting mounds contained large habitations, often with several hearths that indicated several families or an extended kinship shared the longhouses, mound sizes

³ For reviews see: Roosevelt, A. C., *The Rise and Fall of the Amazon Chiefdoms*, in *L'Homme*, 23:255-283, and Clement, C. R., et al., *The Domestication of Amazonia before European Conquest*, in *Proceedings of the Royal Society B, Biological Sciences*, 282; 2015. <http://dx.doi.org/10.1098/rspb.2015.0813>.

⁴ Roosevelt, A. C., *Maritime, Highland, Forest Dynamic*, in *The Cambridge History of the Native Peoples of the Americas*, vol. III, part 1, Salomon, F., and Schwartz, S. B., eds., Cambridge, 1999, pp. 264-348.

ranging from a few acres to over 100 acres. The two large population centers, Marajoara and Os Camutins, included up to forty mounds, each center with total populations perhaps as high as 10,000. The larger centers tended to be surrounded by a group of smaller ones, and it is this feature that justifies the appellation of “city-state” to the most densely populated areas, although no central structure other than a cluster of mounds could have been the source of “city” management. It is proposed that canals and causeways permitted convenient travel and communication, but the nature of the island delta at the mouth of the Amazon has not permitted such structures to survive.

Many mounds are in the proximity of former ponds, and it is proposed that the ponds filled during periods of flooding by the Amazon River, thus providing a supply of readily available fish, turtles, and other marine food sources that took the place of traditional agricultural techniques. In addition, a complex of canals and channels accessible by canoes permitted wide-ranging penetration of the large island for purposes of foraging. There was little formal agriculture, but dams were devised to retain water in flooded areas after flooding receded. The only tools produced relevant to farming were axes, and, with the poor soil, limited area on the populated mounds, and periodic flooding, agriculture was principally represented by grain from local growths of spreading grasses rather than root crops, except for cassava. Edible palm fruits and palm oils were staples. There is the opinion, based on skeletal remains well-preserved in urns, that the general health of the population was probably better than found in other areas. The average human population density for the island would have been about ten per square mile. Primitive horticultural societies, including recent ones in the Amazon Basin, generally average “at least 1 – 10 people per square mile.”⁵

The several largest mound clusters are surrounded by many smaller ones, and the variation in findings among the mounds indicates specialization of some proportion of the population. A major specialty of Marajoara, and principal item of trade, was production of much-prized ceramics, including dishes, figurines, urns, ceremonial ware, and a great variety of ceramic vessels for everyday use. In return, a variety of stone was imported, inasmuch as nothing of this sort was available on the Marajoara delta. Trade may have extended as far as Central America.

Local populations of 1000-2000 persons were common, although the largest were as high as 10,000. Some assume a form of hierarchical social system existed, one suggestion being a chiefdom, but the means, or even its necessity, by which the population was coordinated is as yet unknown.⁶ There was no written language, but some idea of the status of inhabitants can be inferred from skeletal remains (mostly male) deposited in funerary urns that often were placed within the mound area. Female figurines dominate the artistic forms, and some have suggested authority was particularly vested in women. Although it has been proposed that there was an elite population, the distinction between elite and non-elite was modest and may have reflected leadership of commercial ventures rather than a hereditary or political elite. It is uncertain if shamanism was important, the evidence based only on certain female figurines. No evidence of a formal medical

⁵ See: O’Neil, D., *Horticulture*, in a tutorial by the Behavioral Sciences Department, Palomar College, San Marcos, CA, www2.palomar.edu.

⁶ For a review of current scholarly opinion of how Marajoara society was organized see: Moore, J. D., *A Prehistory of South America*, Boulder (CO), 2014, chapter 8.

practice has been uncovered, and osteological data on age at death of the inhabitants have not been presented.

Temples and ceremonial structures have not been found, and there were no offensive or defensive weapons or evidence of violence. The relatively large central and extended populations suggest a centralized egalitarian form of social management for the region was unlikely. Traditional egalitarian relations within a kinship structure probably existed on inhabited mounds, and families apparently were matrilineal. If this is accurate, it suggests that the social environment impressed on the population residing in a geographical environment of mounds would have favored persistence of egalitarian kinships and a disinclination to allegiance with sodalities arising from Marajoara's commercial ventures.

Some metrics of the Marajoara civilization are similar to Miletos, but size of each of the two population centers on Marajo Island is much less than Miletos city although the overall population over which Miletos had hegemony was about the same and the region of hegemony was double that of Miletos. Lack of archeological evidence of a high-level governing elite suggests that coordination of commercial ventures was managed locally by those involved in production networks. Thus, the network of mound clusters might be likened to production nodes that would vary in importance depending on population and competitiveness. This would temper social interactions between communities, mounds, and mound clusters. An alternative social organization is likely within kinship units residing on their respective mounds in longhouses. Forced separation of subunits of the population, a consequence of seasonal dispersion of settlements by waters of the Amazon, may have deterred social integration even in the large centers, resulting in small self-sufficient kinships that could be likened to delayed gratification hunter-gatherer groups with internal egalitarian social controls and duties.⁷ Medical networking is conceivable, for the larger centers and peripheral settlements had sufficient populations to support a number of medical practitioners. But environmental restrictions may have limited any attempt at a medical network within the larger civilization. On the other hand, the remarkable duration of the civilization, well over a thousand years, might be regarded as time enough for its development. The variable Floruit appears to be irrelevant to the development of a network of medical practitioners, at least in Marajoara. The absence of evidence of a medical practice despite a stable, peaceful, and relatively prosperous civilization over five centuries suggests one would never have developed.

⁷ There has been new appreciation of the social complexity of hunter-gatherer groups with the recent recognition of two types, one type exhibiting "immediate-return" behavior in which ready partnering is used to acquire the day's necessities and to make the day's decisions, and the other exhibiting "delayed-return" behavior in which storage of essentials and limited husbandry permit crystallized personal relationships. The latter more readily accepts features associated with agriculture and sedentarism, whereas the former, because of its stricter egalitarian nature, is resistant to change. This is discussed later in detail.

Summary Table for Marajoara

SOCIETY – pre-Columbian

POPULATIONS, LOCAL – 1,000-10,000

POPULATION, TOTAL – 100,000

PRIMARY AREA – *ca.* 50 clusters of inhabited mounds unequally distributed along streams throughout 1,500 square miles, most well within a few miles of another site; for the Os Camutins residential and ceremonial site, *ca.* 0.2 sq. mi.

URBAN DENSITY – 78 persons per acre (Os Camutins)

PRODUCTION – fish, ceramics, stonework

GOVERNANCE – heterarchy for commercial ventures, egalitarian at home

EGALITARIAN ARCHEOLOGY – yes, except for some burials

PROMINENT KINSHIPS – yes, in villages (small mound clusters)

WRITING – no

DISTANT TRADE – yes

SPECIALIZATION – yes, in family units

MONUMENTAL STRUCTURES – none recognizable

DENOUEMENT – deterioration of culture over time, then abandoned, cause unknown

MEDICAL PRACTICE – ?

FORMATIVE PERIOD – 1200 years (first inhabited mounds)

FLORUIT – 500 years (900-1400 AD)

CITY-STATE – yes (Marajo, Os Camutins)

AVERAGE LIFE EXPECTANCY – no published information

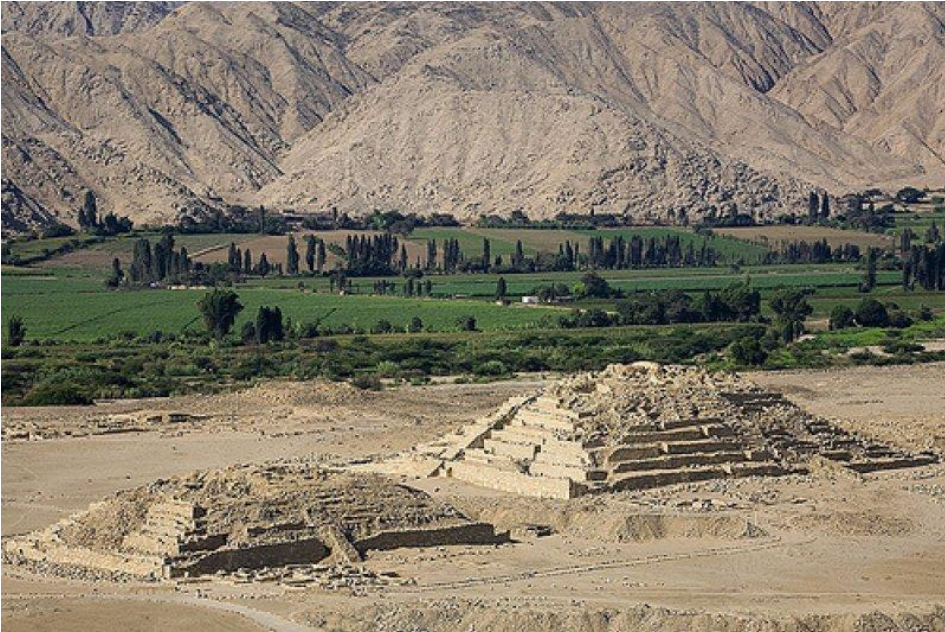


Fig. 7: Archeological remains of Caral Supe, the major temple complex of the 3rd millennium BC Norte Chico civilization in present-day coastal Peru. Although the central population of Caral Supe was only 3,000, that of satellite villages in neighboring river valleys was about 20,000. This photograph is to be found on the World Heritage Site through UNESCO.

2. Norte Chico civilization of coastal Peru (Huaca Prieta preceded, Caral Supe subsequently emerged)

In the North Chico region of Peru is found the ancient city of Caral Supe, about ten miles inland from the Pacific Ocean and a major center of a civilization that flourished on an alluvial desert terrace of the Supe river valley and nearby valleys *ca.* 2600-2000 BC, although initial settlement may have been as early as 3500 BC.⁸ The population in the Supe river valley is estimated to have been as much as 20,000 within an area of 35 square miles, with an estimated 3,000 residing in Caral Supe itself, a central area of about 200 acres postulated to include habitation for an elite subpopulation and an uninhabited locus for large communal gatherings. But most settlements paralleled the nearby several rivers that emptied into the Pacific Ocean, and the overall settled region extended over 700 square miles, with commerce in fishing pursued in coastal settlements and agricultural commerce with inland communities. The network of rivers in the region was vital as it made an extensive irrigation system possible. Numbering about twenty, the affiliated communities initiated irrigation of the generally arid region for sustenance of the population of the valleys and beyond. There was variety in their domesticated crops, and this included corn. Food was cooked by roasting, as this was a preceramic culture. Cotton was an important commercial product, one use being fishing nets. Techniques of textile manufacture were evolving. The nearby maritime and agricultural settlement of Aspero, which antedated Caral Supe and was not as large, was located near the coast and also had ceremonial buildings and platforms, but it is now evident that monumental structures were located in many locations.

Small in central and total population but with regional settlements over an area similar to that of Miletos, Norte Chico civilization was stable for many centuries with growing prosperity and with a suggestion of central guidance over some aspects of daily life as they pertained to monumental constructions. The Norte Chico region, like the Miletos region, was on or near the seacoast, but in contrast to the Aegean Sea there would have been little or no maritime commerce. The growth in size and area of the human settlements was fluid over time, with the greater monuments occurring later in the prehistory of the region.

Evidence is accumulating that distant trade was a major contributor to the survival and prosperity of the region. Cotton fishing nets and other items made in Norte Chico have been identified in other coastal areas. An agricultural surplus was available for exchange with goods imported from further inland, including jungle populations. Thus, the agricultural foundation of the Norte Chico region permitted the formation of communities that produced in turn a prospering regional commercial center. With little evidence to suggest a formal arrangement existed among the communities it is assumed they functioned autonomously in their commercial ventures. As such, this is consistent with a heterarchy. If so, cooperation among the communities may have been mediated by patriarchs or an assigned leader. Another possibility is that the population of each community determined the nature of its commercial operation, thereby representing an early form of corporatism. But, as with Marajoara, within family units there was little to

⁸ See: Haas, J., et al., *Power and the Emergence of Complex Polities in the Peruvian Preceramic*, in *Archeological Papers of the American Anthropological Association*, 14:37-52, 2004.

shift allegiances away from the place of traditional egalitarian kinship for, being in separated communities, integration within a larger commercial structure was not an issue.

The monumental structures of Caral Supe and of Aspero are thought to have required significant central organization and a large labor force, but there is no evidence whatever of coercion or a militaristic component, either offensive or defensive. One explanation for their construction is that the surrounding settlements actually functioned as a “confederation of communities” and that the communities, autonomous, were competitive with each other in supporting the religious cult that was common to all the communities and located at Caral Supe.⁹ They contributed a labor force to the beautification and magnificence of their shrine, much as ancient Greeks competed in their opulent offerings to shrines at Delphi and elsewhere. As a consequence, visitors and traders from distant regions brought desirable products and prominence to Norte Chico, surely another reason for local communities to support their local monumental edifices.¹⁰

Musical instrumentation has been recovered in Norte Chico, but pictorial art is virtually absent, with only a few painted figurines being found so far. Some think a quipu system was used for tabulation, but there was no system of writing. The nature of governance is unknown and there is presently no evidence supporting a theocratic system of redistribution of resources as is postulated to have occurred in early Sumerian city-states. Burial sites have provided no evidence for class stratification and no evidence of violence or warfare. The prehistory of this region, however, is still incomplete, and perhaps Caral Supe with its monumental pyramids was built as a regional center for religious ceremony or other common-use purpose. If the total population of the region of 20,000 is correct, most of the peripheral settlements must have had populations of under 1,000.

Initially it was assumed that a central hierarchy was necessary for the organization and effort required to build monumental structures. But the elite may have fulfilled only religious or mystical needs of the region, and, while that class may have been responsible for organization, design, and upkeep of the monumental structures, the peripheral communities functioned autonomously. Although there is evidence of production of sumptuous items in the temple area (just as there was a building assigned to production of copper ornamentation at the temple area of Cahokia; see p. 151), there were no storage sites designed for distribution of provisions to peripheral settlements.

Nothing has yet been found in the North Chico region that suggests there was a system of either medical practitioners or shamans, although the absence of a written record and of artistic renderings restricts the options available for identifying them. No skeletal remains have been reported that might reveal evidence of surgical treatment. Although trepanation has been reported in other American cultures at an early date it has not been detected in Caral Supe burials. One explanation for this that fits the previous paragraph’s

⁹ See: Korol, D., *Gobekli Tepe and Norte Chico: Structural Monumentalism and Protocivilization Manifestations in Pre-Pottery Societies*, (2015) ENG. English translation of the work is available on the Internet.

¹⁰ A similar dispersion of population and a central temple area is seen at Cahokia in North America (discussed on p. 151). At famous Gobekli Tepe in Anatolia the 12,000-year-old temple area was not surrounded by settlements, but it must have been visited frequently by hunter-gatherer bands in order to exist at all.

speculations may be that the total permanent population was fragmented, a “confederation,” rather than being under the control of a central polity. An explanation for the absence of medical practitioners is not obvious, but population size and density of the individual settlements was relatively small, perhaps ranging from a few hundreds to a thousand or so. There was no high-density central population, although the various communities were in close contact. Like Marajoara, while six centuries of prosperity, peace, stability, and modest growth might seem sufficient for a small network of medical practitioners to appear, perhaps egalitarian customs with their necessary assignment of duties, responsibilities, and status to individuals at a local level and the need for donated services for monuments and shrines were sufficient to hinder formation of a medical network. Like Marajoara, environment (river vs. aridity) necessitated a partitioning or separation of the settlements, a natural inhibitor to network formation and to a supervisory elite. Kinship affiliations therefore prevailed. The Caral Supe-centered civilization flourished until *ca.* 2000 BC at which time it went into decline, the reasons not clear. There now is evidence that a physical catastrophe centering around earthquakes and flooding may have occurred.¹¹

Summary Table for Norte Chico civilization

SOCIETY - pre-ceramic, Late Archaic
 POPULATION, LOCAL – 3,000 (Caral Supe)
 POPULATION, TOTAL – 20,000 (30 settlements no larger than a few hundred to 2,000)
 PRIMARY AREA – 200 acres (hegemony, 35 square miles, but the total area including sparsely settled river valleys was 700 square miles)
 URBAN DENSITY – 20 persons per acre (Caral Supe)
 PRODUCTION – cotton textiles, netting, sea-food and agricultural products, jewelry
 GOVERNANCE – confederation of communities (considered as kinships), each with its own commercial orientation; consistent with either a heterarchy or perhaps a form of corporatism. Social organization was community-based and must have been one of traditional egalitarian kinships, either clusters of small kinship units such as extended families or small clans. Elites probably provided supervision of monumental sites.
 EGALITARIAN ARCHEOLOGY – “no” bases on monumental structures, but “yes” on inhumations, no militarization or evidence of coercion; as mounds were associated with many villages, “yes” is the overall conclusion.
 PROMINENT KINSHIPS – yes (in the villages)
 WRITING – no
 DISTANT TRADE – yes
 SPECIALIZATION – yes
 MONUMENTAL STRUCTURES - yes
 DENOUEMENT – declined, earthquake?
 MEDICAL PRACTICE – ?
 FORMATIVE PERIOD – 600 years (from first monuments)
 FLORUIT – 600 years
 CITY-STATE – no, except perhaps late as the Caral Supe “religious” center became the focus of ritual for the confederation of communities
 AVERAGE LIFE EXPECTANCY – n.a.

¹¹ See: Sandweiss, D. H., *et al.*, *Environmental Change and Economic Development in Coastal Peru between 5,800 and 3,600 Years Ago*, in *Proc. Nat. Acad. Sci.*, 106:1359-1363, 2009.



Fig. 8: Located in northeast Louisiana not far from the Mississippi River is the central site of an early Mississippian mound-building civilization referred to as Poverty Point, a modern name for the area. Although its prominence comes from a unique and large mound complex, culturally and commercially related small settlements extended out several miles. This is a Martin Page image courtesy of Louisiana State Parks, and it is available on the Internet.

3. Mississippi alluvial, Poverty Point:

The alluvial plain of the lower Mississippi river encompasses about 7,000 square miles and contains the focal point of the Poverty Point civilization, a long-lived early mound-building tribal culture that first appeared *ca.* 2200 BC, although the earliest mound-building in America can be dated to *ca.* 4000 BC. It flourished from about 1700 to 700 BC. Its settlements bordered the Mississippi river for perhaps a hundred miles, but a thirty-seven-acre plaza at Poverty Point in present-day northern Louisiana is thought to be a central gathering place for ceremonial practices. It is estimated that the remarkable symmetrical ridges constructed around the site were carefully laid out and required a massive construction effort, although the mounds and central plaza were constructed over centuries. It is likely that the tops of the mounds were occupied by residences for perhaps a thousand people. Although simple stone and clay pottery, tools, and effigies that include human figurines have been found, it appears that many tons of flint, iron ore for weights for fishing nets, and a great variety of other minerals, including copper, were imported from hundreds of miles away for the purpose of producing finished products, and polished stone beads and art forms (effigy beads and pendants) have been uncovered. Study of a cache of unfinished stone beads from fifty miles east of the river documents the use of a lathe in their production, which must have been employed by a specialist in the craft. This indicates that Poverty Point was a major center for commercial production, and examples of that trade have been found hundreds of miles away.

Perhaps Poverty Point should be viewed as similar to Norte Chico civilization in that it was composed of autonomous small settlements along the Mississippi River and its branches that provided a commercial trading center for the southeastern North American continent in addition to its own production of goods for trade. It had no competition. Poverty Point itself may have been a pilgrimage site with some permanent residents to maintain and organize the mound area. But despite the attention to Poverty Point itself it was the clustering of local autonomous villages containing a variety of ethnic groupings that provided the stimulus for commercial ventures.¹²

Within twenty-five miles of Poverty Point are found many smaller settlements, and it is thought that they represented an integrated part of the civilization and its commercial activities by producing or providing specialized goods and services related to the center's commercial activities, although the method for coordinating production is unknown. An interesting hypothesis suggests that the great mounds were able to be built because the person(s) or tribe controlling the area would give parcels of land to those who wished to join the community on the condition that they would construct their section of mound as directed. Thus, it might have been self-interest rather than coercion that made the monumental effort possible. But an alternative explanation posits a materially egalitarian society guided by a "knowledge elite" that was powerful and influential enough to acquire

¹² The source of much of the preceding information is: Gibson, J. L., *Poverty Point: A Terminal Archaic Culture of the Lower Mississippi Valley*, second edition, 1996, *Anthropological Study Series, Louisiana Archaeological Survey and Antiquities Commission*.

voluntary manpower for monumental construction.¹³ Otherwise how can one explain commercial production in a society that had no local natural resources for export? Were some of their imports actually gifts from distant peoples? Could the “knowledge elite” have been shamans? The nature of some of the stone carving and decoration is likely of a religious or ritual nature. As there are no burial sites described at this point, nothing can be attributed to this proposal with certainty. The possibility of shamanism is unproven, but Poverty Point products must have had a significance beyond simple barter.

This civilization is extraordinary in that it was hunter-gatherer and had no agricultural base, a factor that would have limited the size of its central population and favored commercial integration of nearby small settlements to support the commercial efforts associated with Poverty Point civilization. It was a trading center established over many centuries, as were its mound constructions, but ultimately it led to a flourishing commercial period for its affiliated communities lasting, some think, as long as 1000 years. With no evidence of coercion, the mechanism whereby its monumental structures were completed and commercial production was coordinated is speculative. Those settlements closer to the center were involved in commerce, whereas those more distant are thought to often have been unrelated socially or politically. Still, those settlements that lined many miles of the Mississippi river were probably linked via waterways and are considered components of the Poverty Point civilization. They varied in size from several family units to scores of dwellings and are also considered to have been permanent rather than seasonal. As for local political organization, all that can be said is that, because of the massive effort involved in the earthworks of Poverty Point and environs, some form of important central organization must have existed. Its nature and whether there were a hierarchical social scheme is unknown, but there must have been an underlying sense of identity, tribal or communal, that permitted the civilization to persist as it did. Consideration should also be given to the concept of heterarchy whereby groups of persons involved in various commercial ventures, such as production of stoneware and metalwork, importation of raw material, and trading networks, were each located in the various autonomous communities. The activities of daily living required for a non-agricultural society, however, may have taken up the time of most community members.

There is as yet no evidence of any medical practice, although there is little archeological evidence left with which to reconstruct village life, for modern farming has destroyed most of the sites where residences would have been constructed. Remnants of a presumably egalitarian kinship-based society may have hindered development of a medical practitioner network, even though the total population, the proximal settlements, and stability of the site might have supported such a network.

Although more like a “proto-civilization,” the reason Poverty Point is included here is (1) the long period in which it was peacefully sustained and the long-distance trade that was its source of stability, (2) its unique status as a trading center with connections to distant cultures, (3) extensive settlements near and far with clear evidence of their association with Poverty Point as a pivotal ritual center, and (4) the associated settlements, where most commercial activity must have taken place, would have been occupied by a plebeian

¹³ See: Kelly, L., *Knowledge and Power in Prehistoric Societies*, Cambridge, 2015. Dr. Kelly lists ten characteristics consistent with an elite group within an apparently egalitarian society that directs use of its resources and has its source of influence embedded in oral tradition.

population, and if medical practitioners were to arise, it would be from that population, but there is no evidence of it.

Summary Table for Poverty Point

SOCIETY – Late Archaic

POPULATIONS, LOCAL – perhaps up to 8,000 if peripheral clusters are included

POPULATION, TOTAL – certainly many thousands along the Mississippi River for up to one hundred miles

PRIMARY AREA – 1.4 square miles (hegemony, 100 square miles; on the shores of the Mississippi River)

URBAN DENSITY – 3 persons per acre

PRODUCTION – stonework, tools, figurines, ceramics, and some copper work

GOVERNANCE – heterarchical arrangements supporting commercial networks, but with the autonomous communities retaining traditional egalitarian kinship patterns

EGALITARIAN ARCHEOLOGY – despite monumental construction, local villages appear not to have been under coercion and a central elite population has not been identified, so the answer for the moment is “yes”

PROMINENT KINSHIPS - yes

WRITING – no

DISTANT TRADE – yes

SPECIALIZATION – yes

MONUMENTAL STRUCTURES - yes

DENOUEMENT – slowly declined over several centuries

MEDICAL PRACTICE – ?

FORMATIVE PERIOD – 500 years

FLORUIT – 1000 years

CITY-STATE – no; probably a confederation of kinships with a common ritual center

AVERAGE LIFE EXPECTANCY – n.a.



Fig. 9: Cahokia, center of a late Mississippian mound-building civilization, was located in present-day southern Illinois, flourishing from 900-1300 AD. With a central population perhaps exceeding 20,000 at its peak, it was a commercial center connecting the Great Lakes region and the southeastern United States. This artist's rendering of Cahokia, done by Hieronymus Rowe, is provided here courtesy of Wikimedia and licensed under Creative Commons Attribute-Share Alike 4.0 International.

4. Cahokia, part of the Mississippian culture

Modern paleohydrological research now indicates that major flooding events occurred in the region of the central Mississippi River in approximately the 6th C and the 14th C AD.¹⁴ It was during the interval between those events in the flood-plain of the Mississippi River that the Cahokian civilization developed, flourished, and then declined. It was also during that interval that forest clearing and the evolution to sedentism and an agricultural lifestyle took place. The Cahokian civilization, which was sustained for about 800 years, is considered a manifestation of the greater Mississippian civilization, a mound-building civilization that, like Cahokia, was composed of “urban” centers surrounded by smaller settlements that extended from the Great Lakes to the Gulf of Mexico. Cahokia was the largest and oldest of its settlements. Many of the Mississippian settlements were chiefdoms, and social classes did exist.¹⁵

From scattered small agricultural settlements the Cahokian population grew and developed intensive farming practices and fostered trade that would extend from Mexico to the Great Lakes and throughout the southeast of North America. Copper was acquired from which artistic pieces would be traded as well as used locally for ceremonial purposes. Production of tools from imported lithic raw material, copper products, jewelry and ornamentation, pottery, and agricultural surplus, especially corn, made Cahokia, located conveniently near the Mississippi River south of the Great Lakes, the trading center connecting for the southeast with the rest of the North American continent, an urbanized commercial center that functioned like a giant mall for the more immediate surrounding region.¹⁶

It is likely that it also became a focus of religious ritual, for over several centuries, beginning about 900 AD, more than 120 mounds were raised within a 6 square mile area. In its center was the Monk Mound, a dirt pyramid of great dimension used as a ceremonial platform, and a fifty-acre open area. In the periphery were smaller settlements and mounds. Presumably the agricultural and commercial successes of Cahokia preceded its religious significance, but the prehistory of monumental mound-building in North America dates to 3000 BC and earlier. The permanent population of Cahokia may have exceeded 20,000 during its phase of rapid growth, the 11th and 12th centuries, and evidence suggests a large migration into Cahokia of people from distant regions with no ethnic ties to local inhabitants. The enormous human effort expended in building the giant mounds and platforms required organized community effort. This was likely a voluntary effort, perhaps with transient or semi-permanent groups contributing to the

¹⁴ See: Munoz, S. E., *et al.*, *Cahokia's Emergence and Decline Coincided with Shifts in Flood Frequency on the Mississippi River*, in *Proc. Natl. Acad. Sci.*, 112:6319-6324, 2015.

¹⁵ See: Hudson, C., *The Southeastern Indians*, Lincoln (NE), 1995. This and other scholarly works stress the rigid and often ruthless nature of the authoritarian chiefdoms of the Mississippian culture. Cahokia, however, seems an unlikely example of this form of social order. The true nature of its social organization will probably be discerned as archeological study progresses. The consistent importance of commerce in initiating urbanization is one of the underlying themes of this volume of *The Natural State of Medical Practice*, and a “chief” of a large population would have functioned more as a ruler than as a Chief Executive Officer. Although a “chief” might commandeer a commercial enterprise he would not have initiated one.

¹⁶ See: Bolfig, C., *The Paradigm of the Periphery in Native North America*, an Honors Thesis submitted to Texas State University, San Marcos TX, 2010, especially chapter 3, Cahokia.

production of their own particular mounds. The reason for this is unknown, and indeed the reason that Cahokia developed at all is a mystery. But if religious ritual were sufficiently unique and important, this could explain its attraction for distant groups. The finding of ceremonial pipes with shamanistic features would suggest shamans might have provided charismatic guidance important to controlling or manipulating the population.¹⁷ The pipes were found, however, in peripheral sites rather than near a central location. It also has been pointed out that as populations transition from hunter-gatherer to an agricultural way of life the traditional shaman is replaced by more communal and ritualistic behaviors, *i.e.*, a priest-figure. Perhaps the pipes were a remnant of earlier organizational efforts of a band or tribal unit, whereas the center of Cahokia with its massive mounds and burials reflected a change toward public ceremony and ritual rather than individualistic displays of a mystical nature. A second finding is a copper workshop, the only one known in North America, near the great Monk Mound. It is now thought that the principal use of the copper was for ceremonial items related to officiating that occurred on the great mound. Interestingly, heating to high temperature and annealing were used in Cahokian metallurgy. A third point presently being proposed is an astronomical basis for the location and alignment of many structures, suggesting that the concept of a cosmos was part of religious conception. But probably the most important factor directing the course of Cahokia was its kinship arrangements as highlighted by Dr. James Brown. With the finding of “diverse origins in ceramic producing social groups,” the latticework upon which society was formed can now be postulated to be a hierarchy not of a few individuals but of relations between kinships.¹⁸ There was no central coordinating authority. The variation in food storage facilities, most located peripherally, indicates leadership was dispersed. Immigrant groups, formerly autonomous, joined with and intermarried with local kinship groups so that there were “kin-ordered modes of production,” the distribution in responsibility and importance varying with the power status of the kinships.¹⁹ This led to an inequality among Cahokian residents, for the surplus of labor provided by the immigrants meant that their bargaining power was lessened. But interactions were between or among kin-based groups, not a coercive central authority.

Putting this all together, perhaps the attraction of Cahokia was something of a cult-like nature, or perhaps Cahokia was a site for religious pilgrimage. There may even have been a processional route for visitors to follow.²⁰ But otherwise, the economic cohesion that maintained this vigorous and sizeable population was a stable class-oriented society based on kinship groups, large and small, weak and powerful, although it is curious that according to Dr. Craig Lockard “nobility” were required to marry into the plebeian class.²¹ Relations in and between groups would have been formally structured with assigned duties. There are similarities here with the “nested kinships” postulated for early Sumer (p. 46). Further afield were small farming hamlets, based on corporate kin-

¹⁷ See: Emerson, T. E., *Materializing Cahokia Shamans*, in *Southeastern Archeology*, 22:135-154, 2003.

¹⁸ See: Brown, J. A., and Kelly, J. E., *Surplus Labor, Ceremonial Feasting, and Social Inequality at Cahokia: A Study in Social Process*, in *Surplus: The Politics of Production and the Strategies of Everyday Life*, Denver, 2015, C. T. Morehart and K. De Lucia, editors, pp. 221-244.

¹⁹ See: Wolf, E., *Europe and the People without History*, Berkeley, 1982, pp.88-99.

²⁰ See: Pauketat, T. R., et. al., *The Emerald Acropolis: Elevating the Moon and Water in the Rise of Cahokia*, in *Antiquity*, 91:207-222, 2017.

²¹ See: Lockard, C., *Societies, Networks, and Transitions*, Boston, 2008, vol. 1 (of 2), p. 346.

groups, and even these had evidence of “village-level specialization” for production of commercially useful items. While small egalitarian settlements and agriculture were commonly found in regions extending out from the Mississippi River, Cahokia was the exception, its motivation being a commercially-derived hierarchy, probably guided in ritual by a separate elite class, although the peak period of prosperity and size, *ca.* 1200 AD, has also been attributed to an elite group commandeering the mechanism of religious ritual. Although the importance of this is debated, the theory does fit the archeological evidence that this hierarchical phase of Cahokia social life in which the peripheral population shifted from sprawling settlements to the ritual center was sandwiched between much more extensive periods of egalitarianism within kinship groups.

The apparently clear-cut era of prosperity of the Cahokia civilization was attended with several stable and prosperous centuries. With agricultural surpluses, especially corn, and subsequent involvement in commerce that prospered from Cahokia’s convenient location along the Mississippi River between the Great Lakes region and the southeastern North American continent, it became secondarily a great center of ceremony and ritual. Cahokia can be considered a civilization with a commercial base in corporatism but at the same time firmly within a social hierarchy built on kinships. There also may have been a tolerated elite deemed necessary for ritualistic practices and guidance of monumental construction. It is unknown if that separate elite class had more than nominal influence over the daily life or prosperity of Cahokia. No one has yet proposed that some of the large mounds may have been the work of specific ethnic or tribal groups, similar to the monuments of Norte Chico. While there was some hierarchical governance based on kinships, there is so far nothing to dispel the idea that Cahokia was essentially the product of a confederation of autonomous groups with frequent visits from more remote neighbors. The surrounding egalitarian agricultural communities were incorporated into the hierarchical kinship system that developed. But it has been pointed out that the consequence of this social change was not permanent, and when difficulties finally threatened Cahokia the individual kinship units ultimately disavowed the new system and voluntarily departed in order to return to their simpler egalitarian ways. Having marched a short distance along the path to “progress,” they turned back to the stability of ever unchanging tradition.

Dispersal of the surrounding settlements may have terminated the Cahokia civilization. But as Cahokia declined in the 13th C, geological evidence supports the notion of increasingly devastating floods. Its disappearance in the 14th C does not appear to have involved conflict or epidemic disease. But the lives of the people of Cahokia were probably difficult at all stages. In the absence of data from burials of inhabitants of the Cahokia region, the life expectancy of contemporary groups adjacent to the Mississippian culture was sixteen years in those who reached the age of fifteen.²² The findings in a burial site of evidence of a singular large-scale human sacrifice remains unexplained. As there was no written record their life style remains hypothetical, and nothing of a medical nature has been uncovered that describes the nature of day-to-day medical care. A nearby ceremonial medicine lodge and use of caffeine-laced drinks do not represent medical knowledge. Yet metrics of Cahokia could have supported a network of medical

²² This calculation is derived from data from the Steed-Kisker archeological site to the west of Cahokia. See: Obrien, P. J., *Cultural Resources Survey of Smithville Lake, Missouri*, volume 1, *Archeology*, Kansas State University, 1977, pp. 113-127.

practitioners, for the four-century duration of its prosperous and peaceful period and the size of its population at the zenith approximates the lower range of similar values for the five successful primary civilizations. But the overriding fact of this civilization is that it not only arose amidst a confederation of egalitarian kinship communities and remained so throughout much of its existence as a hierarchy of kinships, but it also ended with a resumption of egalitarian existence as its composite social units dispersed in response to environmental changes. As the “common man” who would be the first medical practitioner in Cahokia was never freed from the demands of kinship to make the attempt, Cahokia can enter no candidate for the honor. A comparison of Late Woodland Cahokia with the Late Archaic culture of Poverty Point suggests that after three thousand years there was no change for the better, although things did get bigger. Although there is a vague similarity with the predynastic Egyptian culture and its subsequent pharaonic dynastic monumental structures in that there is a sequence of mound-building civilizations in the Mississippi region (Poverty Point, 1400 BC; Adena culture, 500 BC; Hopewell culture, 100 BC; and Mississippian culture manifested in Cahokia, 700 AD) that produced ever larger monumental mounds, no link among the four has been found. In contrast to most of the twelve lesser primary civilizations, it is now reasonable to attribute the decline of Cahokia to calamitous environmental change.

Summary Table for Cahokia civilization

SOCIETY – Late Woodland

POPULATION, LOCAL – 20,000

POPULATION, TOTAL – ?; fluctuated with coming and going of kinship groups, probably tribes

PRIMARY AREA – 6 square miles (hegemony: may not be relevant in this context)

URBAN DENSITY – 5 persons per acre

PRODUCTION – agriculture (corn), copper metallurgy, hand tools, jewelry, ornamentals,

GOVERNANCE – locally and peripherally egalitarian kinship communities or small chiefdoms (and chiefdoms are based structurally on kinship), but functionally a commercial enterprise with production based on hierarchical kinship relations beginning in the 12th C. As groups came and left apparently voluntarily this can be viewed as an example of corporatism, for kin-group decisions provided direction rather than a central ruling elite. With a plebeian structure built of kinships, Cahokia, most unusually, withstood a formal centralization of power. Egalitarianism remained a potent force.

EGALITARIAN ARCHEOLOGY – no (extensive central monuments)

PROMINENCE OF KINSHIPS – yes

WRITING – no

DISTANT TRADE – yes

SPECIALIZATION – yes

MONUMENTAL STRUCTURES - yes

DENOUEMENT – flooding

MEDICAL PRACTICE – ?

FORMATIVE PERIOD – 400 years

FLORUIT – 400 years (900-1300 AD)

CITY-STATE – yes

AVERAGE LIFE EXPECTANCY – 31 years if there were survival of infancy and childhood (data from adjacent site)



Fig. 10: Artist rendering of a village of the Bronze Age Terramare culture that developed in the region of the Po River in Italy. About seventy villages are known and are characterized by similarities in construction. The total population, estimated at 150,000, suggests an average village size of 2,000, of which some were clustered to give a higher regional concentration. Production of bronze tools and weapons was a major commercial effort. This photograph of an artist's rendering of a Terramare village can be found at EXARC.net in the context of the Terramara Park of Montale and is published under a Creative Commons Attribution-NonCommercial 3.0 license.

5. The Po River Valley civilization of Terramare

The Po River, which begins in the western Alps and empties into the Adriatic Sea south of Venice, drains a valley that covers about 18,000 square miles. In its central region the Po valley was home to the Terramare civilization, a Middle/Late Bronze Age (1650-1150 BC) people initially scattered in small hunter/agricultural settlements. It is viewed as a unified culture of networked villages based on (1) architectural style of their dwellings, quadrangular settlements with houses on pilings surrounded by redirected river channels for protection and water source, and (2) the rapidity with which it appeared in the region, suggesting immigration over a century of people with a common heritage. One theory is that the population migrated down from trans-Alpine pile-dwelling communities. Once established it was an agricultural society with fields and herds, horses, ploughs, and carts. Over time the small clan-sized settlements with an average population of about 130 coalesced into large communities that could cover up to fifty acres and contain perhaps 2000 people, but in general each settlement was within 1-4 miles of its neighbors, and clusters of settlements might contain as many as 6,000 persons.²³ It is estimated that at its peak the Terramare population reached 150,000. Overall population density for the region at its peak is about 40-50 individuals per square mile.

The Terramare civilization, with its seventy villages of identical construction, appears to have been socially well-integrated, and no primary administrative center or central source of power has been identified. Given the commercial venues and self-sufficiency in agriculture for sustenance, it is likely that interpersonal covenants were devised to optimize production, the result being a commercial network distributed throughout a cluster of settlements. There may have been several such networks, each specializing in a particular aspect of the commercial product or procedure. But for day-to-day functioning, maintenance of canals and roads, and protection of villages, there is little to suggest anything other than an egalitarian kinship social order. As time passed there was a movement of the populations of small settlements to a few larger ones. Despite lacking a central authority for social management, the close-knit community network had some metrics similar to Miletos and might have developed a network of medical practitioners at some point, although no evidence for this has been identified.

Metalworking in bronze was an important focus of the region, as was commerce that extended as far as the Baltic. It shared with Etruria common features in its ceramics but maintained its otherwise unique culture. Amber was imported and made into ornamentation. Figurines were produced. Cremations and burial practices were unpretentious, with few goods accompanying the deceased. While the development of the early settlements may be viewed as a *de novo* event introduced by an immigrant population, European populations at that time were generally enlarging and migrating to new regions. It is likely that metallurgical knowledge had been acquired prior to the Terramare settlements, although defined networks of metallurgical manufacture were most developed toward the end of the Terramare civilization.²⁴ But the origin of the people remains undetermined at this time.

²³ Cardarelli, A., *The Collapse of the Terramare Culture and Growth of New Economic and Social System during the late Bronze Age in Italy*, in *Scienze dell'Antichità* (15), 2009.

²⁴ See: Hardin, A. F., *The Mycenaean and Europe*, London, 1984, in which he refers to this network as a "koine" on p. 11, an interesting and relevant analysis.

Despite its growth and prosperity and evidence that some citizens/families were wealthier than others, the Terramare civilization at no point appears to have developed an elite class of citizens that maintained control over the others. There was evidence, however, of a class of citizens that might be denoted as “warrior,” a merit of distinction that could be extended to family members, but the villages were in close contact and any defensive effort would have been directed at outsiders, not at other Terramare settlements. Social organization was based on family units, and perhaps some were primarily involved in commercial ventures and others in defense. In any case, it is thought that close social integration of the communities was made necessary by the effort required to maintain waterways. For these reasons a reasonably nonauthoritarian society was retained despite its growth in population and wealth over five centuries. Interestingly, Dr. Cardarelli considers this civilization as “isonomic,” equality in civil or political rights before the law. Based on limited data, the life expectancy at the age of fifteen was at least twenty-five years, significantly higher than most other civilizations described in this volume.²⁵

It is interesting that a network that functioned to optimize production and distribution of bronze products has been termed by a scholarly source as a “koine,” considered in volume 1 of *The Natural State of Medical Practice* (p. 168) as a voluntary and democratic group of equals. In other words, this cohesive group of villages functioned as a heterarchy, its commercial ventures being primarily production of bronze tools and weapons. Within each village, however, there remained an egalitarian system directed by leadership within a kinship, especially as some processes in toolmaking required no special skills, which means all able-bodied family members could be employed in the process.²⁶ It was a kinship-vested process rather than one directed by a hierarchy.

Climate change rather than social deterioration may have caused the Terramare civilization’s demise, but the true cause is unknown. Near the end of this culture it is proposed that changes in river level, drought, and overuse of the land precipitated a departure of the population, although the timing of the event approximates the end of the Mycenaean empire in the nearby Greek Peloponnese, and thereby may have shared the same fate.

The lack of evidence for medical professionals may have been a consequence of kinship-oriented egalitarianism that persisted throughout most of the Terramare civilization. There also may have been insufficient population density in some areas until its later years. But the physical separation of villages was small and should not have limited the chances of a network of medical practitioners.

²⁵ Derived from the data of Canci, A., et al., *La Necropoli della media e recente Eta del bronzo di Olmo di Nogara (Verona)*, in *Preistoria e Protostoria del Veneto*, Florence, 2015, a conference paper, pp. 327-340. In calculating mean age at death the age used for all those estimated to be 50 or greater was 50, meaning that the final value was certainly greater than 40 years but by how much was not calculable. More relevant is the proportion of persons over 50 years of age: 13% for men and 28% for women. The validity of the data in terms of random sampling is, of course, unknown. The investigators, however, do not report that the inhumations suggest an elite subgroup within the general population.

²⁶ See: Barbieri, M., and Cavazzuti, C., *Stone Moulds from Terramare (Northern Italy): Analytical Approach and Experimental Production*, in *Experimental Archaeology*, issue 2014/1.

Summary Table for Terramare:

SOCIETY – Middle Bronze Age to Final Bronze Age
 POPULATION, LOCAL – 2,000 (clusters up to 6,000)
 POPULATION, TOTAL – 150,000 (200 settlements)
 PRIMARY AREA – 50 acres for a later sizeable settlement (hegemony of the culture, 3,000 square miles)
 URBAN DENSITY – 16 persons per acre
 PRODUCTION – agriculture, herding, metalwork, ceramics
 GOVERNANCE – egalitarian within communities comprising established kinship neighborhoods, heterarchy for metallurgy and cohesion of the overall civilization
 EGALITARIAN ARCHEOLOGY - yes
 PROMINENT KINSHIPS - yes
 WRITING – no
 DISTANT TRADE – yes (Aegean, Verona, Baltic)
 SPECIALIZATION – yes (ore and amber imported)
 MONUMENTAL STRUCTURES - no
 DENOUEMENT – abandoned, cause unknown
 MEDICAL PRACTICE – ?
 FORMATIVE PERIOD – unknown prior to immigration
 FLORUIT – 300 years (1450 -1150 BC)
 CITY-STATE – yes, in terminal stage as larger settlements developed, sometimes with peripheral small subsidiary hamlets
 AVERAGE LIFE EXPECTANCY – 40 years (minimum estimate)



Fig. 11: The famous Neolithic “proto-city” of Catalhoyuk, located in modern-day south-central Turkey, flourished for a millennium about 7000 BC. There is little evidence of a commercial base, nor are there public buildings or evidence of warfare. The population, estimated as high as 10,000, is thought to have been partitioned into neighborhoods probably based on kinship. This photograph of the artistic reconstruction by Wolfgang Sauber of Catalhoyuk from the *Museum of Prehistory and Early History in Thuringia* through Creative Commons 4.0 International.

6. Catalhoyuk

On the ancient alluvial plain of a former river channel in southern present-day Turkey is found the remnants of the Neolithic and early Bronze Age city of Catalhoyuk. The site was populated by 7000 BC and lasted for about 1400 years. Pictures of its unique development of 1,500 densely packed dwellings without streets and entered from their roofs are widely familiar. Every dwelling was of similar design and had a room for habitation and small ancillary rooms, some with plastered walls, often with wall paintings. Inhumation occurred within the settlement itself, but despite many human figurines no site for religious practices has been found.²⁷ More surprisingly for a town of this size, no public buildings have been discovered.

No evidence of social hierarchy has been identified, as suggested by the remarkable similarity of construction and contents of dwellings, this being supported by only limited evidence of specialization based on proximity of dwellings containing similarly produced goods. The interesting idea of Catalhoyuk being formed by two large kinships in such a way as to promote intermarriage has been proposed as an explanation for the large population at the site, which might have reached 10,000 at its peak. The culture was sustained primarily by hunting, although early domestication of animals and agriculture was under way before the area was abandoned. Agriculture was of little importance for most of its existence, and food surplus was an unlikely basis for its settlement and long duration. At the time it was inhabited, the region around Catalhoyuk was swampy and probably flooded annually. Over time agriculture was initiated, but the location of the fields was a mile or more from the settlement, placed there because of the drier land. An important reason for agriculture may have been to provide forage for domesticated animals. Pottery, obsidian mirrors, fishhooks, and a great variety of tools of local production have been found, and there appears to have been some trade with Mediterranean and other peoples, including importation of colored stones that were then made into high quality tools and jewelry. Ceramic products were locally made, and it is suggested that there were ownership seals on some of them indicating private ownership.²⁸ Pictorial art was produced, and animal figurines are abundant. There is no evidence of militarism, offensive or defensive.

An extensive study of burial bones from the settlement suggests the average life expectancy was about 32 years. This value was from a population that included a few individuals of age 60-70 or over, so the mean age at death of many others would have been significantly lower than 32 years. There is no evidence of human violence, but there was an inordinate presence in the community of chronically severe anemia (undiagnosed as to cause) as demonstrated by “porotic hyperostosis” and evidence from skeletal analysis of a high level of physical effort. The extraordinary statement has been made that the description of Catalhoyuk just presented applies to the settlement and its people for over twelve hundred years.

²⁷ See an overview by: Farid, S., *Catalhoyuk Comes Home*, in *Archeology International*, 13:36-43, 2011.

²⁸ For an extraordinary jump of faith but nevertheless an interesting one see: Brosius, B., *From Cayonu to Catalhoyuk: Emergence and Development of an Egalitarian Society*, originally in German (Vergessene Welt), in *Inprekorr*, 400/401, 24-29, 2005.

At this point no medical practitioners have been identified, although in early days of investigation it was suggested that there were some dwellings that could have been used as “hospitals.” This Neolithic town comprised a homogeneous domestic society that lived in virtually identical circumstances for fifty generations before abandoning the settlement and leaving no evidence of a hierarchical or overtly coercive mechanism of social control. Such a description is so remarkable that the reason for social cohesion would seem to be immediately obvious, but it is not. The uniqueness of the Catalhoyuk community has been attributed to a surprisingly well-adjusted communistic society. A selected quotation from the earliest archeologist who explored this ancient settlement said: “...: they concentrated instead on ... the continuity of life ... and the ways of achieving it.”²⁹ Indeed, the social system that permitted survival, without evidence of a hierarchical organization, of so many people living side-by-side in such a small area is so remarkable that there must have been a potent social force, perhaps religious or moral, that forbade or obviated confrontation and violence. Recent evidence may explain these findings. There are groups of attached dwellings that are distinctively walled off from neighboring groups even though physically contiguous. It has been proposed that these clusters were inhabited by kinships and that Catalhoyuk can be considered an “agglomeration of neighborhood communities” rather than a early urban community.³⁰ Were this the case, social organization and control may have been internally managed, *i.e.*, within each kinship, with a cohort of kinship leaders mutually making decisions related to overall management of settlement needs. Any coercion would have emanated from within the individual kinships rather than a central elite.

For present purposes, however, Catalhoyuk is unlike Miletos in a number of ways, including its Neolithic origins, small size, absence of surrounding settlements, and no initial agricultural base. But what it does have is a flourishing era (1200 years) to be envied by great empires, surely time for social specialization to occur and a medical practitioners’ network to form. The evidence for a short life expectancy (32 years) having survived childhood might be considered an important feature that could abort development of a number of trades and professions, but that life expectancy is not much different from other civilizations over the millennia (remember that the plebeian in ancient Egypt averaged about 28 years at the time of death). Surrounded by high infant and childhood mortality followed by a laborious existence and early death from disease and injury, generation after generation should have spurred such a stable population to attempt control of predictable health problems that repeatedly presented themselves. With the few elderly persons indicating to their neighbors that an older age was possible and yet with age at death averaging 32 years or less in the absence of warfare, it would have been expected, from a culture that, from initial settlement to abandonment, lasted almost 2,000 years, that from such a large population several persons would spontaneously, or by a selection process, take on the responsibility for providing medical care for portions of the community at large.

But the nature of governance is consistent with an egalitarian society, not surprising given the limited farming and the reliance on hunter-gatherer sources for sustenance. With no

²⁹ Mellaart, J., *et al.*, *The Goddess of Anatolia*, Milan, 1918, in volume 2, p.11.

³⁰ See: During, B. S., *The Anatomy of a Prehistoric Community*, in *From Prehistoric Villages to Cities: Settlement Aggregation and Community Transformation*, New York, 2013, J. Birch, editor, chapter 2.

food surplus the initial investment in commercial ventures was futile. And it is the nature of an egalitarian society that everyone contributes to the communal effort at sustenance, survival, and security so that everyone could benefit thereby. This requires assignment of the necessary duties and tasks to individuals throughout the community. Egalitarianism is a characteristic of most small kinships, and one's position, including age, within the kinship is associated with certain obligations and restrictions. It is possible that leaders of the various kinships (Catalhoyuk "neighborhoods") in the settlement considered the Catalhoyuk community to be a "super-kinship," with obligations and restrictions assigned to each kinship. Thus, totally immersed in obligations and responsibilities, there was no room for maneuvering for a better status and no hope of the same. Successful completion of assigned tasks prevailed over any other course of action, thus inhibiting the conception and initiation of novel ideas and formation of networks of production. It is also in primitive egalitarian societies that shamanism dwells, and certain recurrent designs in Catalhoyuk have been interpreted as manifestations of shamanistic practices, perhaps another inhibitor of attempts at empirical-rational medical interpretation of sickness, not by antagonism to medical care but by usurping a large proportion of community effort or resources. Egalitarian societies tend to be small groups where no member is a stranger. The population of Catalhoyuk is remarkably large for a strictly egalitarian society. In addition to its divisions into smaller neighborhoods, two possible explanations are: (1) a shamanistic form of social control, or (2) an external environment so dangerous that the existence of the usually small hunter-gatherer group was impossible. Neither possibility would be friendly to an empirical/rational professional medical network. Whether the proximity of the imposing Mount Hasan volcano, which erupted during the early formation of Catalhoyuk, affected the people's perception of the supernatural is unknown.

Key to progress, however, is commercial success. Agricultural surplus was unlikely except during the final stages of Catalhoyuk, and commercial prosperity must have been minimal given the settlement's early position in urban development, limited evidence of trade with the Mediterranean region, and lack of specialization (no particular area of the site or family unit appears to have been tasked with producing a unique manufacture). Unless new discoveries provide a basis for a different social organization, the concept of Floruit as applied to most of the twelve lesser primary civilizations must be greatly constricted in this instance, for by no measure can Catalhoyuk be said to have had a flourishing period. From beginning to end it lumbered along as a purely egalitarian success story, with success being defined by Elbert Hubbard (see p. 251).

But what of those bones that registered evidence of hard work? Hard physical work, as defined today, is sometimes considered a healthy lifestyle, and where one's job does not provide the opportunity for hard physical work popular exercise clubs and gymnasiums can make up the balance. But if that hard work were dangerous, then the short life expectancy of primitive societies becomes more understandable. And the hazards of daily life may not have been merely physically arduous and dangerous work. Attrition from toxic comestibles or specific nutritional deficiencies may have been considerable at times. Remember that Catalhoyuk is so early an attempt at urbanization that the foundation of folklore that has always been so valuable to primitive societies was in its infancy as well. Indeed, the search for medicinal herbs is often touted as an admirable effort by our ancestors, but just the obtaining of a clan's daily bread must have taken a great toll in human life during those ancient times. Even the decision to settle in one location and

initiate farming was probably undertaken as much to avoid toxic botanicals by planting what was known to be safe as it was to have a dependable store of foodstuffs.

After a long and culturally conservative existence the Catalhoyuk community resettled nearby for a few centuries and then abandoned the location, perhaps because the adjacent river and regional streams and swamps began to disappear, although the specific cause remains unknown.

Summary Table for Catalhoyuk:

SOCIETY - Neolithic
 POPULATION, LOCAL – 8,000
 POPULATION, TOTAL – 8,000
 PRIMARY AREA – 100 acres
 URBAN DENSITY – 83 persons per acre
 PRODUCTION – specialized stones, jewelry, obsidian
 GOVERNANCE – confederation of egalitarian kinships
 EGALITARIAN ARCHEOLOGY - yes
 PROMINENT KINSHIPS – yes; neighborhoods
 WRITING – no
 DISTANT TRADE – yes, but little (Mediterranean, Jericho)
 SPECIALIZATION – yes, but little
 MONUMENTAL STRUCTURE - no
 DENOUEMENT – abandoned
 MEDICAL PRACTICE – ?
 FORMATIVE PERIOD – 500 years
 FLORUIT – 1,300 years
 CITY-STATE - no
 AVERAGE LIFE EXPECTANCY – 32 years³¹

³¹ See: Bodley, J. H., *Cultural Anthropology: Tribes, States, and the Global System*, Lanham (MD), 2011, Table 5.8.



Fig. 12: The walled city of Arkaim, one of twenty Bronze Age settlements comprising the Sintashta civilization on the eastern side of the Urals. Although not arranged as a city-state with surrounding complementary villages, each “city” had about 2,000 inhabitants. The commercial activity of each centered on metallurgical productions, but there was no coordinated manufacture. Dwellings appear to have been partitioned to accommodate kinships. This artistic rendering is made available under the Creative Commons CCO 1.0 Universal Public Domain Dedication.

7. Western Siberian Plain: Sintashta Civilization

Extensive Late Neolithic and Bronze Age settlements are being discovered world-wide, opening new vistas for understanding archaic human social settlements and their progression to modern nationhood. Expanding knowledge has revealed a far more technically and intellectually complex series of civilizations and cultures in diverse geographic locations around the globe than previously suspected. Indeed, given the authoritarian crudeness, atrocities, and impoverishment of vast populations in many modern states, it is not unreasonable to surmise that the present political state of affairs represents not the latest modern and improved manifestation of human progress, instead being a regressive or atavistic inversion of progress from those early settlements that, had they been seized upon and managed differently or had they not been railroaded by authoritarian bullies in ancient times, might long ago have led to a peaceful and prosperous longevity for the average citizen. This, of course, is one of the important reasons that archeological research is carried out, for if archeology did not have a goal in furthering human understanding about its past as a way of improving its future it would be no more than a hobby.

One active archeological region of interest that has emerged in the last twenty years is the largest lowland and flood plain in the world, the Western Siberian Plain covering about a million square miles. Much of it is uninhabitable and covered by permafrost, but beginning on the eastern slopes of the Ural Mountains and extending eastward this Cenozoic alluvium was the site of the Sintashta civilization (2200-1800 BC), so named from the originally excavated city. Another of its settlements is Arkaim, a five-acre home to an estimated 2000 people who lived in variably sized houses arranged in circles around a central square. It was solidly walled and surrounded by irrigated fields. Bones recovered in the area are from horses, cattle, and other domesticated animals. That its overall construction and orientation suggests an analogy with Stonehenge is considered by most to be fanciful. Strikingly, furnaces for metalworking were found in most of the houses. There were exterior wooden walkways. Details of its social makeup are unavailable, and it was evacuated by its population before there was evidence of destruction. It has been suggested it was the administrative center for the region, and the planning of the settlement indicates a coordinated effort with central planning.³² But there is no local cluster of smaller villages to suggest either Arkaim or Sintashta was the center of a city-state. Furthermore, the ubiquity of evidence for metallurgy throughout the settlement and in many other regional settlements is evidence that metallurgical manipulation of copper and bronze was an important activity of the population over a large region, although perhaps not on a large scale. There was an unusually strong defensive design to the settlements indicating a militaristic society, but it also included difficult entryways into the village, perhaps to prevent outsiders' access to the villagers' method of extracting ores from local sources for production of bronze and weapons made from bronze. The metallurgical techniques involved may have been intended to be kept secret, but the idea of a warrior class and a culture engaged in frequent warring is been

³² See: Shnirelman, V. A., *Archeology and ethnic politics: the discovery of Arkaim*, in *Museum International*, 50:33-39, 1998.

strongly supported.³³ Half of adult inhumations contain weapons thought to indicate an extensive warrior caste, and so it would seem that warfare was a constant companion of the Sintashta settlements. But it has been also noted that almost all “weapon” types were utilizable for hunting, and osteological evidence of trauma of warfare is lacking. As these further discoveries show, the warfare scenario now seems much less likely.³⁴ Warfare also has been noted to directly correlate with population density, and as a concurring argument the permanent population of the Sintashta region was low outside the settlements.

The Sintashta people had been preceded by a prominent culture, the Yamnaya, which has been credited with expanding the Indo-European language and genetic heritage to a wide area. But, relevant to present interests, it was a semi-nomadic herding culture. Although there was a daughter intermediary culture between it and Sintashta, it may be that Sintashta was a settled subgroup of a larger ethnic population that remained semi-nomadic. Perhaps these other nomadic people were dependent upon the many metal-working settlements in the Sintashta region to provide them with implements of war and hunting, including chariots. It is otherwise difficult to explain the prompt emergence in the region of Arkaim and other settlements, for farming was not one of their features, and successful agriculture is the usual cause of the surplus sustenance that leads to a focal population increase. But it has been suggested that a preceding aridity of the region restricted herding and that semi-nomadic populations would sometimes form permanent settlements near more plentiful sources of water, their fortifications being necessary in order to maintain exclusive use of the area. This was not a matter of fertility for agricultural development; the issue was grazing territory for their herds.

It also appears that there was unequal access to ores and other items throughout the Sintashta region, that the various settlements were not involved in the actual mining of metals and their ores, and that trading occurred between settlements. The network thus established may have provided the leadership needed for Sintashta settlements, a veritable “Ruhr Valley” of industrial centers, with some scholarly opinion favoring an egalitarian form of social control in Arkaim. The idea that Sintashta settlements were seasonally occupied to take advantage of geological resources for smelting is presently considered unlikely. At least some settlements were not only capable of self-sufficiency in maintaining a long-term survival, but also were intent on producing iron products primarily for their own use rather than being part of a network set up by some distant power exploiting local resources for the purpose of supporting nomadic warrior groups. Gravesites have yielded items clearly consistent with an extensive trade network with distant peoples, and receipt of tons of copper products sent from the region is documented in the Mesopotamian city of Ur. Arkaim and its congeners functioned as small industrial towns.

³³ See: Epimakhov, A. V., *Settlements and Cemeteries of the Bronze Age of the Urals: the Potential for Reconstructing Early Social Dynamics*, in *Social Complexity in Prehistoric Eurasia*, Hanks, B. K., and Linduff, K. M., eds. Cambridge, 2009, chapter 5.

³⁴ See: Johnson, J. A., *Community Matters? Investigating Social Complexity through Centralization and Differentiation in Bronze Age Pastoral Societies of the Southern Urals, Russian Federation, 2100 – 900 BC*, Doctoral dissertation, University of Pittsburgh, 2014.

Regarding life expectancy, the statement has been made that very few were of advanced age.

Arkaim is in the midst of about twenty similar communities all located within an area of about 20,000 square miles and all are situated adjacent to rivers. It bears similarity to the original Sintashta archeological site in the same region, the two usually being linked together in Bronze Age descriptions. All twenty communities suggest some similarity in construction design. Furthermore, settlements were separated from each other by 20-40 miles, suggesting a large area was required to sustain each settlement. One obvious explanation is that the metallurgical enterprise required much wood to maintain the furnaces required for smelting.³⁵ An indication that the strong walls surrounding Arkaim were defensive protection of the population is reflected in the invention of the wheeled chariot in the Sintashta region at this time. Much has been made of the Arkaim region as a locus of early Indo-Aryan culture, but no written language has been found, nor has evidence relevant to medicine been uncovered. Kurgans and other gravesites have revealed war chariots suggesting a military cast and supporting the idea a hierarchical society, but there is no other evidence that this was the case. There is agreement that the population in each site seemed archeologically egalitarian, and some settlements reveal a domiciliary pattern consistent with neighborhoods, suggesting grouping by kinship. Several hundred inhumations have been recovered that include all ages, and the overall similarity in ornamentation, ceramics, and “weapons” in five burial sites do not support a traditional hierarchy for social control (see Johnson citation on preceding page). It is likely that the capacity for producing bronze implements and weapons was primarily for personal or communal use, the weapons and the stockade-like construction of the walls being for defensive purposes only.

Yet some form of leadership was necessary to coordinate trade and production. An interesting theory suggests the Sintashta proto-civilization is but one manifestation of a greater regional organization, in effect a territorial State, that integrated metallurgy, mining, and agricultural sustenance. This suggests the culture might be likened to some sort of prehistoric benign Gulag and therefore was “not built on the principle of kinship.”³⁶ State management would necessarily have been coercive, of which there is no evidence in the Sintashta settlements. More convincing is the conclusion of Dr. Ludmila Koryakova, who, based on the closeness of the dwellings, their comfortableness, and the homogeneity of households and their involvement in production, considers their governance a form of corporatism, one in which special interests (in this case the citizenry *in toto*) made communal decisions regarding commercial production and municipal operation, an extraordinary phenomenon.³⁷ Corporatism needs not be authoritarian, and indeed it can blunt the authoritarian hand. Insofar as it might be considered democratic, it can be tyrannical if all involved kinships are committed to specific duties to maintain a commercial enterprise. It would then be functioning as a super-kinship and harbor all the

³⁵ See: Shaparov, D., *Middle to Late Bronze Age Transition in the Southern Urals (Russia): A Settlement Pattern Perspective*, Saarbrücken, 2011, for an extensive and detailed account of regional settlements and metallurgy that include Sintashta, especially chapter 5.

³⁶ See: Alekseevna, O. E., and Aleksandrovich, P. V., *Early State of the Bronze Age: Arkaim – Kargaly Case Study*, in *International Journal of Humanities and Cultural Studies*, 3:121-128, 2016.

³⁷ Koryakova, L., and Epimakhov, A., *The Urals and Western Siberia in the Bronze and Iron Ages*, Cambridge, 2014, p. 181.

advantages and disadvantages of egalitarian control. This is one feature that distinguishes it from a heterarchy, for in the latter there are numerous distinct commercial ventures that would vie for the available labor force, thereby offering choices for the community at large, whereas the corporatism of Sintashta, if indeed it existed, would have been monolithic. An alternative mechanism of social control that would not rely on kinship might be a sodality involving the entire community, but in an otherwise sparsely populated region the possibility of iron production by a community of like-minded but otherwise unrelated individuals and families seems remote.

There must have been a wide-ranging trading network that included all Sintashta settlements and which provided a stabilizing influence on community life. Both the size of the population and the settlement are tiny compared to the five successful civilizations, and, given the small population, 300-400 years may have been insufficient for a medical profession to develop. If Sintashta society required the full strength of its members to maintain, sustain, and defend their outposts in an iron ore-rich geography there would have been little chance for an empirical-rational medical practitioner to develop a network of clinicians. Such persons might have been especially useful, for metallurgy and production of copper and iron products would have introduced unique health hazards into this society.

As the predecessor of the Sintashta civilization, the Yamnaya culture was characterized by nomadic chiefdoms, societal stratification, herding, and mobile settlements, it would not be surprising if aspects of authoritarian governance existed within Sintashta settlements. But study of inhumations does not support this notion. An egalitarian social scheme existed, at least when it comes to personal wealth. Can Sintashta be compared to Sparta? It may have had, like Sparta, a warrior caste and was at least superficially egalitarian. Its size was too small, however, and there is no evidence of conquests or a slave or serf workforce. Like Sparta, the appearance and practice of equality in what might have been a warrior society could have masked the authoritarian nature of egalitarianism.³⁸ But, as mentioned above, the equal distribution of wealth suggests another mechanism of social control, corporatism (see p. 21 for definition). The homogeneity of household production of commercial products may have been the basis for special interest groups, which in this case several large kinships would comprise the community as a whole, directing governance in which decision-making would represent majority opinion or patriarchal or kinship leadership.

Interestingly, some have proposed that this site was not continuously inhabited during its 300-400-year existence, but was used intermittently according to season, for there was herding. The disappearance of the Sintashta civilization has been blamed on climate change, but meteorological studies indicate the environment preceding and during the Sintashta civilization was stable and conducive to agriculture. A better explanation has been put forth by Shaparov in which the unique and closeted production of bronze by Sintashta settlements was, in a sense, put out of business by the finding of extensive deposits of ores in other areas and the spread of metallurgical technology to populations

³⁸ See: Hanks, B. K., and Linduff, K. M., *Social Complexity in Prehistoric Eurasia*, Cambridge, 2009, especially chapters 4 (p. 47, by D. W. Anthony) and 9 (p. 146, by B. K. Hanks) for discussions of the role of warfare and metallurgy on the social fabric of Sintashta civilization.

that migrated into the region, forming permanent settlements with an agricultural base.³⁹ As a consequence, the Sintashta populations may have emigrated to these less rigorous social environments that would have had no kinship affinities and a greater variety of options for living.

Summary Table for Sintashta/Arkaim

SOCIETY – Middle/Late Bronze Age
 POPULATIONS, LOCAL – 1,000-2,000
 POPULATION, TOTAL – 20,000
 PRIMARY AREA – 5 acres (hegemony: 20,000 square miles for 20 settlements)
 URBAN DENSITY – 150 persons per acre (perhaps 400 per acre in Arkaim)
 PRODUCTION – copper, bronze, bronze implements and weapons
 GOVERNANCE – egalitarian, perhaps a form of corporatism or super-kinship
 EGALITARIAN ARCHEOLOGY - yes
 PROMINENT KINSHIPS – kinships present but social significance uncertain
 WRITING – no
 DISTANT TRADE – yes (central Asia and the Near East)
 SPECIALIZATION – yes
 MONUMENTAL STRUCTURES - no
 DENOUEMENT – abandoned (to escape egalitarian kinship for larger sodalities?)
 MEDICAL PRACTICE – ?
 FORMATIVE PERIOD - ?
 FLORUIT – 400 years
 CITY-STATE – no
 AVERAGE LIFE EXPECTANCY – “very few elderly;” 28 years⁴⁰

³⁹ See: Sharapov, D., *Middle Bronze Age-Late Bronze Age Transitions in the Southern Urals (Russia)*. This is available at ScholarWorks@Georgia State University, 5-15-2011.

⁴⁰ See: Baumer, C., *The History of Central Asia: The Age of the Steppe Warriors*, New York, 2012, translated by Miranda Bennett, p. 146.



Fig. 13: Ruins of the eastern residential area of the city of Shahr-i Sokhta that developed in the region of the Helmand River (in present-day Sistan Province of Iran) during the mid-3rd millennium BC. It was a commercially active region situated between Mesopotamia and the Indus River Valley and yet is considered to represent a distinct culture. Its peak population may have reached 20,000. This photograph is found under the Creative Commons Attribution-Share Alike 4.0 license.

8. Shahr-i Sokhta

The Sistan Basin, a region the size of Connecticut (*ca.* 6,000 sq. mi.) located in the south of modern Afghanistan at its juncture with south-east Iran and Pakistan, was the site of numerous Bronze Age settlements. Its geology, which provides an inflow of water via several rivers (primarily the Helmand River) that drain nearby mountain ranges but have no outflow, permitted year-round access to water for much of the time but great susceptibility to intermittent periods of drought. Despite its reputation for aridity, it was the site of an important Central Asian civilization that developed slightly later than those of Mesopotamia to the west and the Indus river valley to the east. It is reported that 900 Bronze Age sites have been located in the Basin. The largest city to be identified is Shahr-i Sokhta, a commercial center with a population as high as 20,000 with a central area covering 350 acres (over half a square mile) that flourished for much of the 3rd millennium, peak prosperity being *ca.* 2600-2400 BC. It developed from a small town of about twenty acres on the alluvial plain (delta) of the Helmand River, arising amidst a myriad of dispersed small settlements only a few acres in size that would surround the enlarging city and thus support its designation as a city-state. Because of its proximity to raw materials, including mines for various ores, and being geographically amenable to east-west commercial traffic, its increasing population in the mid-third millennium was supported agriculturally by efforts at irrigation based on the incoming and subsurface water of the Sistan Basin. Work with flint, textiles, lapis lazuli, turquoise, and chlorite, production of pottery from numerous kilns established in the central city and peripheral settlements, smelting of copper, and transport of ores provided the region with numerous distinct commercial ventures. Each unique trade would have had its own regional location within the city-state, defined supporting population, and system of production and distribution. It is not clear that kinships were a significant basis for social organization, and Dr. Philip Kohl has proposed that, because of the fluid social structure throughout Central Asia and the Middle East at that time, "it is likely that only the "elites" formed tightly integrated, politically uniform kinship groups."⁴¹

It is with some hesitancy that this civilization has been included among the "lesser civilizations" described in this chapter, the reason being the proximity of two of the five large "successful" civilizations (Mesopotamian and Indus River valleys). But Shahr-i Sokhta is the unexpected product of the intrinsic population of a region subject to geological uncertainty and yet grew to become a strategically located major center of commerce to the point that it and its regional associations are now considered the Helmand civilization. The nature of the original settlement is unknown, but the region does not lend itself to agricultural prosperity. In contrast to the other primary civilizations described in this chapter, the origin of Shahr-i Sokhta is likely to have begun as a small trading settlement rather than a small market town. At the present time there is little evidence of hierarchical control of the population except for minor gravesite evidence that appeared in the waning years of the city. It can therefore be archeologically classified as egalitarian. Like the Indus River Valley civilization there is no evidence for a militaristic society (the early Uruk dynasties of Sumer had armies), its success being the consequence of commerce rather than conquest. Given the many distinct kinds of production and trade and the specific activities attached thereto being located in their specific sections of the

⁴¹ See: Kohl, P. L., *The Bronze Age Civilization of Central Asia: Recent Soviet Discoveries*, Armonk, NY, 1981, the Introduction by Dr. Kohl.

city and surrounding settlements, it is reasonable to suggest that the management of the region was partitioned among the various parties involved in each commercial activity. As such it resembles a heterarchy, a group of networks each with its own area of social hegemony, that presumably worked together to further the best interests for local commercial networks. In some respects the functioning of Shahr-i Sokhta resembles Djenne-Djenno (see following section), although it is likely that the successes of the former were very much tied to the fortunes of Mesopotamian and, especially, Indus river valley civilizations. Thus, the fading of the Indus River Valley civilization and the end of dynastic Sumer coincided with the rapid decline of Shahr-i Sokhta because the commercial basis for a cohesive polity was gone.

Archeological finds confirm its contact with distant civilizations, and over several centuries a close commercial association evolved with Mesopotamian city-states. Nevertheless, its cultural similarities with several other nearby smaller urbanized sites have been sufficient to propose the region to be peopled by the Helmand culture. Scholarly opinion holds that the intrinsic culture of this region was clearly distinct from that of the Indus River Valley civilization and was also unrelated to Mesopotamian civilization, with the exception that evidence from a tablet considered to be written in Proto-Elamite suggests some features of Shahr-i Sokhta may have evolved within the cultural sphere of Susa, a city (? Sumerian) approximately 400 miles further west. Despite this finding there is yet no evidence that writing was adopted or invented. The city was not a colony of a distant polity, its people were native to the region, and it grew in size because of commercial prosperity rather than conquest. There is, however, evidence of a variety of cultures from distant regions consistent with the presence of traders passing through the region, a feature reminiscent of Cahokia.

The population itself lived in modest dwellings, for the most part single rooms but sometimes with an internal courtyard. The relatively limited evidence of storage containers of grain and other food in the dwellings has been taken as evidence for a central authority having commandeered from the citizens essentials for sustenance and redistribution as required. This, however, is total conjecture, as central storage facilities have not been identified. Time and further excavation should provide more accurate information on daily life of the population.

Evidence of city planning became apparent only after the city had reached its most prosperous state. Thus, the occurrence of sections of the city involved in a specific commercial production spontaneously appeared, presumably in response to convenience for production. At the present time there has been no report of evidence of an elite population, from either the nature of the dwellings or the presence of an elite section of the city. It has been assumed that there must have been central control of the city-state of Shahr-i Sokhta, but in most archeological sites with known hierarchical power structure the focus of that power has been readily discernible, including the presence of monumental structures. It is not apparent here, and even the two larger buildings so far identified at the site may have merely been variations of local dwellings rather than centralizing features. One thing is clear: urbanization of Shahr-i Sokhta was a purely commercial invention, and its leadership came from traders and producers of goods. Evolution of the city, therefore, was one of convenience for commercial purposes. Without good evidence of central governance it must be considered a relatively pure form of heterarchy. This is consistent with the analysis of some Near and Middle East societies

by Dr. Yuri Berezkin who noted that the development of surprisingly large centralized acephalous populations could occur, sometimes with evidence of private ownership and “the corresponding weakness, both of corporate ownership rights and of kin-based institutions in general ...”⁴²

A remarkable source of information that has only been partially exploited is its sixty-acre grave site. Located outside the city and protected in part by the tendency of the superficial layers of soil to form a thick crust of salts, hundreds of inhumations have been examined out of what has been estimated to be 19,000.⁴³ A variety of techniques of inhumation were employed, something to be expected in that burials in this location occurred over many centuries (2800-2100 BC), and a characteristic of many of them is the presence of some aspect of the interred’s occupation, either tools or the products themselves. Up to the present time a section or a burial technique of the grave site that might suggest an elite class has not been reported. Dress did not differ significantly between male and female, and evidence of ownership (from seals) was found on both sexes. Except for one knife, no evidence of a militaristic population has been found, consistent with the absence of any surrounding fortifications. From osteological study it is estimated that little more than one in twenty of the population reached forty years or more of age, and ante-mortem tooth loss is considered very high. There has been no scholarly comment thus far on evidence for a medical profession, but two grave site findings raise the possibility. One was a much-publicized orbital prosthesis found in the eye socket of a woman, surely a cosmetic device but one with surprising detail. The other, a recent finding, is a triangular trephination defect in the cranium of a 13-year-old girl with hydrocephalus that has clear evidence of healing, indicating significant post-surgical survival.⁴⁴ Whether a medical person performed the procedure is unknown.

It is intriguing that the extremely limited medical evidence available coexists with extremely limited evidence of a form of writing. Had the city continued to survive and prosper might it have become a “successful” civilization in which a group of medical practitioners could join to collate their findings for the assistance of future colleagues just as happened in Sumer? Alternatively, as there was commerce between Shahr-i Sokhta and Sumerian city-states with known medical practitioners, why wouldn’t the idea be copied? Perhaps there was little trade with Sumer, 600-800 miles further west than Susa. Likewise, writing was invented for commerce. Even though the writing found near the city has been attributed to Susa, located on the fringe of Mesopotamia, the origin of Proto-Elamite writing is unknown, although it is cuneiform in nature. Given the prominence of Shahr-i Sokhta in commerce it might be asked if it is possible that Proto-Elamite writing could have originated there. Shahr-i Sokhta is much closer to the Indus River valley (400 miles) than the Mesopotamian region (1,200 miles). As unlikely as that is (a great

⁴² See: Berezkin, Y. E., *Apa Tanis and the Ancient Near East: An Alternative Model of Complex Society*, Uppsala Univ., Arkeologi och antic historia<<http://www.arkeologi.uu>.

⁴³ See: Piperno, M., and Tosi, M., *The Graveyard of Shahr-i Sokhta Iran*, in *Archeology Magazine*, 28:186-197, 1975, and Piperno, M., and Salvatori, S., *Recent Results and New Perspectives from the Research at the Graveyard of Shahr-i Sokhta, Sistan, Iran*, in *Instituto Univ. Orient.*, 43:173-191, 1983. These and other scholarly publications by the coauthors are the basis for much of the information in this section.

⁴⁴ See: Moghadasi, A. N., *First Skull Surgery in Iran: The Burned City and a 4800-Year-Old Skull*, in *Iranian J. Publ. Health*, 43:249-251, 2014.

majority of the writings come from Susa), further excavations should clear up the matter as well as providing additional evidence relevant to the medical practice.

The rapid decline of the city in 2300 BC and abandonment in 2100 BC has been attributed to climate change with worsening droughts. But the more likely explanation is the unification of the region of Sumer under the Akkadians, a simultaneous dwindling of the Indus River Valley civilization, or increasing trade competition that included sea transport. The loss of valuable markets and its consequent diminishing role in regional trade probably led to emigration. Without a commercial base there was no longer any benefit to being a city dweller.

Summary Table for Shahr-i Sokhta:

AGE – Middle Bronze Age
 POPULATION, LOCAL – perhaps as high as 20,000
 POPULATION, TOTAL – n. a.
 PRIMARY AREA – 350 acres (hegemony: based on one day's journey (10 mi.), *ca.* 300 sq. mi.)
 URBAN DENSITY – 62 persons per acre
 PRODUCTION – ceramics, textiles, turquoise, copper, bronze, lapis lazuli, implements
 GOVERNANCE – commercial heterarchy
 EGALITARIAN ARCHEOLOGY - yes
 PROMINENT KINSHIP - unlikely
 WRITING – primitive ?
 DISTANT TRADE – yes (central Asia, Mesopotamia, Indus River Valley, and the Near East)
 SPECIALIZATION – yes
 MONUMENTAL STRUCTURES - no
 DENOUEMENT – abandoned 1900 BC, commercial failure
 MEDICAL PRACTICE – possible
 FORMATIVE PERIOD – 600 years (*ca.* 3100-2500 BC)
 FLORUIT – 600 years (2500-1900 BC)
 CITY-STATE – yes
 AVERAGE LIFE EXPECTANCY – uncommon to exceed 40 years of age (4 out of 86 burials were 40-50 years of age)

Comment: At the time of this revision there have been modifications in relevant literature of modestly earlier dating, significantly larger geographical size, and additional trade interactions of the Helmand civilization, but otherwise interpretations herein of Shahr-i Sokhta need not be altered.



Fig. 14: Artist's rendering of bustling commercial activity centered in the ancient city of Djenné-Djenno, located in present-day southern Mali. With its central and peripheral population estimated at 50,000 and most inhabitants living on large riverine mounds that supported kinship groups, each engaged in its particular commercial venture, the absence of a controlling hierarchy was particularly notable. It flourished from 450-1050 AD. Photograph presently found on the *Making of Cities* website, makingofcities.org,

9. Djenne-Djenno

A more recently discovered alluvial settlement has been described in the Niger River Valley in the sub-Saharan section of the African country of Mali. Djenne-Djenno was settled by nomadic groups in the 3rd C BC as the previous swampland was drying. Over time the population retained herds of cattle, sheep, and goats and developed an agricultural base that was to include rice, the latter being a staple surplus that initiated the growth of the settlement. The settlement increased to cover about 25 acres, its dwellings constructed of mud bricks. Predictable flooding permitted rice production, and the population flourished both in self-sufficiency and in north-south trading from its agricultural base. Small satellite settlements developed nearby, perhaps by immigrants into the area, some becoming the locus of specialized production such as pottery. Habitation was primarily situated on mounds that were man-made and on which there is layer after layer of evidence of habitation over time. Ultimately the mounded settlements numbered about 40 within a 20-square mile area, and at its zenith the population of the Djenne-Djenno area may have reached 50,000. Although the social reasons for initiating this pattern of mound-based settlement are uncertain, periodic flooding probably necessitated a mechanism for escaping rising flood waters. What is certain is that on each of these mounds the inhabitants adopted or introduced specializations in pottery, masonry, and other crafts and skills, efforts assisted by ready transfer of product, goods, and services to and from the polities within reach of the growing riverine “urban” center.⁴⁵ The variety of products and adjoined ethnic groups made Djenne-Djenno an attractive trading center. One activity was iron smelting, and to do this iron ore had to be imported. As time passed, metallurgical processes were moved out to the peripheral clusters of dwellings, perhaps because necessary fuel was more accessible. Unusual imported items found in the settlement indicate that distant trade networks were already functioning and specializing at an early date, perhaps, as suggested from other archeological investigations in the region, even in the Late Neolithic. The resulting Djenne-Djenno iron manufactures and artistic productions are now highly prized. Whatever the mechanism underlying the Djenne-Djenno prosperity and duration (1,150 years, of which its most productive period extended over 600 years: 450-1050 AD), it appears to have been due to the concatenation of opportune resources, geography (river transport), manufactures, and sources of sustenance, especially a surplus production of rice.

Archeological evidence does not suggest a ruling hierarchy during either the early development or the maturation of the culture that developed, implying that supply and demand of goods and services were contracted at a local level or what has been termed “horizontal power relations” suggesting power was located in “overlapping agencies.”⁴⁶ This is consistent with the concept of heterarchy, a system of shifting community influences based on commercial rather than political interests which it can either replace

⁴⁵ LaViolette, A., *Ethno-Archaeology in Jenne, Mali*, Oxford, 2000.

⁴⁶ See: McIntosh, R. J., and McIntosh, S. K., *Early Urban Configurations on the Middle Niger*, in *The Social Construction of Ancient Cities*, Washington, D. C., 2010, Smith, M. L., ed., chapter 5. Most of the information related here about Djenne-Djenno is the result of extensive archeological investigations by the authors as described in that chapter. The theory of urbanization suggested by their investigations is given in a singular phrase: “heterarchy rather than hierarchy,” a topic covered in detail in chapter 13 of the present work.

or ignore. The absence of “chiefly power” elites is consistent with the absence of temple or monumental structures that would have suggested authoritarian central management. The principal investigators of the archeological site report no evidence of Mediterranean influence before the arrival of Islamic peoples in the 12th C.

Like Catalhoyuk (see p. 161), Djenné-Djenno survived in the same location for over a thousand years without evidence of central governance. Likewise, Djenné-Djenno is regarded by many as an egalitarian civilization, with early founding families having implied authority to guide the city’s rituals and development but without much power. Frugal gravesites, no monumental structures, and absence of elite housing and regalia confirm that social organization was egalitarian kinship at the clan level. It has been stated that “the social function of any feature of a system is its relation to the structure and its continuance and stability, not its relation to the biological needs of individuals.”⁴⁷ The longevity of the Djenné-Djenno system suggests it had a very successful system indeed. Given the population size, suburban settlements for specialists, river access for distant trade, and duration of the settlement, a medical profession should have developed there, but there is no evidence for it. Why is this so?

Perhaps the reason no evidence of medical practice has been found is the persistence of egalitarian social organization attached to each residential/vocational mound. In kinships there are obligations and duties of each member. Medical practitioners emerge from the plebeian class rather than from the wealthier population, and the egalitarian nature of kinship groups may have restricted any tendency of its members to involve themselves in extra-kinship responsibilities. And if residential mounds and periodic flooding meant a degree of isolation of the attendant districts similar to that of the Marajoara civilization (p. 137), the enforced separation of segments of the population may also have made a network of medical practitioners less likely.

In any event, the population was settled, stable, and had agricultural abundance. There is empirical evidence of shamanism. The overall development of the city-state is consistent with many others: first a small herding, then agricultural, settlement among many that then grew in response to the need for a market town to manage storage and trade of surplus food, a process which, if the town is geographically conveniently located, attracts commercial ventures. The result in Djenné-Djenno was population growth and development of distant trade. Usually, centralized management would then emerge as a politically based hierarchical form of governance superseding both the horizontal governance of commerce and the egalitarian governance of peripheral kinship communities. This, however, never occurred in Djenné-Djenno. The regional cultures of the middle Niger River suggest a similar pattern of urban expression elsewhere, and from this there is consideration given to a mystic-religious concept that may have added a degree of cohesiveness among these seemingly disparate clusters of specialized autonomous settlements that had a certain homogeneity in pattern. In the absence of elite regalia, separate elite burials, monumental structures, and walled enclosure, group to group business interactions are thought to have been important in maintaining cooperative

⁴⁷ See: Radcliffe-Brown, A. R., in the Introduction to *African Systems of Kinship and Marriage*, Abingdon, 2015, A. R. Radcliffe-Brown and D. Forde, editors, in the Introduction, p. 82, the 1st edition published in 1950.

arrangements, and thus there is the inference that spirits and shamanism common to the area may have added support to that link. Such a theory remains unproven.

The inherent stability provided by this multifaceted support system, one that can be interpreted as a step toward urbanization, was, if foreseen by its early inhabitants, a brilliant production. Such prescience, however, may not have favored a longer life for its citizens. There is extremely limited information on this point from the archeological investigations of Djenne-Djenno, but of eleven adult burials adequate for assessment from the late phase of its existence, six were no more than twenty-five years of age and only one survived to age forty-five years.⁴⁸ The average of the maximum estimated ages for the eleven was thirty-one years. Few skeletal specimens have been found satisfactory for analysis, in part because cremation was common.

The timing of the decline of ancient Djenne-Djenno is consistent with the entry of the Islamic influence into the region and nearby urban development, to which the citizenry of Djenne-Djenno may have emigrated as environmental pressures developed and, as some propose for Sintashta and Arkaim, if the personal obligations of their traditional egalitarian kinships were found to be less burdensome in the new city. Islamic intrusion would have introduced its own form of medical practitioners to the region.

Summary Table for Djenne-Djenno

PERIOD – Historical African
 POPULATION, LOCAL – 20,000
 POPULATION, TOTAL – 50,000
 PRIMARY AREA – 100 acres (hegemony, 20 square miles)
 URBAN DENSITY – 200 persons per acre
 PRODUCTION – iron and iron products, rice
 GOVERNANCE – vocational networking of mound-based egalitarian kinship communities for specialized production and trade (a commercial heterarchy)
 PROMINENT KINSHIP - yes
 WRITING – no
 DISTANT TRADE – yes (trans-Saharan)
 SPECIALIZATION – yes
 MONUMENTAL STRUCTURES - no
 DENOUEMENT – abandoned
 MEDICAL PRACTICE – ?
 FORMATIVE PERIOD – 750 years
 FLORUIT – 600 years
 CITY-STATE – no, as there is no evidence of central governance
 LIFE EXPECTANCY – 31 years (derived from a statistically insignificant sample)

⁴⁸ McIntosh, S. K., and McIntosh, R. J., *Prehistoric Investigations in the Region of Jenne, Mali*, Oxford, 1980, 2 volumes, p. 188 of volume 1.



Fig. 15: The 3rd millennium BC Neolithic city-state of Liangzhu was the center of an extensive commercially active civilization, being especially prominent in production of jade items. Surrounded by more than a hundred small settlements and with a core population estimated at 30,000, the unequivocal finding of prominent class distinction indicates that during its flourishing period its governance was profoundly hierarchical. This is a model of the city by Siyuwj and available under the Creative Commons Attribute-Share Alike 4.0 license. The model is located at the Liangzhu city museum.

10. The Liangzhu Civilization

Emerging in the Yangtze River Delta and spanning 3400-2250 BC, a late Neolithic culture with a central city of considerable size and complexity has been termed Liangzhu. It was preceded by the Songze culture (3800-3300 BC) of which there is limited information other than that obtained from its pottery and gravesites, from which it has been concluded that authoritarian military dominance was in place in the region. The Liangzhu urban center with its suburban periphery covered almost two square miles, including a central walled area of about 100 acres and two other outer walls that would have been major construction efforts. The culture was Neolithic and agricultural, with rice production a major economic resource, although a silkworm-based industry was developing. The layout of both the urban and suburban areas is thought by some to have been planned in advance, as there is little evidence of earlier settlement in the area. This suggests Liangzhu was not a primary city, but the nature of the primary source is unclear. The number of the peripheral settlements is presently set at 400.

The abrupt migration of settlers into an area adjacent to the lower Yangtze River brought with it an early jade industry. Ceramic pottery, slate sickles, stone adzes, varieties of whetstones, artwork, and evidence that diamond was used to finish their tools complement the culture's famous work done with jade. So detailed was some of their engraving that it has been suggested that some form of magnifying lens was used. As Liangzhu's importance increased, there was increasingly specialized craftsmanship with workshops dedicated to different phases of production of finished jade products. Constructed near the Yangtze River, water was dammed and diverted for flood control and watercraft communication. Dockage and piers were built. Expansion of the population, upwards of 30,000 in the central Liangzhu site alone, and its new settlements was southward. At its peak the population of the entire civilization may have been in the "hundreds of thousands."⁴⁹ Lower classes had dwellings raised on pilings connected by wooden walkways, whereas the upper classes resided on more substantially constructed mounds. Indeed, the central region of the Liangzhu site was one of man-made and structured mounds. Regional archeological investigation has identified approximately 150 small settlements adjacent to a network of rivers and streams surrounding Liangzhu and presumably subject to the central city. In contrast to the usual agricultural settlement pattern, the central Liangzhu site has been characterized more as a "city" than a redistribution point for agricultural products.⁵⁰ Waterways permitted efficient transport of goods and services to and from central distribution points. There is evidence of a local observatory for astronomical study.

⁴⁹ See: Major, J. S., and Cook, C. A., *Ancient China: A History*, Abingdon, 2017, especially chapter 33, The Neolithic Era and the Jade Age.

⁵⁰ See: Qin, L., *The Liangzhu Culture*, in *A Companion to Chinese Archaeology*, Oxford, 2013, A. Underhill, editor, chapter 28. Nevertheless, the sequence suggesting that Liangzhu as a manufacturing center emerged without evolving from a market town is so disengaged from the usual that it must be questioned. It is proposed instead that rice production with its surpluses coupled with the town's coastal geography may have resulted in a commercial market place and therefore to be a more likely location chosen for further commercial development, in part because market access and a labor force would already have been in existence.

It is thought that the Liangzhu had a well-established hierarchical governance, with an elite class easily identified from the wealth surrounding its inhumations. This was apparent during its earliest stage, for burial sites, rather than being large and similar as in most egalitarian societies, were now smaller and focused, with evidence that an elite class/families preferred interment of their own. The basis for disparity in wealth appears related to jade production in the period from 3000-2600 BC. The empowered class ultimately lived within the walled central area of the city, its construction dated to the late stage of development of the site. Some suggest that earlier there were a number of smaller chiefdoms, autonomous kinship groups evolving into commercial elite rather than a single centralized authority, for the noted variations in burial wealth are scattered around the region rather than concentrated in one location. Others think the clustered settlements around Liangzhu were not autonomous and were under direct control of a central ruling class.⁵¹ Perhaps both views are correct, with peripheral “bosses” or foremen overseeing certain small settlements assigned by the central authority to provide a particular specialization in commercial production. Evidence of a stratified social arrangement has been identified for the Songze culture that preceded the Liangzhu, and a thousand years was time enough for a hereditary concentration of power to develop. Some authorities have made the generalization that cultures of the Central Plain region along the Yellow River, which would include the Longshan (see p. 93), were more “collectively oriented” and cultures from the Yangtze River Delta were more “ruler-centered.”⁵² There also was a slave population and mortuary evidence of human sacrifice in the latter.

This extraordinary civilization inherited its hierarchical governance from its preceding culture, but then developed technical and artistic vocations at an early era contemporary with Sumer in Mesopotamia. The culture was indigenous. Scholars have suggested hierarchical guidance was present from the city’s earliest years in the planning and implementation of extensive dams, waterways, and monumental constructions. Given scholarly focus on the evidence for hierarchical control, it is difficult to fit into Liangzhu’s development any role for commercial networks of a heterarchical nature for production or trade distinct from a ruling elite, although this is unexpected. The likely explanation is that because of the long duration of Liangzhu society political forces would have assumed power at an early stage. Kinship is of great importance in Chinese culture, but the evolution of a elite dynastic kinships overwhelmed the average kinship unit, thereby replacing an egalitarian authoritarianism with political authoritarianism. The absence of writing appears to have had a limiting effect on its development when compared to early Mesopotamian and Nile River civilizations, although it must be acknowledged that it is unexpected that such a prosperous mercantile polity would have no form of permanent recording of commercial interactions. There has been the recent discovery in the Liangzhu area of etched artifacts that some think represent a primitive form of writing, but further study is under way. The size of its central population and many other features were shared by Miletos, but the area of influence was much greater. Given its duration as a city-state, it seems there should have been professional medical practitioners, although there is no evidence of them so far.

⁵¹ Much of this information comes from the preceding reference and: *The Formation of Chinese Civilization: An Archaeological Perspective*, Beijing, 2005, Sarah Allan, editor.

⁵² Fang, H., Feinman, G. M., and Nicholas, L. M., *Imperial Expansion, Public Investment, and the Long Path of History: China’s Initial Political Unification and Its Aftermath*, in *Proceedings of the National Academy of Science*, 112:9224-9229, 2015.

The metric similarities between Liangzhu and the Shandong Longshan city of Liangchengzhen are quite striking, and in the latter there also has been found no evidence for medical practitioners. The latter, however, is thought to have had little evidence of a social hierarchy in its earlier states, whereas Liangzhu exhibited from an early stage a distinct class division. Liangchengzhen, approximately 700 miles north of Liangzhu, was chosen as the likely source of rational aspects of the medical classic, *Huang Ti Nei Ching Su Wen*, because it was a prominent city characteristic of the age and in the locale of the fabled Yellow Emperor, whereas the Liangzhu culture has no such cultural heritage. The disappearance of Liangzhu occurred abruptly around 2250 BC and is so far unexplained, but it was not destroyed by military violence, and indeed there has been no evidence so far suggesting the culture was militaristic in any way.

Summary Table for Liangzhu

PERIOD – Late Neolithic
 POPULATION, LOCAL – 30,000
 POPULATION, TOTAL – “hundreds of thousands”
 PRIMARY AREA – 4 square miles (hegemony, 40,000 square miles)
 URBAN DENSITY – 12 persons per acre
 PRODUCTION – jade, rice, tools, ceramics
 GOVERNANCE – political hierarchy, probably based on kinship
 EGALITARIAN ARCHEOLOGY - no
 PROMINENT KINSHIPS – elite kinships, settlement kinships
 WRITING – no
 DISTANT TRADE – yes
 SPECIALIZATION – yes
 MONUMENTAL STRUCTURES – large city walls
 DENOUEMENT – unknown, but abrupt and nonviolent
 MEDICAL PRACTICE – ?
 FORMATIVE PERIOD – 500 years
 FLORUIT – 750 years (3000 BC to 2250 BC)
 CITY-STATE – yes (400 smaller settlements)
 AVERAGE LIFE EXPECTANCY – n. a.



Fig. 16: Artistic depiction of Pueblo Bonito in Chaco Canyon as it may have appeared in the 12th C AD. It was a “great house” constructed at enormous effort by the post-Archaic Woodland Anasazi civilization. As initiator of the Pueblo culture, this civilization was dispersed over perhaps 50,000 square miles in the Four Corners region of the American Southwest, but its dominant centralized population lived in the Chaco Canyon region, home to 5-10,000 people, although there were many smaller centers with “great houses.” There was commercial interaction with Central America and the Mississippi cultures. Although matriarchal governance is suggested, the role of coercive leadership in Anasazi development is not yet defined. This photograph is a digital construction of NASA/Ideum and is in the public domain.

11. The Anasazi Civilization

Presently dated to the 1st C BC, the Anasazi civilization appeared when a hunter-gatherer society in the North American West added farming to its means of subsistence. Its culture would persist for 1400 years and its oscillations would provide archeologists with a superfluity of observations on the demography and lifestyle of an ingenious and determined people. The progress of Anasazi society over the centuries, therefore, has been well-studied, but this thumbnail sketch will concentrate on its periods designated Pueblo I (750-900 AD), Pueblo II (900-1150 AD), and Pueblo III (1150-1350 AD).

Corn and squash were introduced from Mexico and remained staples throughout Anasazi prehistory, corn being especially important as it was capable of long storage, a major determinant of its value in early cultures. Basket-weaving, ceramic production, and a jewelry industry subsequently developed. But it was lifestyle and dwellings that have received most attention. Initially there were scattered small farming communities of up to 100-200 people living in pit-houses, but over time clusters of farmsteads began to surround larger village centers with large pueblo structures built of local material, stone or mud, that were used for community activities, meetings, and ceremonies. This was the Pueblo I stage. Then smaller pueblo buildings were adjoined over time to form multi-unit structures several stories high, usually surrounding a central plaza. "Great houses" were built in towns throughout the region (over 200 have been identified). It is estimated that "great houses" in Chaco Canyon, the center of Anasazi civilization, included in their construction some 200,000 logs hauled from fifty miles away. This is thought to have been completed by 900 AD (Pueblo I, early Pueblo II). The social organization for this effort and for the Anasazi Culture as a whole is unknown. For most of their existence the great houses were not residential dwellings for most of the people, who lived in small individual dwellings on the hillsides adjacent to the area containing the central plaza. Placement of the larger and well-organized communities is thought to have been guided by defensive considerations, as was the frequent use of ladders to enter the dwelling units. This suggests a serious threat of attack. The largest pueblo contained 800 rooms, many being used for food storage. Some of the settlements became quite large, and it has been estimated that the population of the Chaco Canyon site may have reached 30,000, and that the total number of homesteads scattered over the region reached 20,000.⁵³ Thus, there were dozens of large pueblos and a vast surrounding area containing hundreds of small settlements, and, although quantitation can be misleading, there were Anasazi-related settlements scattered over tens of thousands of square miles in what is now the "Four Corners" region of southwestern United States, the elevation generally 5-6,000 feet. These settlements participated in a network for trading, for traditional cultural events, and presumably for meetings of local councils. It is thought that the Chaco Canyon site was the primary focus for the entire region. It is not known if organizational decisions from the Chaco Canyon site amounted to governance, but evidence of specialization in production in peripheral settlements has not been reported, suggesting their value to the civilization was primarily agricultural. A complex of roads, estimated at 400 miles, and the great effort involved in erecting the large pueblo buildings imply that some form of central authority coordinated such complex efforts. Archeological findings have included

⁵³ Important Anasazi sites include Montezuma Valley (a broad valley that may have contained as many as 30,000 people), Cedar Mesa, Mesa Verde, and Canyon de Chelly, each area containing dozens of small villages.

remains of colorful macaws that could only have come from tropical Mexico, thus adding to the data indicating distant trade with populations in Mexico, the Pacific Coast, and even the Mississippi region. Intricate jewelry was produced by the Anasazi, including much from turquoise, that would have been exported. Some Anasazi sites had well-developed dams and irrigation systems that supported agriculture in what would become an arid environment. Food surpluses were thereby produced and traded for ceramics and other items.

In all but its last stage most of the population lived in small individual dwellings set apart from the population centers in the larger settlements and Great Houses, and it appears that the latter over time grew to house an elite class. Life was difficult for the common man if the findings at a peripheral settlement located on Black Mesa is any indication. A study of a “household group” of a farming community dating from 1000-1150 AD (Pueblo II) has been presented. Over 200 skeletons have been recovered that span the period from 800 to 1150 AD. Of those that were able to be studied, 10% were infants and 50% were adults. “Life expectancy” was estimated at 25 years and was associated with slow childhood growth, shorter adults (by about 4 centimeters less than elites), childhood mortality triple that of the elites, evidence of heavy labor, a diet short on meat, and a prevalence of evidence of anemia set at 87%.⁵⁴ In contrast, the population centers were prosperous and growing, and the concentration of power and wealth, the elaborate burials of a few of its inhabitants, and skeletal evidence of a less rigorous lifestyle within the relatively few large communities support the notion of hereditary leadership of great influence. This has recently gained support from the finding that, of a cluster of 14 burials in Chaco Canyon’s largest pueblo spanning 800-1130 AD, the period of Chaco Canyon’s dominance, remarkable generational similarities in DNA indicated not only hereditary passage of wealth over that entire period, *i.e.*, a dynasty, but one that was matrilineal and perhaps matriarchal.⁵⁵ Just when this presumed shift from clan council to a hereditary nobility is uncertain, but it probably occurred at an early stage (Pueblo I).

The Anasazi developed no written language. Although “religious” ritual has been considered a very important force in the culture, its role in moral guidance and deference to authority is unknown. In some quarters there is presumption of, but no scholarly discussion of, shamanism, and the practice may have not existed at all. There is no evidence of any form of medical practice. By about 1200 AD, the Anasazi population, which had begun to evacuate its peripheral small settlements and move to population centers, was rapidly declining, probably by emigration southward, subsequently disappearing as a regional culture. The reasons for the decline are debated but it followed

⁵⁴ See: Martin, D., *et al.*, *Black Mesa Anasazi Health: Reconstructing Life from Patterns of Death and Disease*, Carbondale (IL), 1991, chapter 2.

⁵⁵ See: Kennett, D., *et al.*, *Archaeogenomic Evidence Reveals Prehistoric Matrilineal Dynasty*, in *Nature Communications*, Feb. 21, 2017. There was a parallel arrangement in Nepal in the not so distant past. Management of the nation at that time was in the hands of hereditary prime ministers from the Rana family. One of their largest palaces in Kathmandu had 1,700 rooms and 7 court-yards. From their palaces the Ranas controlled a region of 55,000 square miles, not too different in size from that of the Four Corners area over which the Anasazi exerted hegemony. It is tempting to suggest that the 650-room Pueblo Bonito that contained the 14 burials mentioned above was, in effect, the abode and the palatial center of a powerful family that ruled the widespread Anasazi nation. What is missing, of course, is evidence of a mechanism for physical coercion or cooperation from a dominant power.

on the most prosperous Anasazi period. Climatic issues, over-farming, and mismanagement by an elite class are mentioned as possibilities.

But there is an interesting cultural sequence attached to Anasazi civilization when viewed over the 1,400 years of its existence. There is scholarly agreement that during the earlier centuries common customs and rituals held together regional tribes, and egalitarianism within the various kinships was the means of social control. But once sedentism evolved and surplus food and commercial trade could be sources of wealth it became possible for a subpopulation to prosper and to acquire power. This may have occurred, and over about 200 years there developed a prominent elite class, with the lowest class being subject to poverty and arduous toil. An alternative scenario is that over time the populations outgrew the capacity of local systems of agriculture and water sources in areas that were to become arid, the consequence being that an increasing number of farming families were in marginal areas, leading to poverty and malnutrition in peripheral farms and communities. In either event, soon after reaching its zenith the Anasazi civilization deteriorated, its emigrants joining new groups or reestablishing tribal ties elsewhere such as those who are now called the “Pueblo people.” There also was a reversion to egalitarianism, one so rigid that in more recent centuries it has been documented that “nonconformists were driven out.”⁵⁶ For present purpose note that (1) the period of greatest prosperity and influence occurred at a time authoritarian governance was in place, and (2) local events and the means of social control during the interval between the earlier egalitarian period and the development of an elite class have not yet been defined. Nevertheless, it has been proposed that the temporary experience of the Anasazi with inequality and prosperity made them eager to regain their egalitarian ways. But let another scenario be proposed: after centuries of stable social organization based on egalitarian kinship, greater attention was paid to water resources, and dams, irrigation canals, and reservoirs permitted expansion of agriculture to the point that commercial benefit could be obtained by the Four Corners people. This benefited the population as a whole and had been undertaken by the population as a whole, and it was not done with an eye to becoming prosperous. It was instead done to survive during the drought of 850-900 AD. Great houses were begun, and their construction was of a defensive nature, again a matter of survival. It is suggested, therefore, that it was during this difficult period that the ingenuity of the Anasazi not only managed to survive, but to thrive. That success is what may have brought early tribal leadership together to consider regional organization under a ruling family. Community successes may then have been commandeered by some means, and an authoritarian era imposed. At this point one must take note of a series of papers by Dr. D. L. Martin who has described a very nonegalitarian pattern of violence and desecration of bodies in the American Southwest during this period, including some focus on the Chaco Canyon region.⁵⁷ By filling in gaps in the osteoarcheological record and offering a variety of explanations for violent behavior it is clear that the Anasazi culture was permeated with this aberrant social conduct and its consequences throughout Pueblo I, II, and III periods. This reinforces the conclusion of this section, that the preexisting egalitarian Anasazi culture was promptly transformed into an authoritarian hierarchical society.

⁵⁶ Stuart, D., E., *Anasazi America: Seventeen Centuries on the Road from Center Place*, Albuquerque, 2014, p. 208.

⁵⁷ See: Martin, D. L., *Hard Times in Dry Lands: Making Meaning of Violence in the Ancient Southwest*, in *J. Anthropol. Res.*, 72:1-23, 2016s.

In final analysis, the time available for development of a professional medical network for the Anasazi civilization was about 400 years, as the earlier years were hampered by climate vicissitudes and the necessity of constructing defensive housing. Furthermore, the short life expectancy of the non-elite would profoundly impair the founding of a medical profession, for the elite class would not have undertaken medical care as an occupation. Medical care, in contrast to shamanism, was no source of power, but for the Anasazi there is little to no evidence of either. But did the Anasazi socially evolve to the point where specialization and commercial prosperity would have provided the circumstances needed to foster a network of medical practitioners? It certainly had commercial success in trading and agriculture, that success resulting, at least part of the time, in surplus produce. But evidence in support of heterarchy or corporatism is not present, and the widespread role of violence as a solution to social problems makes it clear that a coercive hierarchical system of social organization was in play. A medical network would have been inconceivable given the constant threats of violence, both internal and external. Corporatism could explain why an elite matrilineal hierarchy could be noncoercive, for the plebeians could voluntarily enroll in projects that had communal benefit in mind. But later the archeological evidence of frequent violence favors development of a ruthless elite class or external threat as the culture became prosperous. Thus, the time between the initial egalitarian kinship (patriarchal?) governance and the subsequent central authoritarian governance was too disruptive and short to permit the development of specialized entities such as a medical practice. This could also explain why the general community, rather than coalescing in neighborhoods or hamlets based on kinship, tended to disperse in individual family units surrounding ritual centers. Their allegiance was no longer to their kinship but to the central elite leaders either for safety from marauders or for fear of disturbing their ruling class. It would also explain why the people so quickly reverted to egalitarian kinships as the culture disintegrated. They had found something even worse than egalitarianism.

Summary Table for the Anasazi

PERIOD – post-archaic Woodland

POPULATION, LOCAL – 5,000 (Chaco Canyon; highest estimate: 30,000)

POPULATION, TOTAL – 100,000 in small settlements were dispersed over a very wide area⁵⁸

PRIMARY AREA – 30 square miles (hegemony, 50,000 square miles)

URBAN DENSITY – 270 persons per acre (at Pueblo Bonito)

PRODUCTION – turquoise, jewelry, pottery

GOVERNANCE – egalitarian kinships initially, later merging into hereditary coercive authoritarianism

EGALITARIAN ARCHEOLOGY – yes, initially

PROMINENT KINSHIPS – yes, early, with bands/tribes joining in common effort; later elite kinships control

WRITING – no

DISTANT TRADE – yes (Mexico, Pacific coast)

⁵⁸ See: Lockard, C., *Societies, Networks, and Transitions*, Boston, 2008, vol. 1 (of 2), p. 346.

SPECIALIZATION – yes, but limited

MONUMENTAL STRUCTURES – yes

DENOUEMENT – abandonment

MEDICAL PRACTICE – ?

FORMATIVE PERIOD – 700 years

FLORUIT – 400 years (Pueblo II and III periods; 900-1300 AD)

CITY-STATE – yes, with roads to network with distant settlements

AVERAGE LIFE EXPECTANCY – 25 years for plebeians (limited data), but this included early childhood deaths.



Fig. 17: The 4th millennium BC “proto-city” of Maidanets is schematized here, although its social dynamics are uncertain. Located in modern-day western Ukraine and northeastern Romania and with a possible population of 30,000 but with few peripheral communities and no evidence of organized commercial activity, the basis for the large population centers of the Cucuteni-Trypillia civilization remains to be determined. The hegemony of the Cucuteni-Trypillia civilization has been estimated at 140,000 square miles, almost the size of the State of California, but there is no evidence of any centralized governance. This photograph is made available via license of Creative Commons Attribution-Share Alike 4.0 International.

12. The Cucuteni-Trypillia civilization; Maidanets

In eastern Europe archeological findings over the last 30-40 years have raised many questions regarding traditional theories on the origin of European civilization. The earliest culture that supports this reassessment is the Cucuteni-Trypillia civilization (5000 – 3000 BC), and it grew and prospered in the region now occupied by Moldova, southern Ukraine, and northern Romania. Its settlements tended to be small, perhaps a dozen households, but local crops and domesticated animals, plus hunting, were sufficient to maintain a local population as large as 500. It is estimated that such settlements lasted no more than one hundred years before being abandoned or purposely burned. The same sites were in general not reinhabited for another two centuries. But ultimately this civilization spawned scores of large population centers. One of the largest was the settlement of Maidanets, and it will be used as an archetypal settlement of the Cucuteni-Trypillia civilization.

Differing dates are given for the duration of this civilization that borders the western Black Sea, and an approximation is 2,000 years. Large population centers were evolving by 4300 BC, and the flourishing period for this civilization can be considered to have lasted at least 1,000 years. There is general scholarly agreement that over this entire period the Cucuteni-Trypillia civilization was relatively stable. At least some of the large centers appear to have developed quickly and with a plan in mind for the layout for houses and corridors. Weapons were few and it can therefore be concluded that threats from surrounding cultures or inter-city rivalry were few, at least for much of its duration. The initially small population was engaged primarily in hunting, fishing, and limited agriculture, but over the centuries the population increased, as did settlements, the latter number estimated at 3,000 at its peak. Agriculture and domestication of animals supported more people, and soon the civilization contained many large towns and cities. Maidanets' population has been estimated as high as 30,000 and an area of one square mile. Like city-states elsewhere the large population centers, generally termed "megasites" rather than cities, developed some form of association with or hegemony over many small satellite settlements. The nature of that interaction is unclear, however, for there is no evidence of central urban management, no central stores, no delineation of property or monumental structures, no evidence of tribute and no obvious commercial enterprises that required interaction between the polis and the peripheral settlements. Although some work with copper occurred late in its course, Cucuteni-Trypillia civilization is considered Neolithic.

It is remarkable, given the size of the population centers, that there is little evidence of a hierarchical political system or of an elite class until the final stages of the civilization. Dwellings and the planned design of various communities were of a similar nature, although each of the cities had its unique features, and this pattern was unvarying for most of its span. Much has been made of (1) the apparently planned destruction by fire of many of the dwellings in a 70-80-year cycle, and (2) the vast number of figurines, the majority being female representations. But for present purposes the issue is not why the population did what it did, but why so many did it. For example, many dwellings were burned according to a particular pattern, but they were primarily from the central city rather than peripheral settlements. The unity in the social scheme over much of the Cucuteni-Trypillia region seems unlikely to have been a spontaneous response of citizens. Perhaps there was a relatively rigid adherence to some common social factor that required or

coerced communal agreement and thus aided planning.⁵⁹ Alternatively, as subgroups of city dwellers were intermittent residents, perhaps newly admitted subgroups destroyed dwellings of prior inhabitants in the neighborhood they intended to occupy. Nevertheless, the overall opinion of scholars is that from beginning to end this was an egalitarian society, and this suggests that egalitarianism can be a potent mechanism for population control. Unlike Catalhoyuk, where individual dwellings were physically contiguous, the cities such as Maidanets had their dwellings for the most part separated by sufficient space for each household to provide for its essential daily needs and chores without encumbering others. This finding, plus the large open areas and nearby but separate settlements have led to the classification of these cities as “low density urban sites,” and others include Cahokia, the Anasazi communities, some Longshan sites in China, and population centers in Amazonia, all being discussed in the present work. There is interest in present-day low density urban sites, but the significance of this settlement pattern in prehistoric times is uncertain. It does suggest the possibility that by maintaining family self-sufficiency, it had the effect of placing physical and economic limits on any effort that might be made to develop a central political authority. At the same time, the autonomy of small family units and their modest physical separation would have retained the egalitarian ethos of the underlying society, *i.e.*, a counterbalance to heterarchy, and would have limited any tendency to form specialized groups. This is consistent with the findings: there is virtually no evidence of specialized production of any kind. It is probable that this low-density urbanization with its autonomy of individual units was specifically sought by families as preferable to the relatively isolated small settlements during threatening times. How else can be explained the absence of dense urban housing usually brought about either by commercial ventures that preferred a closely-knit labor force or by the necessity for a common defense.

This settlement pattern also is consistent with other findings: there was very little trade with distant sources, and even that occurred only late in the course of this civilization. It becomes difficult, therefore, to assign any particular form of governance to the large polities, for an egalitarian society that tends to redistribution is not consistent with autonomous family units that prefer to fend for themselves.⁶⁰ Nuclear families are not considered egalitarian, and, if there is a choice, as a unit a family would want what is best for itself, not for its neighbors. For this reason, the nuclear family rather than kinship will agree to accept corporatism: it realizes that it can be better off as part of a commercial group, *i.e.*, corporatism, than a kinship group. Indeed, the reference just cited states in its Abstract that “It is during periods when extended families operate more independently of

⁵⁹ See: Chapman, J., and Gaydarska, B., *Low-density Agrarian Cities: A Principle of the Past and the Present*, in *Trypillia Mega-Sites and European Prehistory: 4100-3400 BCE*, Abingdon, 2016, J. Muller, K. Rassmann, and M. Videiko, editors, chapter 17, pp. 289-300. The entire volume contains valuable updated information and perspective on this interesting civilization.

⁶⁰ In prehistoric Canada the rise and decline of Native American settlements has been attributed to the movement of family units into dense villages and back into autonomous domiciles in response to perceived threats to survival of the small units from climate change or other external pressures. When things were stable the autonomous unit was preferred, apparently because the egalitarian ethos that pervaded the dense settlements was in itself viewed as a threat. There was a reversible exchange of autonomy with security. See: Harris, L., (2013) *Heterarchy, Egalitarianism, and the Archaeology of Complex Hunter-Gatherers: Reinterpretation of Social and Political Dynamics in the Aggregated Villages of the Mid-Fraser Region, British Columbia (2000-800 B. P.)*, a paper read at the 78th annual meeting of the Society for American Archaeology.

band political structures that the opportunity for unequal access to resources and wealth emerges.” The unequal access to wealth associated with commercial ventures in early urbanization is inconsistent with the Cucuteni-Trypillia civilization for neither the central polity nor the peripheral settlements show significant variations in wealth to distribute or acquire. The egalitarian inhumations of this civilization probably reflect absence of wealth throughout its population, for a community that has no commercial activity of significance has little individual wealth to either distribute or to acquire. New discoveries suggest two relevant factors affecting the size and social makeup of the “cities.” One is that large numbers of dwellings were burned at times, thus meaning that the population size at any one time was significantly less than proposed earlier. The second is evidence of housing clusters that suggest neighborhoods, and the size of each neighborhood might be consistent with the requirements of a kinship group.⁶¹

The extensive and long-lived Cucuteni-Trypillia civilization is in some ways similar to the long-lived Catalhoyuk civilization in that over a thousand years passed with little social change. It likewise developed neither a significant commercial agricultural base nor commercial trade. It also was profoundly egalitarian as judged by archeological evidence, but this may merely have reflected the absence of a means to acquire wealth. By extending its borders primarily westward it accommodated an increasing population. And yet it was profoundly different from Catalhoyuk in that the individual families retained great autonomy, a most inequalitarian characteristic and in marked contrast with the strict and dense domiciliary pattern of Catalhoyuk. Perhaps the population was quite satisfied with its circumstances and had little motivation to change, the little change that occurred being associated with knowledge acquired from neighboring cultures. After all, its agriculture, herds, and natural resources for hunting sufficed for its population as long as it could match an increasing population with an enlarging geographical footprint. But it did not develop any features essential for progress to the point that the members of the culture had a significantly improved life. Indeed, one wonders what the attraction was that initially led them to this clustering of family units in the large settlements in the absence of commercial development, for this civilization seems to have been devoid of both a commercial heterarchy and an elite hierarchy. What did they have to gain? One possibility is that extended families and larger kinships could move in and out of the large population centers in response to changing conditions, perhaps environmental or hostile threat. The possibility of corporatism seems unlikely as a form of governance as there was no elite class to combine “corporate” ideas with action and no large-scale commercial projects to benefit from a corporatism approach. In the absence of a source of prosperity through surplus, storage, and trade, the expected role for specialized services did not exist. *Ipso facto*, it would be unexpected for a medical practitioner network to have emerged despite such extended stability. Whatever the final determination may be, the static existence of this civilization over two millennia would be more startling but for the well-studied Egyptian civilization that also saw two millennia pass without progress. If one puts aside monumental structures and craftsmanship, the Cucuteni-Trypillia civilization, just like ancient Egypt, got bigger but not better, even though one was rigidly authoritarian and the other was subdivided among egalitarian kinships. The affiliation of kinship units,

⁶¹ For a discussion of recent thinking on “ground up” neighborhoods in this region see: Chapman, J., *The Standard Model, the Maximalists and the Minimalists: New Interpretations of Trypillia Mega-Sites*, in *J. of World Prehistory*, 30:221-237, 2017.

rather than weakening within a larger urban venture as is usually the case, remained strong and its people "... still lost in kinship ties..."⁶²

The neighborhood arrangements in the Cucuteni-Trypillia civilization megasites, if true, bear some resemblance to mound dwellers of Marajoara, Poverty Point, Terramare, and Djenne-Djenno except that the Cucuteni-Trypillia populations had no environmental features that would cause segregation of kinship units; it was done by choice.⁶³

The life expectancy of the populations of the Cucuteni-Trypillia region is unknown, for no cemeteries and virtually no inhumations have yet been discovered. Presumably it was similar to most other prehistoric populations, 30 – 40 years. As Cucuteni-Trypillia populations span the shift from a hunter-gatherer society to sedentism between 5000 BC and 3000 BC, report of a 6000 BC population declared to be the first farmers in Europe had an estimated average age at death of 31 years for men and 29.9 years for women.⁶⁴

Summary Table for Cucuteni-Trypillia civilization, Maidanets:

SOCIETAL STAGE - Neolithic
 POPULATION, LOCAL – 30,000 (recent estimates less than 10,000)
 POPULATION, TOTAL – ?
 PRIMARY AREA – 660 acres (hegemony: 400 square miles, but the entire civilization extended over more than 100,000 square miles)
 URBAN DENSITY – 31 persons per acre
 PRODUCTION – subsistence until late period
 GOVERNANCE – a large cluster of neighborhoods, each an egalitarian kinship
 EGALITARIAN ARCHEOLOGY - yes
 PROMINENT KINSHIPS – yes, the basis for neighborhoods in the megasites
 WRITING – no (although there is the controversial regional Vinca script)
 DISTANT TRADE – late period, and then with neighboring cultures.
 SPECIALIZATION – only in late period
 MONUMENTAL STRUCTURES – no, but some large buildings are compatible with the function of a community center
 DENOUEMENT – ?
 MEDICAL PRACTICE – ?
 FORMATIVE PERIOD – 900 years
 FLORUIT – 1000 years (4300-3300 BC, although perhaps “expanding” is a better term than “flourishing” for there was little commercial activity)
 CITY-STATE – no; voluntary agglomeration of kinships
 AVERAGE LIFE EXPECTANCY – n.a.

⁶² See: Chapman, J, and Gaydarska, B., in chapter 17 (pp. 289-300), in *Trypillia Mega-Sites and European Prehistory: 4100-3400 BC*, Abingdon, 2016.

⁶³ See: Chapman, J., et al., *The Second Phase of the Trypillia Mega-site Methodological Revolution: A New Research Agenda*, in *Eur. J. Archaeology*, 17:369-406, 2014.

⁶⁴ These data are from a 6000 BC early Neolithic settlement in northern Greece, Nea Nikomedeia, perhaps 500-600 miles south of Moldova. See: *European History: A Survey*, Buffalo, 2002, S. Milisauskas, editor, pp. 184-185. A more general source for comparison is: Boldsen, J. L., and Paine, R. R., *The Evolution of Human Longevity from the Mesolithic to the Middle Ages: An Analysis Based on Skeletal Data*,

D. Overview of the twelve primary lesser civilizations

Relevant to the definition of “city-state” on p. 21, two of the lesser civilizations (Catalhoyuk and Sintashta) had no peripheral settlements, two (Norte Chico and Poverty Point) had central polities primarily for ceremonial use, one (Cucuteni-Trypillia) had no significant commerce, and one (Terramare) developed peripheral settlements as a late phenomenon, leaving only six of the twelve lesser civilizations with a semblance of an autonomous city-state. Furthermore, the civilizations evolved in quite different eras: three were Neolithic, two were Bronze Age, one each was pre-ceramic, Late Woodland, and Late Archaic (all American), and three (Marajoara, Anasazi and Djenne-Djenno) merged into the modern era. Other characteristics include the following:

a. Production and specialization for vendable benefit:

All the lesser civilizations presented achieved self-sufficiency and were able to produce surplus food or provide commercial products, but the degree of success varied. Catalhoyuk and Cucuteni-Trypillia had very little, and Marajoara, a large island at the mouth of the Amazon River, had, by virtue of geography, limited resources and limited access to distant cultures. Poverty Point, near the Mississippi River, had distant trade in stonecraft, but it was not carried by river, for its location was near the mouth of the Mississippi river as it forms a delta that carries into the Gulf of Mexico. The variety and luxuriousness of its product was thereby limited. Nevertheless, as these four civilizations had archeological evidence of distant trade, they will be assessed as marginally specialized in that they had something to trade in return.

b. Political status and governance:

Most of the twelve seemed bereft of a central hierarchical political structure, or at least their sustenance and artifacts do not suggest such a thing. Of those with an elite hierarchy, only Liangzhou was clearly and rigidly so, the Anasazi evolving later an authoritarian elite. Shahr-I Sokhta was purely heterarchical but with commercial neighborhoods presumably kinship-based. Sintashta suggests an organization of kinships consistent with corporatism, and Catalhoyuk is now considered a collection of neighborhoods despite its dense population. The latter three plus the remaining seven centralized populations can be viewed as confederations of kinships. Even Terramare, where there probably were kinship neighborhoods, might represent a coordinated effort of a “super-kinship” confederation, although the idea of a formal alliance of kinships developing within each settlement area would seem unlikely. The role of confederations of kinships as the mechanism whereby egalitarianism is maintained and enforced is part of the big story of this book.

c. Archeological egalitarianism:

Egalitarianism as defined by archeological finds was present in seven of the twelve lesser civilizations. None, with the unlikely exception of Sintashta civilization, provide evidence of aggressiveness as a mechanism for prosperity, although Liangzhou had defensive structures and violent aggression characterized the late Anasazi civilization, although its source is uncertain.

d. Duration and denouement:

The duration of each lesser civilization is given in two parts: the time for a prospering civilization to appear and the time that it flourished. This was done because it would have been during the centuries the civilizations flourished, rather than during their formative years or their decline, that progress would have been manifested in a network of medical practitioners. The shortest duration of the flourishing period (Floruit), 300 years, occurred with the Terramare civilization, the three longest in Catalhoyuk (1,200 years) and

Cucuteni-Trypillia and Poverty Point (1,000 years each). The causes of their terminations are often speculative, with climate change frequently being a possible mechanism. As best can be determined, none were overtaken by conquest. Flooding is quite likely for Cahokia. But it can be concluded that conscious decision was behind the vacating of all twelve sites.

e. Contact with other cultures:

All twelve had some evidence of trade relationships extending beyond local, some for obtaining raw materials, others being markets for finished products or crops. This was very limited in some, *e.g.* Catalhoyuk and Cucuteni-Trypillia, but for the present all are considered to have had contact with outside cultures and thereby some idea that heterogeneity of lifestyle existed among foreign populations.

f. Quality of life:

An indirect measure of this variable is life expectancy, inasmuch as it might reflect community health. For purposes of this book, the interest in life expectancy resides primarily in the number of older people in the community at any given time. Generational wisdom becomes a more significant contribution to community living and planning than it is in nomadic societies because the older, and therefore more likely infirm, population can be assigned sedentary tasks, thereby contributing to society rather than being a burden to a mobile band. Some idea of the rigor of existence can be gained in those few instances where life expectancy data are available. If life expectancy calculations include infant and childhood mortality, the resulting figure would more accurately reflect community health, but calculating life expectancy of those who had survived to the age of 15-20 years gives a better idea of the number of older individuals in a community population and thereby its susceptibility to progress. Although the data vary in quality, the average age at death was consistently in the low thirties (Terramare being a modest exception). The variable of greatest interest for present purposes is age at death, a value that can be only modestly estimated in adults from skeletal remains.

CHAPTER NINE

THEORETICAL CONSIDERATIONS FOR SOCIETAL PROGRESS AS DERIVED FROM THE FIVE SUCCESSFUL PRIMARY CIVILIZATIONS (CHAPTERS 2-6)

“For if Huchard’s position is successfully argued it means that all that mankind requires to sustain and promote progress in medicine is scientific method. This is blatantly in error. As the next chapter will confirm, scientific method is irrelevant if it cannot be deployed or exploited.”

The Natural State of Medical Practice, vol. 1, p. 528

Early decisions about the preferred lifestyle of small kinships, especially hunter-gatherer bands, were based on rational considerations and personal preferences rather than a preset propensity to settle in villages as soon as the warmer climate of the Late Neolithic made it possible. Those decisions ultimately were the determinant for or against urbanization. If “against,” it could result in 50,000 years of nomadism as occurred with Australian aborigines. If “for,” subsequent commercial enterprise and discovery could lead to market towns and then to urbanization, from which subsequent generations might people a vast civilization. Some variables derived from the analysis of the five “successful” primary civilizations in which early forms of scientific medical practice appeared are reviewed for their relevance in evolving a civilization capable of progress.

- A. Rejection vs. selection
- B. Longevity (life expectancy)
- C. Population size and density
- D. Duration
- E. Prosperity
- F. Demographic conclusions
- G. Preceding and succeeding civilizations

- A. Rejection vs. selection

Summaries of twelve lesser civilizations having been reviewed, a most unexpected observation is that in none of the twelve is there evidence of medical practitioners. Yet many of their metrics resembled to a modest degree those of the autonomous Greek city-state, Miletos, and the four primary civilizations with historical evidence of a true medical profession appearing in their early stages of cultural and commercial development. As it has been proposed at the outset of this work that (1) progress in medicine could have occurred fairly quickly because the intelligence of ancient humans was equivalent to ours and could have supported scientific complexity, (2) morbidity and mortality in daily life would have been a perennial motivating force in all ages to avoid or assuage illness or injury, and (3) many important clinical observations are cheap, quick, obvious, and require no technology, why did the capacity for early progress fail to produce any evidence of a medical practice? The absence of medical practitioners as a unanimous finding in the twelve lesser civilizations is so striking it suggests that some explanation has been overlooked or that our reasoning has been faulty

or based on false assumptions. It is especially remarkable given the stability and durability of some of the civilizations. How are nuanced developments in thousand-year-old ancient societies to be judged when such gross anomalies defy understanding?

The most obvious explanation is that the cause of this apparent aberrancy will someday be uncovered by further archeological exploration. But could a clue be found in study of the indigenous population of Australia?

Excursus on Australian Aborigines

The extraordinary history and prehistory of Australian aborigines has received much scholarly attention for many years, especially the complexity of its kinship associations. But a striking observation has been the absence of permanent settlements that might be called a village at any time during the 50,000 years of aboriginal habitation of the Australian continent.¹ At first glance, this suggests there was no motivation to form permanent settlements, indicating an existence relatively free from deprivation and danger, or that the alternative, agricultural settlement, was too difficult, dangerous, or repulsive. Indeed, the present opinion is that much of the Australian land-mass has been poorly amenable to agricultural development, in part because of its aridity. There are acceptable regions, however, in the east and west, such as the Liverpool Plains region in the southeastern state of New South Wales, an alluvial plain that is an important agricultural region today. Here can be found very early aboriginal “occupation sites,” art, and petroglyphs, but no aboriginal settlements have been identified. While aridity has been an important feature of large parts of Australia in recent millennia, it was not always so. When the first aboriginal population arrived, the region is thought to have been lush. Archaic settlements usually have been in the proximity of rivers, and there are many river systems in Australia, in addition to which the option for establishing fishing communities along the extensive ocean coastline would have been as available in Australia as in any other part of the world.

In one of the more curious intellectual exchanges of today, the subject of intelligence, as measured by testing, is sometimes invoked to explain differences in the development of entire cultures. The Australian aborigines have received attention in this regard, and it is postulated that they are below a certain point on a standard intelligence quotient scale that is necessary to recognize methods of adaptation, thereby explaining their lack of communities; it simply didn’t occur to them to change. There is an interaction between intelligence and motivation, however, and if limitations on motivation exist there may be repercussions in assessing intelligence.

Earlier it was pointed out that motivation to change is required for progress, and, if there is insufficient motivation to change, a society can remain frozen in time, and this appears to have happened with the aboriginal people of Australia. As an alternative explanation, however, there may have been motivation to *not* change. It was noted by a French explorer of the upper Mississippi region that among indigenous people of North America

¹ The one or two exceptions are on the seacoast and may have been the production of stranded seafarers from some unknown region.

a nomadic existence often was the preferred existence; settling down in one place and growing crops was demeaned. What could be better than moving about as one pleases? There may have been other factors, of course, such as those related to sanitation, that made it preferable to move from place to place rather than to devise waste disposal systems that to them may have seemed repellent.² Or perhaps some early attempts at settlement living had been met with epidemic disease of either human or animal origin, the fear of which made permanent settlements not an option. Staying in one place for an extended period, therefore, may to them have seemed primitive, dangerous or evidence of disability. But one thing certain is that resistance to change need not be blamed on insufficient collective intellect of a society. The primitive society's communal intellect had knowledge of factors of which we are unaware that militated against sedentism and an agricultural subsistence, and, if recent evidence of limited agriculture and domestication by Australian aborigines is confirmed, this would indicate the concept of sedentism was not unknown. Absent nutritional deficiencies, regional genetic maladaptations, and considering environmental and social priorities and threats, this primitive society's intellect merely was otherwise occupied.

Nomadism has been the norm for most of mankind's time on earth, and sedentism may in some ways be an aberrancy. Nomadic societies are notably egalitarian, although this has not prevented devastating behavior toward one another. It is a popular notion that aboriginal Australians were nonviolent relative to other societies, but this is not supported by evidence in skeletal remains indicating organized conflict and physical trauma, particularly head trauma among women. Some restraint on individualism is an unavoidable necessity in any form of communal living. And it has been proposed that this restraint on individualism has permitted social progress to occur, the destructiveness of the individual being prevented at the level of the average member of a society. Disruptive behavior would be evident to all and promptly controlled. Were this the case, however, egalitarian nomadic groups effective in suppressing individualism should have been the first with evidence of progress, including some form of progressive medical care. Instead, as with the Australian aborigines, they have been the last.

There was a global move toward human settlement with the end of the Late Glacial Period (10,000 BC). Prior to that human settlements were more like encampments. Australia was affected as well by that climatic phenomenon, although the climate of the Late Glacial Period wasn't as severe as occurred in the Northern Hemisphere. Elsewhere a settled existence and a turn toward an agricultural subsistence sometimes evolved. But this change was not forced upon early populations, and it took thousands of years before the Neolithic Revolution and its turn to agricultural settlements gingerly began, so gradual in fact that it can be considered reticent. Glaciation at its peak covered only a small proportion of the global land mass, and although accompanied with extensive drying and desert formation, habitable regions would have been abundant for the tiny global human population of that era. There is also evidence that a human population increase began long before the regression of the glaciers. Finally, the Holocene glacial retreat began

² There is the anecdote by John Hersey in his book, *A Single Pebble*, when, during a period when he was employed as a worker on a boat that carried freight on the Yangtze River, he pulled a thin square of white cloth from his hip pocket, blew his nose, and replaced the cloth in his pocket, a procedure that drew rude comments and displays of disgust from his Chinese co-workers who preferred to vigorously expel nasal mucus on the ground and be rid of it.

19,000 years ago, but the first permanent human settlements date from about 11,000 years ago. And another five or six thousand years had to pass before the Neolithic “revolution,” the switch from hunter-gatherer to agriculture, took place and the Bronze Age population proliferation occurred. And even when sedentism was adopted, large areas such as northern Europe and the British Isles were populated not by villages and towns but by individual or tiny clusters of houses. In other words, if environmental and social dangers were not great, village and town life or other dense population centers were not sought.

Post-glacial climate change apparently was not viewed by Australian aborigines as a reason for altering their traditional lifestyle. Perhaps the reason was not that they rejected sedentism in favor of nomadism, even though that option was always present. Nor was the reason the demeaning “it just didn’t occur to them to change.” Perhaps the reason lay in the coercive power of egalitarian kinship in restraining any inclination to change. Kinship was of overwhelming importance. It defined land boundaries, ceremonies, traditions, membership and place in society, and even individual representations of the popularly known “Dreamtime,” the cosmic worldview shared by the many clans. To be part of and to uphold one’s part in that worldview required obeying its tenets and its enforcer, the kinship. Thus, both ethnic and ethical identity of the individual served to bind him or her to the clan rather than merely marking his or her place in it. In leaving the kinship one left more than a community support structure.

The nature of the Australian aboriginal egalitarian kinship-based society and its oral tradition has been well-studied, and despite a suggestion of limited farming it is considered a hunter-gatherer culture divided into small bands and clans. But clan interactions and strict regulation of membership, marriage, ritual and age/gender-defined responsibilities and duties made for a rigid social system. Although considered egalitarian in that leadership was neither hereditary nor politically determined and family units shared sustenance, with no social classes the authority for enforcement of egalitarian intolerance was engrained into the band or clan structure by a kinship that provided the mechanism for its enforcement.

Attributing such a display of the power of the kinship in prehistory is not to be viewed as unusual. When some brave souls in other global locations did decide to leave their nomadic egalitarian cage, it was not because of attractions elsewhere; it is proposed here that this was done to escape an unsatisfactory social environment at home, an escape from egalitarianism and a theme to be repeated in this book. They were not going to; they were leaving from. From wherever humans first appeared on earth, they did not, like bacteria, form an ever-enlarging colony; they instead dispersed at every opportunity, ultimately to every corner of the globe. But for the Australian aborigines, once arrived, sea level changes caused them to disperse no further. Perhaps external dangers or an arid climate kept them from dispersing in family units; maybe safety resided in bands. This may have increased the hold of kinship on restricting personal choice: to remove oneself from the security of a band may have been considered a dangerous choice, danger coming from either the environment or marauding bands. There was no place to which they could escape. Without commerce no urbanization could occur to which they could apply.

Of pain and debility, mankind’s perpetual motivation for self-improvement, nothing appears to have been developed in Australian aboriginal society that suggests the presence of medical practitioners. Even shamanism is barely in evidence except in its modern

reincarnations. Local empirical treatments, including some herbs and mud casts for fractures, in most instances would probably have been provided by a knowledgeable family member or friend. The local person who pulled teeth or set bones was probably viewed merely as a useful technician, not one who heals with knowledge. But based on present knowledge, that medicine as a specialized skill “just didn’t occur to them” cannot be used as a criticism, for it also did not occur to any other nomadic population or to any of the twelve lesser civilizations described in the preceding chapter. Medicine as a specialization would not appear until urbanization was under way, a major point being made in this book. Had Australia and its aboriginal population remained undiscovered, another 50,000 years would likely have passed without a change in its nomadism and without improvements in medical care, health or life expectancy.

A nearby example that duplicates much of the foregoing occurred in Tasmania. When the land-bridge between the Australian continent and Tasmania was lost because of the rise in sea-level of the post-glacial era, the aboriginal population of the island was isolated from other human contact for 10,000 years until visited by European settlers.³ This population has been considered the least technically advanced of all prehistoric societies, one investigator concluding that there were only thirteen tools (e.g., spherical pebbles for throwing, digging sticks, throwing sticks, wooden spears) used in procuring food that would separate their culture from chimpanzees, a separation considered “narrow.” Whether prehistoric Tasmanians could even start a fire remains a debatable point.⁴ With no social classes, the only organizational structure of the nomadic hunter-gatherer Tasmanian society was the clan, usually numbering from 20-50 persons, although territorial delimitation was assigned to a group of clans that were assumed to belong to a larger common kinship. The difficult life of ancient Tasmanians has been reviewed by the eminent anthropologist, Dr. Robert Edgerton.⁵ It is awkward to assign the term “egalitarian” to a society such as the aboriginal Tasmanians, for evidence indicates a gross inequality among the population, especially the harsh existence of women and the frequent violent raids for women and for food, despite an environment that, unlike the Australian continent, is considered to have had abundance. But egalitarian kinships are rarely egalitarian in the sense of being a group in which all members are treated as equals. It is understood that age- and gender-based inequalities are inevitably present in egalitarian groups, elders being favored and women subject in varying degree to domestic abuse and violence, and that violence in general is commonplace.⁶ Clans are egalitarian

³ An important source of information in this section is: Roth, H. L., *The Aborigines of Tasmania*, Hobart, a ca. 1970 reprint of the second (1899) edition.

⁴ For a recent review of this topic as it relates to the capacity to improve lifestyle see: Haidle, M. N., *Lessons from Tasmania – Cultural Performance Versus Cultural Capacity*, in *The Nature of Culture: Based on an Interdisciplinary Symposium “The Nature of Culture,”* Tubingen, 2016, Haidle, M. N., Conard, N. J., and Bolus, M., editors, pp. 7-17.

⁵ See: Edgerton, R., *Sick Societies*, New York, 1992. Dr. Edgerton considered the poor and often brutish conditions of primitive society a generic manifestation of maladaptation to circumstances, but the cause of maladaptation was not identified. To attempt that identification one must first distinguish among the defects of egalitarianism: the absence of hierarchical controls that restrain violence, the destructive effect of redistribution on motivation, and the presence of nonviolent coercion that restrains individualism. Dr. Edgerton was focused more on the first. More on this matter is found on p. 282 of this volume.

⁶ Some perspectives on egalitarianism in this section are discussed in *Oxford Studies in Political Philosophy*, Oxford, 2017, volume 3, David Sobel et al., editors.

in that, to serve the greater good, there is a redistribution of labor, redistribution of essentials, and no social class. With no mechanism to restrain bullies or those vying for influence, personal differences can be more readily resolved by force than by reason. Although anything produced or captured is supposedly for the welfare of the group, perhaps Tasmanian men ate more nutritious food and labored less than the women because the men felt they had to be fit and ready to defend the clan. Such details are unknown. But in an environment that might have been a little Garden of Eden for a socially acculturated population, the rules of the clan turned Tasmania into a Hell, especially for the women.⁷ For 10,000 years there was not a single sign of betterment for society, and it is even thought that the ancient Tasmanians lost some of the more advanced practices they brought with them from their continental Australian forebears. They had, in fact, regressed.

And that brings up the point of this excursus and a point highlighted in this volume regarding all early and primitive societies: egalitarian kinship as a potent force resistant to change. The problem is not the degree of violence inflicted by some members on others, for there was little choice but to work within the existing system. The problem is not the nastiness of life in an egalitarian prison. If a man or a male-directed subgroup decided to leave the security of the band it would either not survive, merely join another band, or become a band unto itself. The greatest problem for the egalitarian band is egalitarianism itself, not its susceptibility to turmoil. Although turmoil and a short life expectancy bedevil the egalitarian society, the most profound inhibition to progress was the necessity for every member to work for the common good, under coercion when necessary. Working to improve one's lot in life or to make oneself less miserable than others in the kinship was not possible. Without hope of improvement and with escape from the clan an unacceptable alternative, it is a wonder that this situation did not persist forever. One might even view the Australian and Tasmanian aboriginal experiences as evidence that it could. The isolation of that continent and nearby island has provided us a test case whereby we can see the importance of social construction on the brilliant species of *Homo sapiens*, that species capable, on the one hand, of remaining unswervingly attached, without change, to its nomadic bands and clans for many thousands of years, come what may, and on the other hand, separating from the bands and clans and sending man to the moon, splitting the atom, and devising instantaneous communication around the entire planet, all this being accomplished within three centuries. Please see Figure on the following page for the antithesis.

This excursus is not meant to explain why Australian aborigines remained nomadic. It is, instead, to explain that they had a choice, although a choice that they considered unacceptable. But it underscores the astonishing uniqueness of *Homo sapiens* and the consequences of departure from the band on the capacity to think and act as an individual

⁷ Even reports of 18th C French explorers, while describing an intrinsic courtesy and interest by Tasmanians in their interaction with the explorers, mention the difficult tasks assigned to women while the men were not so tasked. And pertinent to life expectancy, when they met a group of about 60 Tasmanians, an estimate of individual age ranged from infants to roughly thirty-year-olds, but for one fifty-year-old man.

for personal interest. But to do this those egalitarian bonds needed first to be broken.

End of excursus



Fig. 18: From the Museum of the American Indian in New York City: (Left) Two Clovis projectile points from Washington county, New York, dated to about 10,000 BC. Made from knapped flint, it is proposed that the Clovis design spread across North America in but two or three centuries. (Right) A scepter of the Mississippian culture found in Le Flore county, Oklahoma, also made from knapped flint about 1200 AD. In a little more than 11,000 years technological advances permitted things to get bigger but not better. Photographs by the author.

It is suggested that the absence of evidence of early medical organization in the twelve lesser civilizations, if subsequent study confirms that to be true, was, as is the case of the culture of nomadic egalitarian groups, the consequence of choice, not ignorance, the choice being to remain within the security of the kinship or to risk destruction outside it. It was a selection that had the effect of rejecting change. Members thought they were merely accepting a sensible system of social control and mutual assistance. The stultifying effect of egalitarian kinship was not recognized because there had never been an alternative. This will be discussed at greater length below in the context of efficient use of resources and the role of food surplus and commercial ventures in assisting the birth of progress. But for the moment it is sufficient to propose that primitive societies remained primitive for many centuries, even for thousands of years, not because of any

inadequacy of intellect but because of a social prison that they purposely constructed and in which they unknowingly incarcerated themselves, a prison in which they themselves were the jailors, and often nasty ones at that.

B. Longevity (life expectancy)

A demographic factor relevant to progress is the age of a population. By this is not meant maximum life span, which is defined as the number of years a person is able, likely or not, to reach. Presently that age is thought to be about 120 years, the limit to which the physiology of the human body is not expected to exceed. In a sense any death occurring at an earlier age is premature. It is generally agreed that this measure has been unchanging for humans over recent millennia. More relevant to the status of a society, however, is the life expectancy for each individual born into it. As a demographic, a number of variables enters the calculation of the average life expectancy of a society, an important one being infant and childhood mortality. These young deaths are consistently high in primitive, ancient, and poorly governed societies, and if the calculation of the average age at death for a community includes deaths in infancy and childhood, the mean life expectancy of the total population, skewed by inclusion of that early peak in premature deaths, will differ greatly from the average duration of life of those that survive to adulthood.⁸

As the variables in demographic analyses are many and often difficult to quantitate, this has given rise to complex statistical methods by which estimates of life expectancy are derived.⁹ Because of limited data for present discussion, a recent summary of life expectancy according to archeological era has been published as derived from a paper by Doctors MacLennan and Sellers that discusses age at death of ancient populations:¹⁰

Era	Life Expectancy (yrs.)
Paleolithic	40 or more
20,000-6,000 BC	under 40
Neolithic	25-28
Bronze Age	24
Iron Age	?40
Classical Age	66-72
Dark Ages	36

⁸ The mathematical “mean,” or “average,” is the value obtained by dividing the sum of a data set by the number of data in the set, not the mode (the most frequent value in a data set) or median (the middle term in a data set). For a better understanding of the complexity of the subject of life expectancy, see: Hacker, J. D., *New Estimates of Census Coverage in the United States, 1850-1930*, in *Social Science History*, 37:71-101, 2013. And to further complicate the issue, the modal age at death is now being proposed as a superior gauge for comparing health outcomes in modern nations with relatively high populations of elderly.

⁹ See: Hoppa, R. D., and Vaupel, J. W. (editors), *Paleodemography: Age Distributions from Skeletal Samples*, Cambridge, 2002.

¹⁰ See: MacLennan, W. J., and Sellers, W. I., *Ageing through the Ages*, in *Proc. Royal College of Physicians*, 29:71-75, 1999.

If these figures in any way approximate the true nature of life expectancy in ancient societies, it should be no surprise that foci of organized medical knowledge are not found prior to the Classical Age except in the four primary civilizations discussed in chapters 3 - 6 of this work, for perhaps only in major alluvial regions could a civilization's population become large enough to have sufficient older members, and therefore experience, in close contact with each other to make organized medical thought possible. The numbers in the above list, however, are extracted from an article that does not present the mass of raw data from archeological excavations. They are, instead, very limited samples containing few data points that are provided by the authors as examples of their respective ages, rather than the mass of data points sometimes obtained from large inhumation sites. But even with such data there is no way of knowing how closely the inhumed represent the total population of a community, nor can statistical findings be adjusted to account for unpredictables such as epidemic disease or warfare.^{11, 12} In prehistoric cultures discussed in the preceding chapter, for example, limited data are provided for the Terramare Bronze Age culture in Italy, where the average age at death of men and women in one site was at least 40 years, somewhat longer than that listed above for the Bronze Age, as were some Old Kingdom Egyptian (2650-2150 BC) burials: 36 years. But a critical review using specific criteria and ancient European sites supports

¹¹ Those injured or killed in battle often can be identified by archeological study, but the lethal consequences of war to noncombatants are unable to be differentiated from the pathologies of other times except in their quantity. How much is unappreciated of the full consequences of warfare. A true accounting of the tragic history of the common man, the detritus of families, the deaths of infants, helpless children and the infirm, starvation, slavery, all left in the shadow of great events, remains, and will probably always remain, unknown and, sadly, unacknowledged. This, of course, is one impetus for the present work.

¹² See: Boldsen, J. L. and Paine, R. R., *The Evolution of Human Longevity from the Mesolithic to the Middle Ages: --An Analysis Based on Skeletal Data*, in *Exceptional Longevity: From Prehistory to the Present*, Odense, 1995 (updated in 2000 by V. Castanova), Jeune, B. and Vaupel, J. W., editors, pp. 25-36. It is notable that females had a significant decline in survival during this period. As for males, assuming a mortality of 50% in infancy and early childhood, of ten male newborns, five might live to age 20 years, of which two might live past the age of 32.5 years, of which one, with luck, might live to 49 years or more. It has been pointed out, therefore, that with statistics like these few prehistoric children knew their grandparents. The situation was actually worse, for recent statistical demographic analysis of Classical antiquity, which included references to cemetery stele and the like and therefore more wide-ranging than the ages of the rich and famous, has pointed out the frequency of fatherlessness (with motherlessness not far behind). On average, about half of those reaching 20 years of age had lost their father. See: Scheidel, W., *The Demographic Background, in Growing Up Fatherless in Antiquity*, Cambridge, 2009, S. R. Hubner and D. M. Ratzan, editors, pp. 31-39. And excavations of almost 700 skeletons from the prosperous Greek colony of Metaponto located in the south of Italy indicate that in the 7th-2nd C BC life expectancy at birth was in the 20's and age at death having reached 15 years of age was 40 years, far short of the estimate for the Classical Age given on the preceding page (see: Henneberg, R. J., and Henneberg, M., *The Diet of the Metapontine Population as Reconstructed from the Physical Remains*, in *Living Off the Chora: Diet and Nutrition at Metaponto*, A. Prieto and J. C. Carter, editors, Austin, 2003, pp. 29-36). In Neolithic Orkney Islands, data from hundreds of burials show the additional life expectancy of 15-year-old boys to be 13 years (average age at death: 28 years) and pubescent girls to be only 9 years (average age at death: 22 years) and only four out of ten were over 12 years of age. (See the remarkable book of J. W. Hedges, *Tomb of the Eagles*, New York, 1987, for the extraordinary story of the ancient Orkney Islands, especially the section on Tribal Orkney I.)

the conclusion that, from approximately 7,000 BC to the classical age (500 BC) the chance of a 20-year-old man surviving beyond 32.5 years was fairly stable at 40%.¹³

Most osteoarcheological studies have as a goal a clearer understanding of the health status of a population. The classic paper by Angel, based mainly on skeletal studies of ancient Europeans, included not only assessment of life expectancy, but also data on stature and pelvic inlet depth, both reflecting aspects of health status. In addition to suggesting that paleolithic man was in general healthier and longer-lived than agrarian man, there was a very modest increase in life expectancy in Hellenistic times that succeeded the age of Classical Greece, the age of Hippocrates.¹⁴ The issue at hand, however, is to determine to what age a sufficient number of adults of a population need to survive in order to provide a productive workforce that can sustain both family and culture and provide an institutional memory to instruct and guide its younger members.

While most references to life expectancy in the world's past and present populations require complex statistical manipulation that adjust for both the many variables and the insufficiency of data that can affect the final result, the requirements for present purposes are relatively few. They are: (1) only the ages estimated by study of adult skeletal remains from inhumation need be used for calculation, (2) randomness of those data should preferably be limited to plebeians in the population, with obvious wealthy or elite status being grounds for exclusion as being less likely to represent life expectancy of the population as a whole from which non-elite community specialists (including medical practitioners) would emerge, and (3) size of the population being studied, as well as its variations in density, values usually obtained from study of dwellings and estimating the number of individuals who may have lived therein. The

¹³ Life expectancy if one reached the age of 20 years in the United States, as detailed in the 1852 census, was 40 years, the average age at death being, therefore, 60 years (average of men and women combined) in Massachusetts, and for "colored" men and women in New England it was 36 years and 40 years, respectively, the average age reached being 58, whereas the same statistic for the ancient European sites based on 40% of twenty-year-olds reaching 32.5 years would be in the range of 30 years, barely one-half the 1852 data.

¹⁴ The average age at death of prominent Greek personages has been estimated at *ca.* 70 years. The Gerousia in Sparta required its members be over sixty years of age, and many prominent Greeks are known to have been seventy years of age or older (Sophocles lived to age ninety). In contrast, the early study of J. L. Angel (*The Length of Life in Ancient Greece*, in *Am. J. Gerontology*, 18:18-24, 1947) found the average age at death to be about 40 years, and an extensive study of workers in Imperial Rome indicates an average age at death of about 30 years (see *Bones: Orthopedic Pathologies in Roman Imperial Age*, New York, 2015, Piccioli, A., *et al.*, editors). And of 880 late Holocene inhumations in Indian Knoll in Kentucky (estimated at 3,000-2,000 BC) only one skeleton was judged to be that of an individual over fifty years of age. In predynastic Egypt (Naqada) only one skeleton out of 266 examined was felt to be over sixty years of age, and in *ca.* 1500 BC there was a similar age distribution. There are many who believe Classical Greece life expectancy was significantly longer than that of prehistoric civilizations based on statistics such as this, but hard data on the point are few. The variables necessary to calculate life expectancy in various ages are many, so all that can be said is that the larger the population the more likely it is there will be a larger number of individuals whose life experiences could be useful to survival. The presence of many prominent persons who might be expected to live longer on average than plebeians may in fact reflect an increase in life expectancy of the general population, but for Classical Greece it remains an assumption. In the absence of writing, oral transmission of experience is especially valuable if there is to be any hope of progress, for otherwise new and useful observations vanish in a generation or two.

weakness of this approach is in sampling, for calculations are almost always derived from a miniscule and nonrandom sample, and in the state of preservation of specimens.

It has been proposed from data reviewed in volume 1 of this work that the time necessary for an urbanized society to develop a reasonable grasp of clinical medicine basics, meaning recognition of syndromes, the body's responses to acute injury, a concept of infectivity, contagion and its prevention, basic principles of physiology, and judging the effectiveness of therapies, is in the range of a few hundred years. How does the age of the population affect this value?

Taking as an example the Djenne-Djenno civilization (see p. 178) which flourished for about 600 years, there is no evidence of medical practitioners. This is unexpected because a pan-Mediterranean civilization (the Roman Empire, Western and Eastern) and an Egyptian civilization were roughly 2,000-3,000 miles away from this major trading center that had a population at its peak of perhaps 50,000. Yet there is no evidence of contact by Djenne-Djenno with either civilization prior to the arrival of Islamic influence in the 11th C AD, a time that coincided with the city's deterioration. Up to this point the civilization was thriving, self-sufficient, and enlarging. In view of the evidence for a general prosperity in Djenne-Djenno over many centuries and the lack of evidence for a coercive political hierarchy, what features might have restrained development of an early medical profession?

- a. One is low life expectancy. Just how close the cited average of 31 years of age at death comes to the true value for adult plebeians in Djenne-Djenno is unknown, but it is consistent with all the other ancient sites from which the data are better. There would have been few adults old enough to have acquired significant medical knowledge worth passing on to younger members and fewer still with whom an older knowledgeable person could consider collegial peers.
- b. Demography interacts with other social features. Egalitarian kinships throughout Djenne-Djenno would have assigned roles, duties, and obligations to their members, and an environmentally partitioned civilization like Djenne-Djenno with its residential mounds would have maintained traditional kinship duties and obligations within households while at the same time working within boundaries set for commercial production. In other words, even if a person should live to forty or fifty years, the status assigned by kinship would have had priority over other activities and the chance of developing a peer group focused on any innovative venture must have been slim.
- c. The social class is important. Although Djenne-Djenno had no obvious ruling class, some of the population had superior status. In a hierarchical society it often happens that the life expectancy of the elite classes tends to be significantly greater than that of the plebeians. In the presence of an elite population that is spared some of the toil and danger and is the recipient of a proportionately greater share of the society's productivity, it follows that a hierarchical society will have more older members than an egalitarian one. But it is thereby obvious that neither form of governance, egalitarian nor elitist, is likely to favor development of a network of medical practitioners: the egalitarian society will have no individuals it wishes to spare, or those that are available will have few years as a mature adult in which to acquire sufficient practical wisdom worth exchanging with others, whereas the

elite, although longer-lived, will have no interest in doing a plebeian's work.¹⁵

- d. But when people are more safe and the food supply is better this brings another benefit: a larger population. A more secure food supply and a settled lifestyle that characterized the switch to an agricultural and then a commercial society might improve fecundity and lower neonatal and early childhood mortality. Another valuable consequence would be an increase in the general population and thereby in the absolute number of more mature and experienced. That proportion may not increase, but with a growing population in a defined space there would be a greater density of elderly. Interactions among the more knowledgeable segment of the community (*i.e.*, the older population) would be more likely and more information would be shared, if for no other reason than being a manifestation of the increased social interaction that is a concomitant of urbanization. The greater density of those longer-lived individuals would be expected to improve linear passage of acquired wisdom so that each succeeding generation would be better able to avoid dangers and to benefit from the historical experience of elders.
- e. The size of one's social group also influenced personal choice and thereby innovation. The outlook for those few who became elderly in hunter-gatherer bands was not good. As the injured and infirm aged and became a hindrance to the group and physically contributed little to its survival, they would not receive group benefits. Although this did not always happen, the great variety of ways by which hunter-gatherer groups shed responsibility for the elderly has frequently been catalogued, and geronticide is a well-recognized solution in many areas.¹⁶ In not so ancient times, for example, some Pacific atoll populations would release such persons on a separate but otherwise uninhabited island apart from the rest of the population. Village young people would then be assigned to periodically visit that island to replenish its food supply, but otherwise there was no assistance provided. Although geronticide may have eased physical burdens on a small band or tribe, knowledge was lost because of it. By casting away the elderly infirm, options for action would be limited by the inexperience of the myopic young, a further hindrance to progress. But with the change to an agricultural and sedentary way of life the elderly could now be useful at home doing many of the more monotonous tasks related to daily living. This would have applied to Djenne-Djenno. In any case, the few burials of elderly found in prehistoric times may sometimes reflect the practice of isolating or leaving behind those who were burdens to society; *i.e.*, they may have received no burial, merely being left behind with a parcel of food. This was no Garden of Eden.

¹⁵ In ancient Greece apprentices starting at an early age learned medicine from existing practicing physicians, but the new primary civilizations described herein would have no prior experience with "physicians."

¹⁶ See: Brogden, M., *Geronticide: Killing the Elderly*, London, 2001. There is no one section of the book that can be highlighted as a summary, for documentation of a subject, more comprehensively termed "death-hastening" and seldom popularly discussed, is extensive.

 Excursus on Eden

“And the Lord God planted a garden eastward in Eden; and there he put the man whom he had formed.”

Genesis 2: 8

Modern lifestyles in the West and in culturally similar countries, regions, and cities around the globe have produced a level of convenience, security, a prosperity for so many people over recent generations that, despite the billions who share little of that abundance, it may seem, especially to the younger population, that prosperity has always been with us, was deserved and inevitable, the natural state of things, and will, with the digital age upon us, remain so. A future without limitations or cares, a secular Eden on a global scale, is eagerly anticipated and is impelling ideological political thought, although overt and pending hazards periodically dampen enthusiasm.

One marker that supports faith in such a future is life expectancy. Biblical statements declare 120 years to be the expected duration of life for humans, and over the past two centuries it has risen from 35-40 years to almost 80 years in many countries.¹⁷ There have always been exceptional persons, exceptional in health or exceptional in luck, who far outlive the average for their societies, but to have so many live for so long and so well is a remarkable fact of modern times. This has never previously happened. Perhaps this *is* the path to a secular Eden. Pertinent to that path and to the purpose of this book is human progress, and life expectancy can be viewed as a measure of human progress.

But first is the issue of priority. Should the increase in life expectancy of modern times be attributed to progress, or is progress merely an inevitable consequence of an enlarging population of older, and thereby wiser, members? The wisdom of the patriarch, the sage, old wise men and women, church elders, oral histories, and biblical declarations (Job 12:12 – “Is not wisdom found among the aged? Does not long life bring understanding?”) has reportedly been objectively confirmed.¹⁸ Is a society where children usually do not know their grandparents inherently disadvantaged? If so, then most societies since the first man and woman have been so disabled, and this might explain the slow evolution, perhaps tens of thousands of years, of progress among humankind. And it is true that there are two periods that are usually considered to have significantly longer life expectancies: modern times (proven) and the Classical Age of Greece and Rome (unproven). As the present volumes propose, these two eras are credited with great success in advancing human progress, and if a larger mature and experienced population can be shown to inevitably explain the periods of progress, then this, the present volume, has been a waste of time. The issue is readily resolved for modern times, for life expectancy and population should increase prior to evidence of progress if progress is their inevitable consequence rather than a cause. A recent analysis confirms a significant increase in European populations by 1850, first evident in western Europe and then in

¹⁷ See: *Genesis* 6.3. But the conclusion about lifespan is not without its critics.

¹⁸ See: Li, Y., et al., *Compensating Cognitive Capabilities, Economic Decisions, and Aging*, in *Psychology and Aging*, 28:595-613, 2013.

eastern Europe.¹⁹ Using a significantly increased life expectancy as it relates chronologically to new health-related practices, Europe at baseline (1770s) did not have a significant increase until 1900, and this includes a significant decrease in infant mortality.²⁰ As medical progress and movement toward the natural state of medical practice began in 18th C Europe, these data confirm that progress in Europe, and subsequently in the global populations, preceded population growth and increased life expectancy.²¹

There is some scholarly debate about life expectancy regarding the merits of a Paleolithic hunter-gatherer diet over a Neolithic agriculturalist diet, with evidence that the former resulted in longer-lived and healthier humans. Both the hunter-gatherers and the agriculturalists, however, still had a life expectancy shorter than gorillas and orangutans. This seems odd in that the human brain is given great credit for mankind's 19th C "survival of the fittest" narrative to the point where he has obtained mastery over virtually every facet of the planet, whether animal, vegetable, or mineral. Such dominance has been declared or is implied as proof of a genetic *tour de force*, survival in the best Darwinian sense, that has produced a rise in posture, stature, and nature from four-legged forebears illustrated so frequently in cartoons, by some sort of triumphant yet inevitable consequence of the blind chance of a Big Bang, producing gradually more upright, taller, and brighter human specimens, each little development of each of the big and little bones of the shoulder and spine and feet, each millimeter in height, each point of the Intelligence Quotient, each additional neuron coming into play slowly by molecular selections of infinitely small gradations in survivability generation after generation for millions of years, perhaps with infrequent leaps and bounds by "punctuated equilibrium," to improve mankind's chance of survival in life-or-death competition with other earthly life-forms and myriads of environmental threats that would finally lead to an increase in life expectancy countless thousands of years in the future, specifically our 19th and 20th centuries. What a masterstroke of luck that our ancient forebears accommodated such an extraordinary sequence of events for us, and what a misfortune that they knew not what was occurring.

How did this all begin in the first place? What set the continuum in motion that stealthily led, over fifteen million years, from the two-foot tall, four-legged, forty-pound *Proconsul africanus* to *Homo sapiens*? If the human species has exhibited, society-wide, a level of intelligence that has been both unchanging for millennia and universally similar, how is it that a "survival of the fittest" theory can explain the following: that as early as there is objective evidence, primarily from osteology and going back to Paleolithic times, human life expectancy is routinely found to be in the range of 30-35 years, a finding that changes

¹⁹ See: Max Roser (2018), "Life Expectancy." Published online at OurWorldInData.org. Retrieved from: 'https://ourworldindata.org/life-expectancy' [Online Resource]

²⁰ See: Riley, J. C., *Estimates of Regional and Global Life Expectancy 1800-2001*, in *Population and Development Review*, 31:537-543, 2005, and Haines, M. R., *The Population of Europe: The Demographic Transition and After*, in *The Encyclopedia of European Social History*, Encyclopedia.com, 10 December 2018.

²¹ Complexities of demography are great, however, and just how much benefit can be ascribed to medical progress and to other factors is a matter of debate, but not here.

little until modern times.²² In a related observation, the infant mortality rate of gorillas in the wild (*i.e.*, mortality in the first three years of life, including stillbirths) varies considerably although 25% may be a reasonable approximation. But a recent textbook states that Paleolithic humans (9000 BC) had only a 50% chance of survival to age 15, and study of a Bronze Age inhumed population in 500 BC Italy revealed that from 33-50% of the interred were under 5 years of age.²³ Such an abbreviated life expectancy and early childhood mortality in a biological body that is thought to permit living to an age well over 100 years does not seem to be a positive indicator of superior survivability, especially as gorillas, chimpanzees, and orangutans have a life expectancy of 35-50 years in the wild and 50->60 years in captivity.²⁴ And yet at Indian Knoll, a permanent prehistoric habitation site in Kentucky that flourished between 3000 and 2000 BC, a recent reanalysis of data has concluded that, of an interred population over centuries of 880, only one was deemed over fifty years of age.²⁵ The Neolithic hunter-gatherer of the

²² See: Angel, L., *Health as a Crucial Factor in the Changes from Hunting to Developed Farming in the Eastern Mediterranean*, in *Paleopathology at the Origins of Agriculture*, Orlando, 1984, M. N. Cohen and G. J. Armelagos, editors, pp. 51-73. This informative paper has been updated in many ways, but the definitions of life expectancy are so varied, vague, or unstated, that it is difficult to group findings from different papers into one statistical base. The listing of approximate longevities (in years) of ancient populations provided by Angel can be used as a starting place for a general statement such as is discussed here: Late Paleolithic (30,000-9,000 BC) – 35.4 (males) and 30.0 (females); Mesolithic (9,000-7,000 BC) – 33.5 (males) and 31.3 (females); Early Neolithic (7,000-5,000 BC) – 33.6 (males) and 29.8 (females); Late Neolithic (5,000-3,000 BC) – 33.1 (males) and 29.8 (females); Early Bronze Age (3,000-2,000 BC) – 33.6 (males) and 29.4 (females); Middle Bronze Age (2,000 BC and for varying periods afterwards) – 36.5 (males) and 31.4 (females); and Early Iron Age (1,150-650 BC) – 39.0 (males) and 30.9 (females). (Note that dating of major divisions of the Stone Age vary.) Taking a more specific study for comparison, a well-defined population from a Late Neolithic tomb in Spain dated to 3,700 BC had an average age at death for 38 individual skeletal remains as follows: 17 were “subadult” (under 20 years of age) and 21 were “adult” (over 20 years of age). The mean age of the latter group (male and female grouped) was 30.5 years (determined from the average of the individual age ranges reported, minus 7 adults in whom an age range was unable to be determined. Violence was not the cause of death, and they “exhibited a moderate number of pathologies.” See: Alt, K. W., et al., (2016) *A Community in Life and Death: The Late Neolithic Megalithic Tomb at Alto de Reinoso* (Burgos, Spain), PLoS ONE 11(1): e0146176. Doi: 10.1371/journal.pone.0146176.

²³ See: Stockwell, E. G., and Groat, H. T., *World Population: An Introduction to Demography*, New York, 1984, and Tafuri, M., et al., *Diet, Mobility and Resident Patterns in Bronze Age Southern Italy*, in (unable to identify), pp. 45-56, 2003.

²⁴ The Center for Great Apes reports the following life expectancy (in years) for gorillas – 40-50 (wild), 50-60 (captive). Type of gorilla not stated. The National Geographic Institute reports 45 years for chimpanzees (wild), type not stated. Other estimates include orangutans as 35-45 years (wild, with maximum observed being 53 for a female and 58 for a male) and baboons as 30-45. Some local reports give significantly shorter survivals than these estimates, but the difference is generally in the range of only 5-10 years. And a study of chimpanzees in the Mahale Mountains (Tanzania) indicate female fecundity greatest between ages 20-35 years. (Nishida, T., et al., *Demography, female life history, and reproductive profiles among the chimpanzees of Mahale*, in *Am. J. Primatol.*, 59:99-121, 2003.) In Dr. Dian Fossey’s book, *Gorillas in the Mist* (Boston 1983), appendix C, 9 gorillas on whom autopsies were performed that did not die from poachers included one that was between 50-55 and the other between 55-60 years of age.

²⁵ See: Johnston, F. E., and Snow, C. E., *The Reassessment of the Age and Sex of the Indian Knoll Skeletal Population: Demographic and Methodological Aspects*, in *Am. J. Phys. Anthropol.*,

Jomon people of Japan had an average age at death of 36 years if those individuals managed to survive to age 15 years; more recent hunter-gatherers of the Japanese Neolithic who survived to age 15 years had an average age at death of 44 years.²⁶ Very premature death at every age category seems to have been unavoidable until the last two centuries. A reasonable conclusion is that survivability of our early ancestors, or even their first appearance, is not the consequence of a preceding period in which gradual expression of a superior fitness was operative generation after generation. If so, those ancient humans might early on have approached that 100-year life expectancy as a consequence of their superior attributes and survivability, primarily the complexity of their brain, that their ancestors lacked. Instead, the complex brain of *Homo sapiens* seems to have provided no survivability benefit at all. Evidence even suggests that the life expectancy of early Upper Paleolithic man (considered “modern” man) was no greater than that of roughly contemporary Neanderthals.²⁷ It almost seems as if humans had not been biologically evolving to inhabit a “survival of the fittest” world, instead just being plopped down in the midst of a dangerous world after emerging from some other state in which their evolution was guided by quite another process, one in which survival was not predicated on confrontation of danger and chaos, one that was perhaps even Eden-like. If evolution of the complexity of the human brain was not a matter of natural selection, one might wonder why it did so happen.

An unanswered question, of course, is, to what use is the elderly population to survival? If the more complex brain resulted from a selective force for propagation of the human species rather than longevity, there might be a Darwinian explanation for its development. That, however, would require evidence for increased fecundity or some other mechanism for increasing the number of births and their survival into child-bearing years.²⁸ If there is no correlation between the two (*i.e.*, brain size/complexity is found to be unrelated propagation), then to what is the modern brain an adaptation? Why did development not follow some other course and inhabit the cranium of a long-lived and peaceable genus such as *Chelonoidis nigra*, the Galapagos tortoise that can live as long as 170 years.

To this end, the fine-tuned biological system that each of us contains so many variables that are susceptible to genetic alteration may have been meant for some other state. What

19:237-244, 1961. Subsequent reassessments have been made regarding techniques, both osteological and statistical, of this unusual population that displayed much evidence of violence, but the rarity of an “elderly” adult in this ancient Native American population, mostly from ca. 3000-2000 BC, is obvious. In the United States in 2016, almost 30% of 300,000,000 people were 55 years of age or older, whereas among the approximately eight hundred Archaic period (8000 – 1000 BC) skeletal remains of Indian Knoll only one was classified as over fifty (see p. 208). The 30% in 2016 can be compared to 0.1% at Indian Knoll, a 300-fold difference or, as usually presented in current popular media, a 30,000% increase.

²⁶ See: Kaplan, H., et al., *A Theory of Human Life History. Evolution: Diet, Intelligence, and Longevity*, in *Evolutionary Anthropology*, pp. 156-186.

²⁷ See: Bocquet-Appel, J., and Degioanni, A., *Neanderthal Demographic Estimates*, in *Current Anthropology*, 54:S202-S213, 2013.

²⁸ One area that would have contributed more to species survival than a bigger brain might have been an increase in fecundity, something impossible to quantitate over the ages, in part because risks attendant to bearing children is blamed for the generally shorter life expectancy of women in prehistoric times, especially for the primigravida. This is one reason why fecundity is not more important in the survival of the human species: its mechanism for success decreases the fecund.

that state might have been has always been the grand question. It is in regard to this that it is appropriate to consider Darwin's conclusion on the construction of the human eye in its complexity and fine integration of functions that permit normal sight.²⁹ His statement was that it seemed absurd to think that such a complex biological system as the human eye could have been the result of a series of selective genetic mutations whereby each genetic change permitted one member of a species to survive where others could not, that survival benefit being the consequence of improved vision or merely by chance. Nevertheless, he considered his theory of evolution, first expounded in 1859, to be so excellent that he believed it was the truth, despite its element of seeming absurdity. One wonders what Darwin would have to say about this were he to return today and see the true complexity of the eye and vision as far as modern science has been able to ascertain it. That complexity is so incredibly vast and multifaceted, from the simple optics of refraction to the intracellular production of innumerable species of proteins that make up the eye's tissues and fluids, that modern knowledge cannot be mentioned in the same breath with the simple concepts of the mid-19th C of Darwin. And even now we know our knowledge of the entire process of vision to still be at an elementary stage. Were Darwin here today and aware of all that has transpired in modern understanding, perhaps he would revert to his original position.

And think again about mankind's increase in life expectancy that has occurred only over the past 200 years. There is no evidence of a gradual increase in life expectancy over hundreds of millennia to match the gradual or intermittent march posited in cartoons for early hominid to upright man. Prior to the 19th C life expectancy was in the range of 35 years for the average person, even since the beginning of mankind itself, give or take a few years as suggested by the modest increase geographically and chronologically localized to the Hellenistic period (323-31 BC) (Table 3).³⁰ It was little different from the average of 35 years during the European Dark Ages. It is not hyperbole, indeed, it is a fact, to point out that mankind has, since its very commencement, been living in a perpetual Dark Age except for the last three centuries. With the exemption of the controlling elites of human society who might live longer than the plebeians, mankind from the beginning has provided little evidence for improved survival because of an ongoing genetic selection favoring some mythical "fitness." Fitness for what? Despite his vaunted brain mankind's life expectancy did not exceed that of the gorilla until 200

²⁹ See: Darwin, C. A., *On the Origin of Species By Means of Natural Selection*, New York, 1860, p. 167: "To suppose that the eye, with all its inimitable contrivances for adjusting the focus to different distances, for admitting different amounts of light, and for correction of the spherical and chromatic aberration, could have been formed by natural selection, seems, I freely confess, absurd in the highest possible degree." Modern biology has integrated Darwinism within the larger scope of genetics that many feel dispels absurdity, but the point is best debated elsewhere rather than here.

³⁰ Life expectancy in the Greco-Roman world is uncertain even though accurate ages of some of the elderly are known. Socrates, Sophocles, Plato, Seneca and Archimedes lived to age 71, 90, 77, 93, and 75 years, respectively, but they reflect the lifestyle of the rich or famous rather than the average worker or mother. Another major unknown is infant and childhood mortality. Phlegon of Tralles in the 2nd C AD wrote *On Long-Lived Persons* in which he claims to have identified seventy individuals in one area of Italy who lived to be older, some much older, than one hundred years, and Pliny also comments on centenarians in 1st C AD Italy, but see T. G. Parkin, *Old Age in the Roman World* (Baltimore, 2003), especially chapter 6, pp. 173-189, for a discrediting of such claims. The Greco-Roman world was vast and varied, and a meaningful single estimate of life expectancy applicable to either Greek or Roman "culture" in that period of history is unavailable.

years ago.³¹ Events suggest instead that man first appeared on this planet quite unprepared for the survival of his species.³² Despite his capacity for brilliance, life has been for most humans very much as Hobbes noted, short and brutish, but not so much from man's unsociable disposition, instead being due to an inability to cope.

Table 3: Mean Stature in Feet and Median Life Span in Years of Humans in Prehistory and History³³

	Mean Stature (ft.)		Median Life Expectancy (yrs.)	
	M	F	M	F
Paleolithic	5.81	5.47	35.4	30.0
Mesolithic	5.66	5.24	33.5	31.3
Early Neolithic	5.57	5.10	33.6	29.8
Late Neolithic	5.29	5.06	33.1	29.2
Bronze/Iron Ages	5.46	5.06	37.2	31.1
Hellenistic	5.64	5.13	41.9	38.0
Medieval	5.56	5.15	37.7	31.1
Baroque	5.65	5.18	33.9	28.5
19th C	5.58	5.17	40.0	38.4
Late 20th C (USA)	5.72	5.36	71.0	78.5

Increased age, of course, cannot be viewed as evidence for natural selection ("survival of the fittest") because at some point increased age and its inevitable infirmities impose a burden to society rather than a benefit, and age-related decreases in fertility obviate any genetic mechanism for fecundity that might otherwise apply, although it might be a marker for other features that are beneficial. It has long been known that the brain of modern man is smaller than some of his proposed forebears and related species such as *Homo neanderthalensis*. Maybe the idea that the size of man's brain has produced his modern mastery of the world has actually been associated with a decrease in brain size rather than an increase.

³¹ Wich, S. A., et al., *Life History of Wild Sumatran Orangutans (Pongo abeleii)*, in *J. Hum. Evol.*, 47:385-398, 2004, reports wild orangutans reaching the age of 58 for males and 53 for females, and for gorillas the "life span" usually given as 35-40 years in the wild and 40-60 in zoos. Hakeem, A., et al., in *Handbook of the Psychology of Aging*, 4th ed., Birren, J. D. and Schaie, K. W., eds., San Diego, 1996, p. 79, states, however, that "Long-term observational data suggest that the maximum life spans for zoo-living and wild primates may be about the same." (Life span is not the same as life expectancy.) The life expectancy of the same species contemporary with ancient civilizations discussed in this book is unknown, but when available data are compared to that of humans shown in Table 3, the point is made: parallel branches on the hominid ancestor tree support the conclusion that life expectancy of humans relative to other hominids is no better and may well be inferior.

³² Unprepared, unless his preparation was not meant primarily for propagation of his species. But if not for that, then for what? An intriguing question.

³³ This Table is modified from that used by: Wells, S., in *Pandora's Seed: The Unforeseen Cost of Civilization*, New York, 2010, p. 23. Measurements of stature could reflect nutritional status.

But, if man's brain and his fecundity were truly associated with a bettering of his status in life, why, given our great expectations and predictions, has his progress been so middling that in the 18th C Alexander Pope acknowledged him "Created half to rise and half to fall; Great Lord of all things, yet a prey to all;... the glory, jest, and riddle of the world."³⁴ Whatever has propelled humankind to its apogee has not been its prehistory and early history, of this we can be sure. And whatever humankind was capable of doing 10,000 years ago, it is no more capable of doing now. But a few hundred years ago something happened, some other circumstance intervened that, after millennia of mankind's milling about in self-imposed incarceration, opened the cage, progress was unchained, with the betterment of the mass of mankind finally improving and doing so at a previously unimaginable rate.

In conclusion, what explains this phenomenon, this sudden appearance of longevity? With human history packed with successes in all sorts of ventures, whether building of empires, climbing mountains, winning great battles, building massive monuments, or growing the largest pumpkin, why is it only now that life expectancy clearly exceeds that of man's fellow hominid, the orangutan? As it turns out, there *is* a path to a secular Eden, a path that is now evident. That path, born of the Reformation (see volume 1, p. 458) and bred by parliamentary process, is characterized by three features: the importance of the individual, liberty of conscience, and freedom of self-determination. Their mechanism of operation and its importance in human collaboration will be discussed in later chapters, but for time on earth, for appreciating the pleasantness that life can offer, for the personal interactions with others that provide meaning and fulfillment, a long life, perhaps even one of Biblical proportions, might be desired and attainable, unless humanity reverts to its unpleasant default state. But why has it taken so long for mankind to realize this path, and will it be permitted to continue the journey? That is a question to be answered, in part, in these four volumes.³⁵

End of Excursus

C: Population size and density

Large city size is apparently irrelevant to mechanisms that induce progress in a society, for there have been hundreds of large cities in prehistory and early history, and prior to the modern West virtually none have been the source of institutionalized progress and none have been the reason for its initiation. Cities may become larger and more elaborate, and monuments, colorful markets, and a fascinating polyethnicity may indicate accommodation, but they do not mean progress. There may repeatedly be small foci of progress in the midst of city bustle, but they become lost in the crowd. A large city, even

³⁴ From Pope's second epistle of *An Essay on Man* (1734).

³⁵ It is curious to note, with regard to Eden, that the calculations of F. A. Hassan (*On Mechanisms of Population Growth during the Neolithic*, in *Current Anthropology*, 14:535-542, 1973) show that, beginning with a single fertile couple and a population growth rate of 0.1 percent per year, the total world population at the time of Hassan's article would have been reached in 20,000 years. And in preparation for the chapters to come it may be helpful to revisit the frontispiece of this volume and its commentary.

if rigidly authoritarian, would not be expected to impede individual medical practitioners, but if those practitioners became organized or a source of wealth authoritarian strictures might appear, as historically occurred with the *Code of Ur Nammu* in Sumer or that of the code of Hammurabi in Babylonia, both discussed on p. 58 of volume 1.

For evolving small cities, however, population kinetics as size increases can have positive consequences. Previously parochial kinships and personal interests now can interact with others and foster new ways of thinking and doing things. The concept of “settlement hierarchy” has been used to explain the tendency of a population to naturally structure itself, with an increasing population leading spontaneously to more complex hierarchical organization as the community adjusts to changing needs. The necessity of organization is expressed in the many special interest groups who will share their unique perspectives or impress their influence on local issues and so contribute to overall development of the community. It is at this point, when the bond of kinship has weakened and there is spontaneous organization of groups that can provide special services to the community, that a medical practice network is likely to appear, and it will appear in the plebeian population.

The demographic point at which egalitarian process and kinship regulation are affected by size has received scholarly attention. It is observed that, given time limitations on discourse, the larger the egalitarian population the more arguments and disagreements occur and the greater the difficulty in reaching a consensus and in maintaining group cohesion. For egalitarian bands as an example, the Dunbar number has been proposed as a population size beyond which social cohesion weakens.³⁶ That number, presently estimated at 150, will vary according to a number of factors, but the concept is of value here not because of the number but because the elements of truth embedded in it provide a reasonable explanation for the initiation of hierarchical controls in societies as population size increases. Whether the hierarchy that evolves is the classical chiefdom, the patriarch and his council, or a “big man” mechanism of social control is not the issue. It is instead the loss of power previously distributed throughout the egalitarian community. Because egalitarianism denies a fundamental right that humans be “agents of their choices,” individualism emerges from the weakening of its grasp.

An analogous situation exists with kinship. It has been observed that, “Increases in the rate of population growth increase the size of kin groups but decrease their inequality and vice versa.”³⁷ This occurs as the kin group, or some of its more politically forceful members, seeks ways to maintain cohesion in response to the enlarging population. Again, the point is that kinship regimentation, *i.e.*, the assigned status of its members, weakens beyond a certain group size.³⁸ Thus both egalitarianism and kinship authority diminish as urbanization evolves, and traditional controls are replaced by new options and alliances. Contributing to this process, at least in evolution of medical

³⁶ See: Dunbar, R. I. M., *Neocortex Size as a Constraint on Group Size in Primates*, in *J. of Human Evolution*, 22:469-493, 1992.

³⁷ See: Hammel, E. A., *Kinship-based Politics and the Optimal Size of Kin Groups*, in *Proc. Nat. Acad. Sci.*, 102:11951-11956, 2005. A model of this consequence of rate of population growth has been proposed.

³⁸ This should not be confused with the “kinships” of brotherhood with a specific goal, *e.g.*, a brotherhood of railroad workers. It has been pointed out that in large cities new kinships abound as humans congregate around a common cause or ethnicity. This kinship is one of friendship and mutual assistance prompted by a common need rather than the term’s use herein as a way of life from birth to death that finds its origin in the relationship between members of the same family.

services, is the presence of more experienced persons in the population, an increase reachable by either increased longevity of the population or increased population density.

The importance of demography in effecting progress should now be clear. Even without any improvement in life expectancy, the mere increase in a focal population size may suffice to concentrate the basic skills and knowledge for progress in specialized fields as people more freely interact once they are liberated from the lifelong constraints of small egalitarian kinships. The five successful civilizations of chapters 2-6 with at least circumstantial evidence of a medical practice network were neither villages nor sprawling metropolises at the time their medical networks began. This excludes that ubiquitous mystic, the shaman, and it does not include the empiric medicine of a family member or friend nor the closeted medical knowledge of midwifery that might be held in common by a group of women in a community, all of which can be found in small societies. This, by the way, is not to diminish the inestimable role of midwifery in the course of human events. That groups of women who looked after their own at a critical juncture in life did not become a formal group of medical practitioners was no fault of theirs. It may still be discovered that early groups of male medical practitioners who are behind the classical medical writings presently under discussion got their inspiration for forming their medical groups and networks from observing the unobtrusive dedication of self-proclaimed midwives. And if ever there is a question raised about the humaneness of *Homo sapiens* in view of its sordid history one merely need point to the selfless midwives who, anonymously, without pomp and without remuneration, have helped or attempted to help minimize the trauma attendant to childbirth throughout the ages.

Interest for the moment, however, is focused on small polities and the minimal size required to initiate and sustain progress, and now an attempt at understanding can at least be surmised. The estimated size of a specialized workforce in which a few men provided medical care for a small local population might be something like the following:

Population to be served by one part-time practitioner	250
Number of practitioners required for the aggregate to develop an organized specialty (or "profession") ³⁹	x 10

Size of population (of all ages) being served	2,500
Percent of population over 20 years of age ⁴⁰	x 40%

³⁹ This arbitrary guess on group size assumes that in a small community a nucleus of a minimum of ten persons might be adequate to maintain relatively permanent communications among at least several in the group for whatever purpose the group might be offering or sharing, whether it is a Rotary, a book club, a child-care service, or, for present purposes, medical novices. Studies of groups point out that primary groups with close personal relations are small but tend to be long-lived, function without leadership, and are inclusive, whereas secondary groups are larger and impersonal with less face-to-face interaction. Size of the former is in the range of 5-10 persons. It is with consideration of optimal size for a local collaborative group to develop that ten was chosen for this calculation.

⁴⁰ The average size of medieval households of peasants was about four, and it was "two generational," meaning there were on average two parents and two children. Household size has been estimated for a number of prehistoric sites, and the average value is also roughly four or five. For a rough estimate of prehistoric town demographics, the number of persons per household is proposed as four, with two children and two adults over twenty years of age. Given an average life expectancy in the low 30s, the number of adults over twenty years of age had a rate of attrition that

Adult population (>20 years)	1,000
Size of elite population (leaders, militia)	- 100
Size of adult plebeian population	900
	/2
Size of male adult population	450
	(10/450) x 100
Percent of eligible men as practitioners	2.2%
Percent of total population as practitioners	0.4%

From this example the number of persons needed to initiate a collegial network for some form of medical care, 10 from a plebeian population of 450 adult males, is a significant (2.2%) part of the eligible population. Thus, the minimum size of a community population is a factor in determining whether there are sufficient adult males in a community who can devote enough time to care for the sick and injured to maintain a dialogue with colleagues, thereby providing an opportunity to initiate a nascent profession. The requisite size of the community used in this example for this to happen is theoretical, but if a few of the ten part-time practitioners are in communication, share clinical observations, and impart their collective experience to novitiates, it might be possible to begin on the slow road to forming a profession and to medical progress in stable communities having but a few thousand persons. The populations of the five primary civilizations identified in chapter 2-6 as having done so, however, averaged about ten times larger, averaging about 40,000 in their nuclear populations. Using the approach tabulated above for a population of 40,000, about 200 part-time practitioners would be needed, or 0.4% of the total population, scattered throughout the growing city. There would be a better chance of a subgroup of practitioners meeting up and organizing if there were 200 in the area of a square mile rather than 10. On the other hand, if ten years were the average practice duration (because of a short life expectancy), the opportunity for collegial accumulation of knowledge would be much lessened. But, in general, it can be hypothesized that, based on experience (the five "successful" civilizations) and theoretical considerations, a central population neither more nor less than tens of thousands is sufficient for a nascent medical profession.

Little has been mentioned heretofore about population density, in part because it is even more phantasmagorical than some of the other parameters. In Table 4 (p. 236) the population density is derived by dividing the largest believable population at the time of interest (*i.e.*, Floruit) by the dimensions reported from archeological studies, and both numbers are highly variable because of poor quality data. The final number does not reflect published scientific estimates for each site because they are seldom available or, if available, are given with significant qualifications that preclude a reasonable generalization.

would gradually lower the adults in a household, whereas if children survived the first five years or so of life, their chance of reaching adulthood was better than their parents reaching the low thirties. Thus the 40% value was chosen.

D. Duration

Once a primitive settlement was established and had expanded into a city-state it took on average about 400-500 years to develop a nascent medical profession in the five successful civilizations, one that could provide a collegial mechanism for progress in medicine. Dogged by their short lives, the early city-state inhabitants had previously relied on a family member or friend for advice on health matters, herbal remedies deemed effective, and botanicals to be avoided. At this point may have appeared the earliest empirical practitioner who would make some cogent observations and perhaps institute generational passage of his knowledge. If there were serial passage of knowledge, perhaps a century would pass as new knowledge accumulated among his descendants. A familial and generational practice of practitioners was born. At different locales throughout the enlarging city-state this could have been repeated to varying degrees until the time came when one of the practitioners would hail another and ask if he had seen people with an unusual rash and fever such as had recently sought his help. The two might then have discussed the possibility of meeting with several other practitioners with whom they were familiar. When the meeting transpired the several practitioners may then have decided it would be useful to all if there were future meetings, thus essentially founding a primitive medical society. After another few generations passed the now “members” may have determined that their experience was decidedly better than that of other types of practitioners. It would behoove them to organize their pooled wisdom, for it would help guarantee that their superior type of practice would invite prosperity, and, now comprising a rather bulky amount of information, they might want to pass on their knowledge to future practitioners. At first this would have been oral transmission, but as the civilization continued to flourish and commerce became more complex, early forms of writing appeared. This practical invention could then have been acquired by the practitioners, the ultimate result being the original form of the classics of medicine attributed to the five successful civilizations.

The fictitious scenario of the preceding paragraph is but one way of speculating on medicine’s earliest days, although some of its particulars conveniently fit with factual observations of the medical profession’s history. These include: (1) the role of certain families being identified as the source of medical practitioners (such as the purported Asclepiad families of ancient Greece), (2) the pooling of knowledge from a number of practitioners that can explain the evidence of a broad experience in dealing with the sick that could not have been accomplished by just one or two medical practitioners who had seen the same disorder or injury in a variety of persons that is a feature of the classic medical writings under discussion, (3) the generous and probably self-serving association of the information in those medical classics with prominent, now legendary, individuals in the distant prehistoric past (such as the Greek god, Apollo, the Yellow Emperor, the sage Bharadvaja, Asclepius, and Imhotep), and (4) the astuteness of some of the observations in the classical writings that indicate scientific confirmation by sequential practitioners.

Admittedly the forced assembly of this jigsaw puzzle into a narrative covering a few centuries is unscientific, but it was pointed out in volume 1 of *The Natural State of Medical Practice* that medical knowledge is cheap, obvious, and quickly, easily, and painlessly obtained. Thus, once under way it would not take many people or much time for medical practitioners and their knowledge to flourish just as the local society was flourishing. A wide window of time is not required for the transformation to take root. Once a *de novo* city-state had reached a stable prosperity (*i.e.*, Floruit), four or five

centuries should have more than sufficed for a nascent medical profession. Obviously, this does not apply to newly developing cities of an empire with preexisting specialization and communication.

E. Prosperity

Who would undertake the responsibility of providing medical care on his own other than what might be requested by family or friends? It is unlikely, given the struggle for existence, that a member of a primitive nonegalitarian community who acquired some medical expertise would otherwise offer his services without some form of compensation. A member of an egalitarian community would not even conceive the idea. It is also unlikely that a community that required total communal involvement to merely exist could produce such a person. The importance of a settled and flourishing community now becomes apparent. With a commercial base in agriculture or in the production of something desirable, whether a tool or decorative bauble, the benefit to a community is two-fold: (1) it can provide wealth and stability extending over generations, and (2) some form of personal benefit could now become available to those who provide useful specialized services. A person who acquired excess grain could trade some of it for assistance, including asking for help from a person recognized as knowing a therapy that might help in overcoming an infirmity. It is necessary, therefore, that a community be not only of sufficient size, but also sufficiently prosperous, to entice the occasional member of the community to initiate a service previously unknown outside the family circle. If this picture is approximately correct, it is unlikely that any medical care could ever have emerged from bands or tribes other than that suggested by word of mouth and implemented by a family member. Their populations were small and their egalitarianism, while it may have ensured that what little was known of medical care was available to all, its quality would never improve. It is the commencement of profitable heterarchical structures within the greater society that would open the door for improvements in daily life and in services obtained by barter.

A possible issue of a minor nature related to prosperity of a polity as it evolves professions is the life expectancy of the plebeian population in general and medical practitioners in particular. As discussed earlier, a useful development would have been a longer lifespan for the individual practitioner. He could then acquire more knowledge, experience, and expertise and instruct more novices. One thing that would improve his life chances would have been a bettering of his personal station in the community, for he then might join the more elite population in sharing the benefits of a less arduous and less dangerous lifestyle and thereby live longer. Thus, prosperity might provide two possible benefits to the medical practitioner: (1) it introduces a profit motive that provides the fuel for entrepreneurship and (2) it might contribute to a longer life in some of the community, including medical practitioners, who can now provide for their personal needs without hazarding the daily dangers confronting the majority of the plebeian population. The last statement has, of course, not been validated, and given the exposure of medical practitioners to all manner of infection, local and contagious, there may have been, on

average, no increase in life expectancy.⁴¹ Finally, if the practitioner indeed personally benefited from a better station in life, the ultimate beneficence would accrue to the general population as medical practitioners improved their skills and knowledge that would be available in times of necessity. That such a distinction could conceivably be significant in promoting intellectual progress may seem absurd, but the mean age at death for males over many centuries in pre-Classical Greece as measured by Dr. Angel was 38.6 years, whereas for Classical Greece it was 42.6 years.⁴² This was enough for Dr. Angel to state “It is clear that a small but definite increase in length of life accompanied the rise of civilization in ancient Greece.” Furthermore, the mean length of life of 83 “men of renown” in Classical Greece was found to be 71 years.⁴³ Social mobility of prospering plebeians leading to an improved lifestyle and life expectancy suggests an increasing length of life, even a modest increase, at least be considered among those factors underlying the initiation of a medical profession. Credit for this must go to the prosperity of early urbanization when it extended to the plebeian class.⁴⁴

F. Demographic conclusions

Despite insufficient data to scientifically prove the point, it is proposed that a concatenation of several demographic conditions need to be satisfied before an adequate nucleus of potential talent is available that would permit the initiation and maintenance of an occupational specialty. This would have been especially so in medicine, for that specialty would have benefitted primarily from the wisdom and experience of those who were older, a feature less important in specialties in which technique was fixed and skill was more important than acquiring new knowledge. For medicine perhaps as few as ten or so members (assuming they were in close proximity, but more if they are dispersed throughout peripheral settlements) would have sufficed to provide medical services for a local population of a few thousand. But if the older and more experienced members of the plebeian segment of society were few, the required size of the population would need be much larger.

A further variable is that the community remain politically stable for an extended period, perhaps three centuries or thereabout. If several prosperous centuries pass without evidence of medical practitioners, it is likely none will ever appear. The civilizations of Catalhoyuk, Poverty Point, and Cucuteni-Trypillia all “thrived” for at least a millennium and left no evidence of medical practitioners. Their way of life precluded that possibility.

⁴¹ A recent study of medical professionals concluded, “Our results are in line with the many nineteenth-century studies showing that medical professionals, compared to other ‘civilized classes’, had a somewhat lower average duration of life.” See: Van Poppel, F, *et al.*, *The Life Expectancy of Medical Professionals in the Netherlands, Sixteenth to Twentieth Centuries*, in *Population*, 71:619-640, 2016.

⁴² See: Angel, J. L., *Length of Life in Ancient Greece*, in *J. Gerontol.*, 2:18-24, 1947.

⁴³ See: Batrinos, M. L., *The Length of Life and Eueria in Classical Greece*, in *Hormones (Athens)*, 7:82-83, 2008.

⁴⁴ But this burden of the common man has persisted into modern times. A careful study published in 1885 found the “rich” class in Budapest had an average age at death of 52 years, whereas for the “middle” and the “poor” the values were 46 and 41 years, respectively (von Korosi, Josef, *Ueber den einfluss des Wohlhabenheit und der Wohnverhältnisse auf Sterblichkeit und Todesursachen mit besonderer Berücksichtigung des Auftretens der Infectiosen Krankheiten*, Stuttgart).

Another requirement is anticipation of personal benefit, usually prosperity, and that prosperity may result from an element of “fee for service,” in which case the medical practitioner, acquiring some form of wealth, might be able to avoid some of the dangers associated with daily living and become longer-lived and more effective in his work. Prosperity would not be limited to a specialization, and therefore this requirement is essentially the development of a middle class.

As the life expectancy of the plebeian population varied little over thousands of years, an increase in “knowledge years” could be obtained only by starting education early (*i.e.*, making the profession familial) or increasing the size of the adult population (far above the “few thousand” mentioned earlier), a slow process that requires a flourishing polity that is able to more widely distribute its wealth in return for purchased services. The father-to-son transmission provided longevity to medical wisdom and permitted the salvage of some knowledge that would otherwise have been lost. To the extent that this is true, the familial closeting of medical knowledge is less a matter of selfishness than it is of pragmatism: one way around a short life expectancy was to begin education in childhood. Viewed thus, the shift from familial professions to free-standing professional groups such as occurred in Hippocratic Greece may have been a consequence of an increase in the wealth among some of the non-elite population as commerce flourished.

Assuming no prior experience with, or knowledge of, such a thing as a clinical medical practice, demographic requirements for initiation of a progressive medical practice, as derived from study of the five ancient “successful” civilizations might include:

1. A collegial network of at least several medical practitioners
2. Several centuries of social stability
3. Prosperity, as evidenced by trade and specialization, sufficient to support medical practitioners working for profit
4. A total population in the tens of thousands, perhaps as low as 10-20,000.

Limited statistics that support this conclusion are found in Appendix A, p. 313.

G. Preceding and succeeding civilizations

Of the five successful primary civilizations described in chapters 2-6, four had long delays between original settlement and evolution to a phase that permitted development of medical professions. If the FORMATIVE and the FLORUIT periods are totaled, the average duration of the four is 1,340 years (standard deviation: 256), whereas the average for the same periods for six of the longest-lived lesser civilizations is 1,640 years (standard deviation: 191), a difference that is marginally not significant ($p = 0.06$) and the difference does not favor the longer duration. This is relevant to the lesser civilizations of chapter 8 because it does not suggest that total duration of a civilization is a significant factor in initiating progress or in initiating a medical network. The reason for lack of progress lies elsewhere.

Consider the course of medical practice in a primary civilization specified as successful. Roughly 1,600 years (4400 to 2800 BC) separate the early Naqada settlements in Egypt from the proposed time of the original composition from which was copied the Ebers papyrus. For most of that time empirical recycling of limited knowledge was taking place, generation after generation passing limited wisdom on to the succeeding one, its

limited value further limited by short life expectancy. New clinical observations and new attempts at remedies surely were made throughout that period, most to be forgotten because there was no network of practitioners for remembering. There was no central locus in which to record that knowledge as it became available, and there was probably no one else in the community capable of doing so. And this is the important point: the idea that there is somehow a gradual communal accretion of medical knowledge over centuries that accumulates to the point it can be considered the organized wisdom of a superior civilization is false. The accumulation of knowledge comes in bursts if the time is right.⁴⁵ But if there is no one to record or otherwise develop and report a new finding at the time, it is likely to be forever lost.

But if there is an organization that preserves the event, whether in writing or in a common memory, the event can live on for centuries. The dramatic flowering of Renaissance art, produced by gifted individuals who are always plentiful in any society, was possible not because a flood of geniuses happened to be born in Renaissance Florence and environs in the 15th and 16th centuries, and not because they were lucky enough to have been selected by their patrons, but because they were provided a degree of individual freedom to pursue their art that included the freedom of networking with colleagues also protected by patrons to inform each other of new works and ideas about that art.⁴⁶

Thus, if the original medical composition of the Ebers papyrus that was copied in 1550 BC is dated to 3000 BC, the data on which it was based was not amassed over the preceding millennium; it was instead collected within a few generations of its writing. It occurred during a brief window of opportunity that was preceded by a long period of linear transmission of medical lore, most of which was lost and the rest of little consequence because it was of poor quality, unverifiable, and succeeded by a Pharaonic Egypt that impressed upcoming generations of medical practitioners into government service.

Applying the same assessment to Sumer, the principal content of the *Medical Treatise of Diagnosis and Prognosis* and the *Therapeutic Manual* has been assumed to represent medical thought in Sumer prior to its appropriation by the Akkadians in 2350 BC. The millennium or two preceding the collection of the wisdom underlying the cited medical texts was not one of gradually accumulated knowledge to be assigned to an entire civilization. Nor is it to be assigned to the succeeding age of Sargon when all Sumer and other city-states were merged into one man's empire. Instead, the wisdom that would be found in the medical classics was collected over a few generations, most likely during the

⁴⁵ It may be helpful to review Fig. 31 in the Epilogue to volume 1 of this work. There is a faint increase in knowledge above background empiricism attributed to nascent medical practice in Sumer and ancient Egypt (to which the present volume would now add India (Indus River Valley) and China (Liangchengzhen)), a larger increase associated with ancient Greece (Hippocratic medicine), and a vast flowering of Western medical knowledge over the last two centuries. Also compare these flourishing periods with the life expectancy of the Hellenistic and 19th C periods as presented in Table 3 (p. 216). If there was an increase locally during the Late Neolithic Period it is undetectable. It is proposed that the periods of longer life expectancy concomitant with the flourishing of medical knowledge indicate a general flourishing of salutary aspects of lifestyle other than medicine, the outbursts of medical knowledge merely reflecting community-wide enterprise.

⁴⁶ They may not have been free as individuals, but, beginning with medieval guilds, venues for artists in training, for exhibiting and selling their works of art, and by virtue of these organizations to exchange ideas. The importance of guilds and patronage is discussed in vol. 1 of this work and recently received scholarly attention in: *Encyclopedia of Social Networks*, Los Angeles, 2011, G. A. Barnett, editor (see *Artists Communities*, p. 57ff.).

Late Uruk or Jemdet Nasr period, *i.e.*, sometime between 3200 and 2900 BC, a period of rising prosperity.

For China, similar estimates, although less reliable, can be made by referring to its prehistoric culture as outlined in chapter 6. The size of settlements of the Dawenkou culture that preceded the Longshan civilization were small, no more than a few hundred persons, and incremental increases in medical knowledge prior to the rise of Longshan culture cities is inconceivable. There is scholarly opinion, however, that the Dawenkou period (4100-2600 BC) represented a formative step in developing the Longshan culture, and the Longshan culture is considered by many to be the principal begetter of Han China, the era of early unification and the Yellow Emperor. The earliest acquisition of medical knowledge has traditional and legendary ties with Longshan culture. Furthermore, the Iron Age Yueshi culture that replaced the Shandong Longshan culture has been clearly associated with a pronounced cultural decline. Thus, both demographically and intellectually the earliest collection of medical wisdom is unlikely to predate 2600 BC Longshan culture, and for reasons mentioned previously unlikely to postdate 2200 BC, the onset of decline of the Longshan culture. It is proposed that these four centuries are the window of time during which a few generations of medical practitioners began to work together as a nascent profession. Legend would be more specific and place its origins before and up to the time of the Yellow Emperor, *i.e.*, 2600-2400 BC. It would have been a time of commercial prosperity and growth in Liangchengzhen before political classes and elite kinships became powerful.

Parallel changes in the Indus River civilization exist but are unfortunately even more vague. The Early Harappan period (3300-2600 BC) was for the most part a time of villages that progressed to city-states during the Mature Harappan period. Given the sequence of social changes, an argument can be posed that a window of time for the original collection of medical wisdom transmitted through the classical clinical medicine texts in India could well have been a sequence of generations sometime during the years of the Mature Harappan culture (2600-1900 BC) of the Indus River civilization. The Vedas are often dated prior to 2000 BC, and many agree that a primitive and as yet undeciphered Indus River script was in use at that time. It was during this period of growing population and commercial prosperity in Mohenjo-daro (or an equivalent size city-state), *ca.* 2600-2300 BC, that medical insights would have been gained and reputation established within the city that would later be interpreted and incorporated into the Atharva Veda.

In summary, it is proposed that the origin of all the classic medical writings of antiquity did not gradually emerge over the ages from this or that great civilization in this or that region now identified with modern nations. Their origins instead are to be found in ancient city-states that had few or no ties with preceding or subsequent civilizations. Their origins are not related to a race, ethnic group, or beloved national identity. They are, instead, somehow related to a system of governance, in all instances the product of a relatively autonomous and generally prosperous commercial city-state. This, of course, is consistent with the situation that existed in ancient Greece and the city-state of Miletos. In a word, they were related to, and we are indebted to, the type of governance that supported or ignored rather than interfered with commercial ventures, thereby promoting prosperity, growth, a middle class, and options for specialization of services.

A window of opportunity appeared as early cities, before hereditary or political interests were involved, spontaneously attempted to establish order in their polity through a process now called "settlement hierarchy." At this time social complexity increased as newly created special interest groups burst into being to support the growing city. This

should not be surprising, for, as expressed in *Why Liberty*: “Spontaneous order: it is common for people to assume that all order must be the product of an ordering mind, but the most important kinds of order in society are not the results of conscious planning or design, but emerge from the voluntary interaction and mutual adjustments of plans of free persons acting on the basis of their rights.”⁴⁷ Could this somehow be related to the lack of progress among the twelve “lesser” civilizations described in chapter 8?

⁴⁷ See: Palmer, T. G., *The History and Structure of Libertarian Thought*, in *Why Liberty?*, Ottawa (Illinois), 2013, edited by Tom G. Palmer, p. 32.

CHAPTER TEN

APPLICATION OF FINDINGS OF CHAPTER NINE TO THE TWELVE LESSER PRIMARY CIVILIZATIONS

“The impediment to social development had been extrinsic and climatic, but the impediment to intellectual development was intrinsic and political.”

The Natural State of Medical Practice, vol. 1, p. 156

After identifying common features found among all the lesser primary civilizations, selected characteristics from each are compared to the same features from the five successful primary civilizations. Intergroup variations in size of nuclear population, regional population, area, duration of prosperity, governance, and other factors are discussed. Although most of the twelve had a mixed form of governance, meaning more than one of the four general patterns of organization mentioned earlier in this work (hierarchy, heterarchy, egalitarian, and corporatism), all can be considered as maintaining a plebeian population with prominent egalitarian kinship affiliations. Although that egalitarianism was manifested differently, in none of the twelve is there evidence of a medical practitioner network. In contrast, the role of egalitarian kinship was diminished in the nuclear populations of the five successful primary civilizations considered to have medical practitioners.

- A. The five successful and the twelve lesser civilizations compared
- B. Statistical analysis of successful and lesser (unsuccessful) civilizations

A. The five successful and the twelve lesser civilizations compared

All seventeen civilizations discussed in this volume have been characterized by nineteen criteria. The feature common to most of the twelve of the lesser civilizations and to the five successful ones was an alluvial plain location. Restricted to the five successful ones was the presence of medical practitioners and writing (although some evidence is circumstantial), and the reason for this distinction is being sought. With these three issues (geography, medical practice, and writing) removed, it is within the remaining sixteen parameters that some clue may exist to explain why some nascent civilizations progress and some do not. The principal categories, derived in part from the analysis of the five “successful” civilization, are demographic, commercial, duration, and social structure at both the municipal (central) and village (peripheral) components. For convenience some statistics from the five successful civilizations are repeated here to which individual lesser civilizations listed later are compared (a group analysis is in the next chapter):

Nuclear population: 43,000 with range of 25,000 to 60,000
 Total population: 110,000 with range of 50,000 to 170,000
 Area for nuclear population: 1.3 square miles with range of 0.7 to 1.9 sq. mi.
 Population density per acre (central; 95% confidence level,): 56 (29-84)
 Duration of Formative period:
 Miletos – 250 years
 Others - 825 years with range of 530 to 1,100 years

Duration of Floruit period:

Miletos - 300 years

Others - 470 years

Total time to mature specialization (using acquisition of medical wisdom later found in medical classics as endpoint marker):

Miletos – 550 years

Others – 1,330 years with range of 1,100 - 1,600 years

1. Marajoara – The total population (100,000-150,000) of this island approximated the mean value of the successful civilizations. Although the clustered populations were individually small, two large clusters of mounds may have roughly approximated the population of Hierakonpolis in Egypt (10,000). The area of Marajoara hegemony was twice that of Miletos. There was significant distant trade, but no maritime component. It is difficult to compare the occupied central area of populated Marajoara sites with the successful city-states because residences tended to be on mounds that periodically were physically isolated because of flooding, which would have made visitation inconvenient. Nevertheless, the period in which the civilization had a stable prosperity has been estimated at 500 years, longer than the five successful primary civilizations. Traditional archeological interpretation of dwellings and inhumations indicate a nonhierarchical and egalitarian polity, probably based on kinships residing on mounds with some direction from a patriarch or headman, whereas the association of specific foci of specialization indicate organized networks of production and distant trade consistent with a heterarchy. The two outstanding features relevant to present discussion are (1) the limited size of Marajoara's centralized populations, a feature complicated by environmental separation necessitating habitations on mounds, and (2) a mixed pattern of governance with commercial heterarchies networking the mounds and egalitarian kinships operational on individual mounds. A testable conclusion from this civilization is that if progress is not evident within a few hundred years it probably will never occur.

2. Norte Chico – A central population was present in the Norte Chico civilization, although it is likely that the central area (Caral Supe) was not that of a permanent residential/commercial settlement or ruling hierarchy but rather a central facility with permanent staff used for public ceremony. Although the immediate region has been described as having a high-density population, a total population of 20,000 distributed among some twenty or more sites, each with a ceremonial complex, suggests an average population of a thousand for each of these settlements, not to mention any individual dwellings outside of the settlements. This also suggests a population density of about thirty people per square mile, about one-tenth that of Miletos when it had hegemony over an equivalent area. It is the assigning of Caral Supe as the ritual or managerial locus for the region that suggests the entire populated region as being a city-state, but with no evidence of central bureaucracy as a central coordinating mechanism it must be considered a confederation, not a city-state. There is no good support for a hierarchical society, as each settlement had its own monuments, inhumations, and specializations. Norte Chico civilization organizationally qualifies as a heterarchical society, with the basis for social cohesion of its regional population being agricultural and marine surplus, with manufacture traded within both local networks for the region's settlements and extended networks

up and down the coast and inland. If scholarly opinion holds that the cluster of communities represented a confederation, then each of the twenty or more communities could be considered a node within a heterarchical confederation. Nevertheless, within each settlement there may have been elements of a local hierarchy headed by a chief or senior family member superimposed on what might have been traditional egalitarian kinship communities. The possibility of a theocracy guiding the entire region, the many monumental constructions representing something like an American Angkor Wat, can be considered unsubstantiated for the time being. The protracted period of growth and prosperity (800 years) suggests that progress in improving lifestyle, at least as manifested in medical practice, was, as with Marajoara, never going to appear.

3. Poverty Point – This civilization is extraordinary in that it had no agricultural base, a factor that would have limited the size of its central population and favored commercial integration of nearby small settlements to support the commercial efforts associated with Poverty Point civilization. It was established over many centuries, as were its mound constructions, but ultimately it led to a flourishing commercial base lasting, some think, as long as 1,000 years. With no evidence of coercion, the mechanism whereby its monumental structures were completed and commercial production was coordinated is speculative. Perhaps there was an egalitarian system for social regulation at the “urban” site itself, one that offered “citizenship” in return for agreeing to respond to direction and to provide the effort necessary for mound construction and to fulfill a specified role in maintaining the physical integrity of the community. Also involved, however, is the concept of heterarchy whereby persons involved in various commercial ventures such as production of stoneware and metalwork, importation of raw material, and trading networks were relatively autonomous from the day-to-day functioning of the community. The activities of daily living required for a non-agricultural society, however, would have taken up the time of most community members. Reliance on shamanism (one of the large mounds is considered to be purposely shaped as a bird figure) for direction may have been due to a “knowledge elite.” Remnants of a presumably egalitarian hunter-gatherer society may have hindered development of empirical-rational medicine and a practitioner network, even though the total population, the proximally distributed settlements, and stability of the site, might have supported such a network. A more likely explanation, however, is the lack of an agricultural base that might have eased the physical burdens necessary for survival. The reason Poverty Point is included here is that the long period over which it was sustained and the long-distance trade that was a source of stability.
4. Cahokia – As the center of Mississippian culture Cahokia flourished for three centuries with a core population density of about 3,000 persons per square mile (*ca.* 5 persons per acre) and an integrated total population of perhaps 20,000. Although this is far less than that of Miletos (*ca.* 65,000 persons in one square mile) there was considerable agricultural effort beyond Cahokia’s recognized boundaries to support its commercial productions and ritual center. As a confederation of disparate bands that settled contiguously to further their combined commercial self-interests, no overarching governance was necessary and little evidence of hierarchy has been found. There must have been some specific hierarchical leadership for monumental structures, and perhaps this and an apparent mystical cosmology were guided by

priestly spiritual interpreters. But, just as all five of the successful civilizations were located at important trading junctures, Cahokia prospered because of its convenient location near the Mississippi River for trade between the region west of and around the Great Lakes and the southeastern North American continent. As a consequence, its principal organizational structure was a commercial and agricultural heterarchy, apparently one that was often in flux as groups joined or left the polity. Guidance within the commercial heterarchy was one of cooperation between kinship groups from which a hierarchy of kinships emerged that placed greater power in the hands of certain kinships. For the plebeian, however, traditional egalitarianism and band leadership applied, and it is to this that each group within the confederation returned when Cahokia could no longer prosper. The failure of groups to break traditional kinship allegiances and to join in a permanent and integrated workforce in their commercial and agricultural efforts would have stymied attempts of medical practitioners, had there been any, to form a network, even though the duration of Floruit, population size, and convenient access to the large Cahokian population should have supported the effort.

5. Terramare – Villages were initially small, but over time there was a coalescence into fewer but larger settlements. The overall population density rose to about 50 persons per square mile rather than the usual hundreds per square mile for the five successful primary civilizations. The later settlement sizes also were relatively small (a cluster of villages reaching 6,000 population), none reaching the size of the relatively small city of Hierakonpolis in Egypt (*ca.* 10,000). This was an archeologically egalitarian civilization that survived on hunting, herding, and agriculture and prospered from its metalwork carried out within the individual dwellings. Except for metallurgy, its commercial effort was unlikely to extend much beyond the individual village or cluster of villages, for there was no evidence of hierarchy. It prospered, therefore, as a Bronze Age commercial heterarchy, each settlement being a node of that system. Canals, roads, and defensive ditches required concerted communal effort that must have evolved through egalitarian kinship organization. Community health may have been above average, based on ages at death, but this could not be attributed to medical care for there is no evidence of practitioners. A network of medical practitioners might have developed to the point that there were traveling practitioners to visit the various settlements, just as ancient Greek, Chinese, and Mesopotamian practitioners did, for the total population was sizeable, the distance between settlements was not great, and there was a common cultural heritage that prospered for three centuries. Three centuries may have been enough time for that development, but exigencies of daily living required or demanded by the egalitarian kinships that made up the villages may have prevented specialization beyond that needed for commercial production.
6. Catalhoyuk – The incredibly stable mini-civilization that had a central population approaching that of Hierakonpolis in ancient Egypt (8,000 and 10,000, respectively) but no surrounding smaller settlements is one of the five civilizations among the twelve being discussed that is not a city-state as defined on p. 21. Its population density of perhaps 50,000 per square mile approaches that of Miletos (65,000 in a square mile). Despite successes at early agriculture and some evidence of trade with distant cultures there is no evidence to support the existence of either an elite hierarchy or a commercial heterarchy. Analysis of dwellings, however, confirms that

Catalhoyuk was divided into wards that would have housed kinships. As an egalitarian society of extraordinary size, the elements that permitted its cohesion are unknown, although some have assumed there was a strong religious component pervading the community. Both age at death and osteological study confirm a difficult and short life for the inhabitants. Unless new discoveries provide a reason to change present-day concepts of Catalhoyuk, it can be considered a 1,200-year-old archetypal example of egalitarian “success.”

7. Sintashta – With individual settlement populations of no more than 2,000 and a total population in twenty settlements of twenty times that, the Sintashta civilization is too small by both parameters to compete with any of the five successful primary civilizations. But the population density of the Sintashta sites was as much as 400 persons per acre, whereas for the city of Miletos it was about 100 persons per acre and the principal cities of the other four successful primary civilizations ranged from 31 to 78 persons per acre. These are, of course, the most crude of estimations, but there is some logic in the idea that the more sparse the population the less likely it will be that a specialized network benefiting the community will materialize. Moreover, Sintashta population density was associated with prosperity for three centuries, and Sintashta was but one of many settlements of equal size and substance rather than a central polis with many peripheral settlements. For this reason the Sintashta towns are not grouped as city-states. All of their labor force was within walled boundaries rather than having some in peripheral settlements. A Spartan-like egalitarianism may have existed as there is no overt evidence of an elite class, but commercial production must have had coordinated leadership. Given the homogeneity of specialization relevant to metallurgy, perhaps the overall management was a form of corporatism, commercial management with input from large special interest groups, in this case the several kinships of the community itself (see p. 21 for definition of “corporatism”). Whether corporatism favored individual initiative and weakened the hold of egalitarian kinship is unknown in this setting. The demands of kinships may not have been affected inasmuch as they remained intact, for dwellings were organized into “neighborhoods” that were probably based on kinship. Perhaps the three centuries of prosperity and relatively low total population were insufficient for initiating a local medical network.
8. Sharh-i Sokhta – Sufficient agriculture was available to support the development of a small village into a major commercial and trading center between two populous civilizations, the Indus River Valley and Mesopotamia. Its population density was about 60 per acre and population size was 20,000, both similar to that of the five successful primary civilizations, and governance was through a heterarchy of commercial ventures, as there is little evidence for a central hierarchy and its size and trading prosperity and lack of militarization make a high-level form of authoritarian political control unlikely. It flourished for three centuries, its decline mirroring the decline of Harappan civilization and the empire-building of Mesopotamian militarization. Its decline, therefore, was not a consequence of intrinsic governance, instead being the result of market failure. Dwellings were organized into neighborhoods presumably guided by an egalitarian kinship, but the heterarchical commercial ventures may have been based on corporatism. There is only suggestive evidence of medical practitioners and an early form of writing, although whether this was intrinsic to this small civilization or was imported from distant civilizations

remains to be determined. Were it the former case it would strengthen the association between commercial prosperity and progress. And it is notable that Shahr-i Sokhta, of all the lesser civilizations, is the one closest to matching the successful ones in its stage of development. But it is the evidence of neighborhoods, perhaps kinship enclaves, within city boundaries that keep Shahr-i Sokhta classified as a kinship-based society, at least for the plebeian population.

9. Djenne-Djenno – Herding and agriculture-based prosperity initiated the growth of Djenne-Djenno, and river-associated trade continued that prosperity. Built on mounds inhabited by kinship bands reminiscent of Marajoara but with a single central area of settlement with a higher population density and a central population matching Miletos, the seemingly egalitarian society became a commercial heterarchy with an intrinsic departmentalization of production and trade unguided by central governance. It flourished for six centuries without militarization or conquest. Lacking central governance, it grew by accretion of inhabited mounds identified with production of specific commodities. Like Marajoara, two factors probably contributed to the lack of a network of medical practitioners, the environmental divisions imposed on the mound-associated community residences and an egalitarian kinship social organization at the residential level.
10. Liangzhu – The riverine city-state of the Liangzhu civilization had metrics comparable to the five successful primary civilizations plus commercial prominence, specialized production, sufficient agriculture and aquaculture for a large population, and water access to distant trading sites. In contrast to the other civilizations covered in this chapter there is scholarly agreement that throughout its existence all evidence points to a hierarchical society with a prominent elite class. It is notable, given its otherwise similar status to Miletos and the other successful primary civilizations, that for over seven centuries it flourished without evidence of a network of medical practitioners. With time, size, population, a slave population, and prosperity, how can this be explained? Its social organization is considered distinctly more complex than Yellow River urbanization sites, including Liangchengzhen. One way an elite authoritarian hierarchy could have obtained control over the city and its jade industry at an early date would have been to have planned the city from the beginning. Scholars point out that this is supported by the little evidence of a local preceding culture. The reason for the city-state's abrupt disappearance is unknown. For the moment Liangzhu is considered the only overtly authoritarian hierarchy in this chapter. But its ruling hierarchy, however nonegalitarian in deed, was based on an elite kinship in fact, and the laboring class was ordered in its own egalitarian kinships. Thus, Liangzhu will be functionally classified as a civilization based on prominent kinships.
11. Anasazi – Perhaps metrics and social organization of the Anasazi civilization most closely resemble Hierakonpolis, although population dispersal was far less in the latter. Initially it was the growth of small agricultural Anasazi settlements that, as climate improved, developed crop surpluses. As villages grew in size the traditional egalitarian kinship social organization, presumably with councils of elders or headmen, gave way as distant trade evolved linking meso-America with the southwest, and occasionally as far east as the Mississippi. Egalitarian kinships changed as allegiance switched from tribal kinships to the larger culture and a

cohesive leadership perhaps centered in Chaco Canyon. At this juncture roads and large dwellings with extensive storage of crops were developed. According to some reports the civilization left no evidence of internal dissent, physical coercion, or slavery, so the large construction projects would have been done voluntarily by plebeians. More recently, however, widespread evidence of violence in the region generally and the Pueblo II period in particular must be factored into the development and disintegration of the Anasazi civilization. Perhaps there were impelling mystic-religious reasons for this, just as pharaonic power was viewed as an attribute of the gods. More plausible, however, is that the flourishing period of the Anasazi occurred at the time of a takeover of kinship-based heterarchy of the plebeians by powerful political forces. An elite matrilineal hierarchy definitely existed, and it functioned in guidance and managing of central resources (such as grain storage) and presumably capable of commandeering a labor force for large projects. As more information is obtained about violence in the region it becomes clear that the 350-year Pueblo II Period governance was not benign and that violence and coercion increasingly became the order of the day in the region. It is not clear whether the Anasazi were perpetrators or victims of many of the atrocities, although the lack of evidence of warrior status at Chaco Canyon would favor the latter.¹ Evidence of violence against lower class women suggests that, as in some other warring societies, the defeated men were killed and the women made captive. Because of violence, social changes that occurred under a matrilineal stratified society ceased by 1150 AD, the remaining years ending in total disintegration as people fled the authoritarian madness to return to their earlier egalitarian ways.

12. Maidanets (Cucuteni-Trypillian civilization) – This conservative and long-lived northerly civilization shares with Catalhoyuk and pharaonic Egypt a remarkably static social record, but they differ remarkably in appearance and metrics. Cucuteni-Trypillian “cities” are considered unequivocally egalitarian and their population sizes compare favorably with the five successful primary civilizations. Why did Maidanets not develop commercial enterprises that might have improved the daily life of its society? Perhaps it was not on a convenient trading route between larger populations or in a maritime location, and any commercial venture with other cultures had little chance of reaching a level of importance sufficient to justify the effort. Given the region, the early date of this civilization (roughly 5000 BC to 3000 BC), and its expanse, most of its units of population may have been, from the commercial point of view, isolated inland. It developed no hierarchy, no heterarchy, and no corporatism, remaining for many centuries what it was at its outset, egalitarian domiciles and hamlets, the only change over time being a merging of these small units into much larger wards of what has been called a proto-city without a change in social complexity or development of specialization. There was no chance for a medical network here. There has been scholarly investigation of a possible form of proto-writing connected with Cucuteni-Trypillian culture and the preceding Vinca culture. But writing was invented as a tool for commercial use, not for intellectual expression. In that the Cucuteni-Trypillian civilization had little commercial development writing would not be expected. Scholarly debate continues.

¹ The absence of warrior status is also an argument against a Spartan-like regional control of outlying “Helot” populations emanating from Chaco Canyon.

From this list one (Liangzhu) had a powerful elite kinship hierarchy, one was purely heterarchical but with kinship neighborhoods (Shahr-i Sokhta), and two (Catalhoyuk and Maidanets) were purely egalitarian, the others having mixed social organization with a prominent egalitarian kinship base upon which a heterarchical or corporatism management was superimposed. All, therefore, had prominent kinship affiliations and will be considered as egalitarian in the Table and statistics to follow.

B. Statistical analysis of successful and lesser (unsuccessful) civilizations

Table 4 includes features of Table 1 so that sixteen characteristics of all seventeen “civilizations” are displayed and can be compared. From this list it can be inferred that there probably is a minimum urban size required for a *de novo* medical network to develop, perhaps in the 10,000 range. Nuclear population density by parameters presented in the Table is unassociated with a medical network, and those population densities of unsuccessful civilizations that lie within the standard error of the mean for population density of the successful civilizations include Marajoara, Cucuteni-Trypillian, Shahr-i Sokhta, and Catalhoyuk. Of these four, Shahr-i Sokhta is the most likely of the twelve lesser civilizations to have had a medical network, but the argument is not helped by statistics. Unexpectedly, neither the duration of a civilization, nor its formative and flourishing periods considered separately, are associated with development of a medical practitioner network. This suggests that formation of a medical network, considered necessary for medical progress, is not a time-dependent process, and one that will never arise in a civilization without certain prerequisites. Of all the conditions evaluated, three go statistically hand in hand with a medical network: writing, heterarchy, and a nonegalitarian social structure. Monumental construction and span of time all appear unrelated to the event. Absence of a medical practice might be explained by its diminutive and relatively unprofitable status, but its appearance in the five successful primary civilizations suggests otherwise: prosperity favors it. As for writing, it is a concomitant of medical practice, not a precedent, and is a consequence and marker of progress of a civilization rather than a cause. This leaves one factor for consideration: egalitarianism.

The following is a list of the more relevant conclusions drawn from the cursory statistical analysis of data in Table 4 comparing the five successful vs. the twelve lesser (“unsuccessful”) civilizations as presented in Appendix A with relevant commentary.

1. Central populations were significantly larger in five successful city-state civilizations, but not significantly larger than the four unsuccessful city-state civilizations.
2. Population density showed no significant association with a successful civilization.
3. There was significant association between city-state status and a successful civilization.
4. Archeological egalitarianism was similar in successful and unsuccessful civilizations.
- 5. There was a strong association between a prominent egalitarian kinship presence and the absence of a medical network (i.e., the “unsuccessful” civilizations).**
6. Heterarchy was significantly associated with the successful civilizations.
7. The lengths of either the FORMATIVE or the FLORUIT periods were unassociated with a successful civilization.
8. Commerce/distant trade: similarly present in successful and unsuccessful civilizations.
9. Writing and medical practitioners were each unassociated with egalitarian kinships.
10. Writing was not significantly associated with FLORUIT duration.
11. Writing was not significantly associated with commerce (extent not quantitated).

Table 4: Parameters for comparative analysis of the 17 civilizations discussed in text. The information condensed here is the basis for the calculations performed in Appendix A. Note that many attributes, *e.g.*, size of population and governance, changed over time. This makes assigning a particular status in some instances more of an art than a science.

	MILETOS ¹	URUK	HIERAKON-POLIS	MOHENJO-DARO	LIANG-CHENG-ZHEN	MARA-JOARA	NORTE-CHICO	CUCU-TENITRYP.
POPULATION OF POLIS, MAXIMUM	65,000	50,000	10,000	40,000	50,000	10,000	3,000 CARAL SUPE	20,000
POPULATION HEGEMONY	200,000	1,000,000	105,000	70,000	70,000	100,000	20,000	?
PRIMARY AREA	1 SQ. MI.	2.3 SQ. MI.	0.5 SQ. MI.	1.6 SQ. MI.	1 SQ. MI.	0.2 SQ. MI. OSCAMUTINS	0.3 SQ.MI. CARAL-SUPE	1 SQ. MI.
GOVERNANCE DAY-TO-DAY	HETER-ARCHY	CORPOR-ATISM, HETER-ARCHY	HETER-ARCHY	HETER-ARCHY, CORPOR-ATISM	HETER-ARCHY, CORPOR-ATISM	HETER-ARCHY	HETER-ARCHY, CORPOR-ATISM	KINSHIP HIER-ARCHY
PROMINENT EGALITARIAN KINSHIPS ³	NO	NO	NO	YES, BUT NOT IN POLIS	NO EVIDENCE SO FAR	YES, ² ON INHABITED MOUNDS	YES, ² IN VILLAGES	YES, IN NEIGHBORHOODS
WRITING	YES	YES	YES	PROBABLE	POSSIBLE	NO	NO	NO
MONUMENTS	YES	YES	NO	NO	NO	NO	YES	NO
DENOUEMENT	RAZED	SUB-SUMED	SUBSUMED	DECLINED	SUBSUMED	DECLINED	NOT KNOWN	NOT KNOWN
MEDICINE	YES	YES	YES	?	?		NO	NO
FORMATIVE PERIOD	250 YEARS	900 YEARS	1200 YEARS	700 YEARS	500 YEARS	1,200 YEARS	900 YEARS	900 YEARS
FLORUIT	300 YEARS	550 YEARS	400 YEARS	600 YEARS	500 YEARS	500 YEARS (900-1400 AD)	800 YEARS	1,000 YEARS
CITY-STATE	YES	YES	YES	YES	YES	YES	NO	YES(?)
MEAN AGE AT DEATH OR LIFE EXPECTANCY	N.A. ⁴	31 YEARS	28 YEARS - COMMONERS	35 YEARS - BETTER OFF	N.A.	N.A.	N.A.	N.A.
PERIOD	LATE ARCHAIC	LATE NEO-LITHIC, BRONZE	LATE NEOLITHIC	BRONZE AGE	LATE NEOLITHIC	PRE-COLUMBIAN	PRE-CERAMIC	NEOLITHIC, ENEOLITHIC
ARCHEOLOGICAL EGALITARIAN	NO	NO	NO (ELITE BURIALS)	YES	YES	YES	YES	YES
POPULATION DENSITY	100/ACRE	33/ACRE	31/ACRE	39/ACRE	78/ACRE	78/ACRE	20/ACRE	45/ACRE

¹ The first five columns contain features of the “successful” primary civilizations, and the remainder are the lesser ones. Because of fluctuating characteristics over time, archeological uncertainties, approximations in dates, and disparities in data as presented by different scholars, the dates and statuses in this Table must be considered crude estimates as interpreted by the author from an extensive review of scholarly literature.

² Persistent kinship control of individual life affected mostly those who had no large geographically contiguous central population or whose central population was a temple or ritual elite.

³ Includes extended families, clans, tribes, chiefdoms.

⁴ Data unavailable.

ANA-SAZI	POVERTY POINT	CAHOKIA	TERRA-MARE	CATAL-HOYUK	SIN-TASHTA	SHAHR-I-SOKHTA	DJENNE-DJENNO	LIANG-ZHU
5000	1000-3000	20,000	6,000	8,000	1,000	20,000	50,000	30,000
?200,000- MANY HAMLETS	? - MANY VILLAGES	? 40,000	150,000	8,000	20,000 20 TOWNS	?	50,000	200,000
30 SQ.MI.	1.4 SQ. MI.	6 SQ. MI.	0.1 SQ. MI. (LARGE)	0.15 SQ. MI.	5 ACRES	0.5 SQ. MI.	0.15 SQ. MI.	4 SQ. MI.
HETERARCHY	HETERARCHY	CORPORATISM	CORPORATISM	KINSHIP HIERARCHY	CORPORATISM	HETERARCHY CORPORATISM	HETERARCHY	KINSHIP HIERARCHY
YES, ² IN ITS ORIGIN AND VILLAGES	YES, ² IN VILLAGES	YES, NESTING KINSHIPS	YES, ² IN NEIGHBORHOODS	YES, NEIGHBORHOODS	YES, NEIGHBORHOODS	KINSHIP NEIGHBORHOODS	YES, ² ON INHABITED MOUNDS	YES, ELITE KINSHIPS
NO	NO	NO	NO	NO	NO	POSSIBLE	NO	NO
YES	YES	YES	NO	NO	NO	NO	NO	NO
VACATED	DECLINED	FLOODING	VACATED	VACATED	VACATED	DECLINED	VACATED	?
NO	NO	NO	NO	NO	NO	POSSIBLE	NO	NO
700 YEARS	500 YEARS	400 YEARS	?	500 YEARS	?	600 YEARS	750 YEARS	500 YEARS
400 YEARS	1,000 YEARS	400 YEARS	300 YEARS (1450 TO 1150 BC)	1,200 YEARS	400 YEARS	600 YEARS	600 YEARS	750 YEARS
YES	NO	YES	YES, LATE	NO	NO	YES	NO	YES
25 YEARS POOR DATA POOR PEOPLE	N.A.	31 YEARS, IF SURVIVE INFANCY	40 YEARS, MINIMUM ESTIMATE	32 YEARS	"FEW" ELDERLY, 28 YEARS	FEW OVER FORTY YEARS	31 YEARS, POOR DATA	N.A.
POST-ARCHAIC WOODLAND	LATE ARCHAIC	LATE WOODLAND	BRONZE AGE	NEO-LITHIC	BRONZE AGE	MIDDLE BRONZE AGE	HISTORIC AFRICAN	LATE NEOLITHIC
NO (ELITE BURIALS)	NO (MONUMENT)	NO (TEMPLES)	YES	YES	YES	YES	YES	NO
?	3/ACRE	5/ACRE	40/ACRE	80/ACRE	200/ACRE	62/ACRE	50/ACRE	12/ACRE

CHAPTER ELEVEN

EGALITARIANISM

Egalitarianism: Removing inequalities among people by redistribution of products of labor or their means of production.

Egalitarianism is closely examined because its effects are greatest in that segment of ancient populations from which medical practitioners arose, the plebeian (commoner) class. Definitions of egalitarianism are discussed, political and social, with social egalitarianism as a practical answer to social organization in early/primitive societies. With permanent settlements, selected archeological characteristics have been the means by which scholars recognize egalitarian communities. As the mechanism by which an egalitarian social organization was usually selected, Maslow's system of motivational hierarchy is discussed. The primal levels of the hierarchy, survival and safety, are personal motivations and considered irrelevant to egalitarianism. But now the "need to belong" motivation comes into play as each member attempts to adapt to or modify the behavior of others to accommodate his or her own behavioral preferences. Differences of opinion are presented so as to attract others to a particular opinion, and at some point the more forcefully impelled or popularly held opinion restricts opposing ones. Thus, a seemingly democratic result can, in the hands of the majority of a society, shut down completely all alternatives. Motivation has been stifled. But egalitarianism is minimized as trade promotes urbanization, prosperity, and population growth. Urbanization, a consequence of commercial ventures, can weaken the allegiances to social structures, especially the kinship, and provide a window of opportunity for individuals and families to break free.

- A. What is egalitarianism?
- B. The source of primitive egalitarianism
- C. Egalitarianism, the move to settled existence, and commerce
- D. The nature and consequence of coercive egalitarianism
- E. Egalitarianism and transgression of natural law
- F. Sparta and imposition of the egalitarian state
- G. Egalitarianism and spontaneous order
- H. Egalitarianism and kinship
- I. Egalitarian kinships
- J. Conclusion

- A. What is Egalitarianism?

It is necessary at the outset of this section to define egalitarianism as it might be considered to have existed in early or primitive societies. Egalitarianism, being a popular and adversarial issue in modern times, has led to categories of egalitarianism that are unlikely to have existed in premodern societies. As an example, "luck egalitarianism" is based on the premise that it is wrong for some people to have less than others because of misfortune not of their own making. Society is therefore obligated to correct this by redistribution of goods and resources. Isonomia is the basis for "legal egalitarianism," where equality before the law is the issue. Other categories of egalitarianism include gender, racial, and economic. But it is hard to imagine that premodern societies would have identified race, gender, economic status, class distinctions, or codified laws as

discussable issues when deciding distribution of effort or products of that effort. Those societies were small and their principal adversaries were the physical environment and their own ignorance. The morality of their redistribution of effort and products of that effort was not an issue, or if it was it was overshadowed by the necessities of daily life. For these reasons the definition of egalitarianism will be minimalist as given above, indicating the focus is on its implementation more than explanation and consequence more than validation.

Archeological studies of prehistoric populations frequently identify a community with a common lifestyle expressed in similar dwellings, appurtenances, luxury goods, and burial practices lacking affluence as being egalitarian in that there appears to have been no privileged class, family, or person. The term is also applied to most primitive hunter-gatherer societies who possess little of a private nature. It is often assumed these egalitarian venues indicate a society's desire for equality among its members, an equality that includes access to food, to comforts, and to a voice in group decisions. The efforts of men and women in procuring daily necessities are also considered equally shared, although child-bearing and physical size and strength guarantee gender inequality in tasks. Group decisions are made by common consent. It is furthermore often assumed that egalitarianism in a society has been chosen by its members because it seemed to be a good way to live together in harmony.

Egalitarianism is especially important to the origin of medical practice for its effects are most pronounced on plebeians, and it is from the plebeian class that medical practitioners arise. It is for this reason, unfair as it seems, that monarchies, priesthoods, and other elite groups are mentioned but little in this volume except as objects of criticism. It would be otherwise if the elite political classes were the source of societal progress, but they instead supply the abusers of that segment of society which is the source of progress, bent on keeping their privileged status by preventing the plebeian in seeking his.

It may, of course, be inappropriate to designate any ancient primitive society as "egalitarian." The ethical implications of the term in modern minds implies a purposeful selection from a collection of different philosophical lifestyle choices. This obviously did not happen in ancient times, for prehistoric populations had no political history from which to make a choice. In fact, the similarity in choice of population management used by most primitive societies, a choice regarded as "egalitarian," was probably followed by them in part because it was their human nature as extended families to do so, guided by practical considerations of survival and security. The grouping in clans and tribes also was probably a further response to the latter two concerns. One sociological classification sequence in complexity of societal governance specifies (1) "egalitarian" bands or tribes based on kinship reciprocity with equal access to resources, (2) a second phase that includes only the system of redistribution of egalitarianism now managed without threat of force by hereditary elites (chiefdoms), and (3) the ultimate phase, a stratified society with "unequal access to basic resources" supported by threat of force and exploitation. Placed in juxtaposition with the proposed alternatives, a harmonious and stabilizing egalitarianism seems quite a tempting lifestyle.

A reason for the modern popularity of egalitarianism is its presumed pacific nature. Evidence against this assumption is plentiful (see excursus on Australian aborigines, p. 200). But even if egalitarianism were inherently pacific, if a war-like

society appeared on the scene, the peaceful society will be quickly eliminated.¹ The Society of Friends and other pacific groups and sects can be admired in the West because they are protected by Western democracies, their pacific nature unthreatened. But should authoritarian political forces continue to centralize power within democracies around the globe, those groups will surely disappear once they have been found to be expendable.

There also has been much scholarly investigation into lifestyles of primitive bands and tribes, both extant and historic, and support for the notion of caring and altruistic societies capable of surviving on their own is lacking. Whether it be longevity, harmonious rapport, care for the elderly and infirm, or pacific interaction with outsiders, anecdotes inconsistent with a congenial and caring egalitarian society abound to the point of being cliché.² The importance of geronticide as a solution to those whose age or infirmity are deemed deleterious to the band or tribe is an example of egalitarian thinking that finds its equivalent in discussions of modern medical practice. One must, therefore, doubt whether egalitarianism as fairness or a moral precept ever entered the mind of either ancient or contemporary primitive people whose survival was focused on a coordinated physically capable membership to withstand the threats of an unforgiving environment. It must have been more important that as many as possible of a group's membership be prepared for the next day's sally with Nature, and if a lucky catch by one member permitted a personal feast while other members went hungry, there could be unpleasant repercussions. Others propose egalitarian social practices originated not from innate tendencies of generosity or fairness but from the fact that bands could not travel with surplus food, and so it was distributed to all as needed. In other words, a practical reason for sharing, an amoral rather than moral basis for what superficially might be termed egalitarianism, better explains its pervasiveness.

It is not possible to accurately define the egalitarianism practiced by ancient societies, although it has been thoroughly parsed for modern primitive ones. Perhaps archeological evidence has been misinterpreted and presumed egalitarian ancient societies were not so. Certain cities as well as nomadic bands called egalitarian are so utterly distinct that their forms of egalitarianism must also be distinctive. It has been pointed out, therefore, that direct evidence of egalitarianism in large ancient societies is nonexistent, mostly being an assumption based on negative evidence, *i.e.*, archeological studies revealing no evidence of a nonegalitarian society. But what is called egalitarian may mask powerful but unexpressed internal forces regulating community behavior by means of secret knowledge such as shamanism. Dr. Keith Otterbein maintained that even among hunter-gatherers there was no such thing as egalitarianism, that threat and mental or physical coercion was present and was guided by a hierarchy of power even though there was no named headman.³ For present purposes the following characteristics, in

¹ It is not denied that a well-run hierarchical state can tolerate and protect egalitarian groups as well as oppositional views. In the United States the Quakers and other pacific groups and sects are protected and admired, but in most other historical settings their separate identity and existence would have been short-lived. It has been truly said, "The meek may inherit the earth, but that's the only way they will get it."

² Classic works such as that of Sir James Frazer (*The Golden Bough: A Study in Comparative Religion*, ultimately in twelve volumes, 1906-1915) and of Joseph Campbell (*The Masks of God*, four volumes, 1959-1968) include plentiful anecdotes of often bizarre or grotesque practices from ancient and primitive societies. And see p. 210 for end-of-life care of elderly in primitive societies.

³ See: Otterbein, K., *How War Began*, College Station (TX), 2004, especially p. 77, the section on The Myth of the Egalitarian Band.

whole or in part and in line with current scholarly opinion, will be used to objectively identify a prehistoric society as “archeologically egalitarian:”

1. No differential wealth present in burials, within dwellings or in architecture
2. No monumental structures
3. No distinctive longer-lived population
4. No separate habitation district based on class
5. Absence of militarization and of defensive barriers

An unqualified “egalitarianism” in present context is meaningless because so many qualifiers have been attached to the word, either in attempts to improve understanding or to suggest moral equivalence. For present purposes, therefore, the term as applied to early societies will be qualified and either stated or implied as “coercive egalitarian.” This melds into an egalitarian ethos the position, duties, and responsibilities a member has in his society regardless of his personal preferences, for redistribution comes with a price:

Coercive egalitarianism – A doctrine that would forcibly interfere with voluntary choice by imposing social or economic equality on a society.⁴

This definition is similar to the one given at the beginning of this chapter, but it also is a reminder that egalitarianism is always coercive, and therefore but another expression of authoritarianism. Even though egalitarianism is now commonly used in describing economic redistribution, it includes within its tenets enforcement in the production of products that are to be distributed.

The following sections analyze the seventeen “civilizations” in the context of archeological and functional evidence of egalitarianism as a means of social control and the alternative governance options of commercial heterarchy, authoritarian hierarchy and primitive corporatism as populations increased.

B. The source of primitive egalitarianism

What might have been the pragmatic cause of ancient lifestyles now declared to be egalitarian? Was it merely a matter of familiarity with a social pattern followed by parents and grandparents to which there was no experience with an alternative? Perhaps it was a result of understanding the vagaries of human nature, that some persons could disrupt a tenuous lifestyle to the detriment of the group as a whole by actions that exceeded a communal norm, or perhaps it was a matter of like and dislike of personalities that considered themselves superior to the rest of their society, an inherent psychological antipathy to hubris.⁵ An interesting recent theory proposes that nomadic hunter-gatherer bands began with a hierarchical structure. This seems logical in that families are not naturally egalitarian, and consanguineal kinship provides the basic structure for most

⁴ This definition is derived from: Wollstein, J. B., *The Idea of Equality*, 1980, a publication of the Foundation for Economic Education.

⁵ See: Zaluski, W., *The Psychological Bases of Primitive Egalitarianism: Reflections on Human Political Nature*, in *The Emergence of Normative Orders*, Krakow, 2016, J. Stelmach et al., editors, pp. 83-106.

hunter-gatherer bands. But the level of intolerance in small bands for unequal access to food or other resources is such that there develops a “counter-dominant mentality” that renders the troupe egalitarian, or, if there is a leader, reverse dominance allows the troupe to dominate the leader so as to render the troupe coercively egalitarian.⁶ Or was it a matter of communal efficiency intended to combat daily vicissitudes of primitive life by minimizing need and waste and avoiding excesses? A “scattered and unpredictable” sustenance as the origin of coercive egalitarianism has been proposed because it is the “leveling mechanism” of success and failure, something bordering on “luck egalitarianism” that prevents undue accumulation of power in any one person. In this scenario, egalitarianism, while temporarily essential to survival, will be shed to some degree when predictable sustenance becomes available.⁷ In other words, egalitarianism could be good in situations that threaten survival. But what if egalitarianism itself is inescapable?

A tendency for humans to form groups is important to progress, for by forming groups there is more interface of ideas and a greater ability to act on them. Indeed, the essence of volume 1 of this series was the critical role of the small group of autonomous individuals pursuing a common goal of self-interest, the “koinon,” in promoting progress within a society. Why, then, did hunter-gatherer groups not promptly come upon novel ways to improve their lives, instead persisting in a way of life that was unceasingly arduous and dangerous, sometimes for thousands of years? It may be relevant that there appears to be an optimal group size for decision-making. For example, some suggest six to eight people is optimal, for beyond that number the frequency of social interactions increases exponentially and the time permitted each member to present his or her thoughts decreases. Egalitarian bands on average have fewer than fifty members. Thus, the band might be considered more amenable to good ideas than the tribe or clan that operate more on the level of subgroup interactions rather than individual ones, with quite different consequences. There is, however, no evidence of this, as neither band nor clan is, over time, associated with any improvement in the primitive state. Thus, the size of an egalitarian society seems unrelated to this outcome. Another factor for consideration is disruptive behavior. Within hunter-gatherer groups antisocial behavior by an individual might be met with force, either physical or by public ostracism. But as population size increases, overt social pathology is less effectively recognized and managed. The larger the group the more likely it has the potential for this disruption embedded within it. While it is unknown how many early/primitive societies, ranging in size from bands to tribes and clans, were brought to an end by internal dissension, the issue again is improvement in their primitive state. And again, increasing size of population is not an obvious determinant for improvement, for if larger size favored progress the world would have been populated with cities far earlier than has happened.⁸ Thus, the persistence of an

⁶ See: Boehm, C., *Egalitarian Behavior and Reverse Dominance Hierarchy*, in *Current Anthropology*, 34:227-254, 1993.

⁷ See: Cashdan, E. A., *Egalitarianism Among Hunters and Gatherers*, in *American Anthropologist*, 82:116-120, 1980.

⁸ If the disruption is not sociopathic but instead is just a matter of justifiably contentious issues or rivalry between peers for leadership, the band can split, each contender taking with him his allies. This is probably the reason for the innumerable small hamlets and individual domiciles scattered throughout some prehistoric, primarily Bronze Age, regions of the world discussed in section C of this chapter. It may have seemed wiser to exist in a small group with single leadership than a larger

egalitarian social structure and the tardy devolvement of urbanization cannot be attributed to a surfeit of good ideas. The absence of change within egalitarian groups is, instead, associated with the *absence of the expression* of good ideas. The answer seems obvious: something about egalitarianism itself is inimical to the interface of ideas. The proliferation and persistence of small egalitarian groups is not a consequence of intelligence.

In volume 1 of this work (p. 29) it is stated: “This opportunity [to compromise] is diminished further by a finite earthly existence during which cumulative experience is seen through a myopic lens: each generation feels justified, even compelled, to reinvent the wheel and considers itself especially favored by new ideas to forego the old ones.” Given the short life expectancy of ancient/primitive populations and their narrow institutional memory in populations where children rarely knew a grandparent and frequently did not know their biological parents it is a safe assumption that egalitarianism was not carried forward generation after generation because of custom. Instead, it is likely that the same social organization was utilized because it was repeatedly selected century after century based on contemporary circumstances. What was the overweening circumstance?

As the most basic level of motivating factors listed by Maslow in his “hierarchy of needs” is a threat to survival, perhaps ancient egalitarianism finds its roots there.⁹ The communal enforcement of sharing, if the small society overcame “scattered and unpredictable” threats to survival and were healthier because of that sharing, would be conducive to survival. And the second most powerful and basic motivational factor is security, and personal security might have been promoted by belonging to a larger group, a band or tribe.¹⁰ Thus might be explained the apparent affinity in primitive society for egalitarianism and then tribal membership; the need for survival was fulfilled by egalitarian behavior and the need for security by tribal affiliation. But this is an error.

It is here argued that the need for survival and security was fulfilled not by purposeful egalitarian behavior; it was fulfilled by common sense. It is inappropriate to infer a planned political motivation to such basic behavior. There was no intention to

group in which desire for leadership prompted grounds for contention and discord that could affect all members of the group.

⁹ In 1943 Maslow (*A Theory of Human Motivation*, in *Psychological Review*, 50:370-396; also see p. 29-30 with footnote of the present work) put forth his hierarchy of needs as the basis for personal and societal motivation. Some of his ideas and observations were obtained from studies of “primitive” modern societies. His five-tiered hierarchy listed physiological survival as the most basic motivational force, followed by security, belonging, esteem, and self-realization, in that order, and the more basic need(s) had to be satisfied before moving on a less basic ones. Endless parsing of his scheme has followed over the years, but most criticism has been directed at the upper, less basic, tiers (see, for example, Kenrick, D. T., et al., *Renovating the Pyramid of Needs: Contemporary Extensions Built Upon Ancient Foundations*, in *Perspectives on Psychological Science*, 5:292-314, 2010). As the present subject matter concerns prehistoric man, the Maslow hierarchy will be used as a basic reference on motivational factors for the ancient societies discussed herein. Walter Rostow (*The Five States of Economic Growth*, Cambridge (UK), 1960) also provided a nuanced theory of societal evolution, but the focus of the present work is more basic: a free society contrasted with an authoritarian one.

¹⁰ An inconsistency in this statement is that personal security would be expected to include one’s health, and yet not one of the twelve lesser civilizations examined in chapter 8 left evidence of a medical presence even though the average age at death was in the low to mid-30s.

prevent or erase inequality *per se*; the need was to meet threats to survival.¹¹ Maslow's most basic elements of his hierarchy of needs were survival and security. They are personal motivating factors and therefore are identical attributes in all individuals; if survival as an individual or family unit was unlikely, then egalitarianism was not a choice.

It is the next level that is problematic. Matters now become complicated in that each member of a society becomes subject to the organizational structure of the society inasmuch as he or she has voluntarily exchanged some degree of individual liberty for group security. And it is here that the third, and yet "primitive," level of motivating factors from Maslow's hierarchy of needs comes into play, and that is the desire to belong, to be one of a group. The issue is no longer survival and safety, these having already been transcended in that the larger society can now maintain its existence. It is at the third level of motivation where the intellectual basis and modulator of ancient egalitarianism can be found.

The desire to belong invokes issues not found in the desire to survive and to be secure. The nature of interactions with others varies from the productive and pleasant to the destructive and hateful. In a society the latter must be controlled to protect the other members of that society. The means employed is egalitarianism. Its essence is to control.

Egalitarianism, while not an issue prompted by survival and security, is related to the desire to belong, to belong to a group, but implicit in this is that the group be socially acceptable to the individual joining it or deciding to remain in it. There is considerable modern discussion of the merits and demerits of such a scheme in large modern societies, but they may not be relevant to ancient, and perhaps primitive, small societies where, for example, one disrupter out of fifty members is controllable, whereas one million out of fifty million in a modern society is controlled with great difficulty. A large population thereby ensures that coercion will be needed from a central authority, the State, but a small population such as a band or tribe can function as a *committee of the whole* in pressuring an individual to act in accordance with customary behavior even when it is against that individual's personal interests, or else depart.¹² Some degree of coercion seems reasonable and at times unavoidable, given the range of personalities in any human society, in order that society be not critically disrupted. And is it not but realistic that a person be agreeable to some personal limitations if those limitations improve the status of the society that might redound to his or her personal benefit? But it may not be a wise trade-off. This is not an issue that a primitive or ancient band or tribe is likely to have addressed, for there would have been no knowledge of consequences of the coerciveness of egalitarianism over the long run, no knowledge of other forms of social organization, and no concept of progress as a means of permanent improvement of society. Egalitarian coercion was an immediate solution to an immediate problem in the same way that parenteral coercion is to raising young children. It is only in light of knowledge accumulated over many centuries that we can now look back and judge the consequences of that early form of egalitarianism. One thing is certain. The basis for the adoption of egalitarianism by each generation of ancient or primitive "egalitarian" societies was not prior knowledge of it or its consequences except for that form of egalitarianism within which existing members came of age. In the dangerous world of the Neolithic, were a

¹¹ The factor of personal attachment is not addressed here, but this has nothing to do with egalitarian behavior.

¹² One example of this is "reverse dominance" as described on p. 252. In small societies where there is, by necessity, a leader, the total society membership can dominate that leader, something that is suggestive of presidential governance in a democracy.



Fig. 19: Bronze Age roundhouse, a dwelling style widely distributed throughout Europe and the British Isles. Such housing was adequate for a family or a small extended family, sometimes with separate space for domesticated animals. Settlements might comprise several roundhouses. Photograph by the author of a reconstruction at Flag Fen, U.K.

form of governance to be found unsatisfactory, none would have survived to implant that information into local lore that could be transmitted orally from generation to generation.

Under all the layers of interactions that make up human society, the primary cause for social egalitarianism was, and is, to control the disrupter, the person not like you. In the small group the disruptor is an individual; in large groups the disruptor is the small group. In a nation the disruptor is the large group, the party or movement. And it is the tragedy of egalitarianism that the coercion that restrains the disruptor includes in its pattern of restraint the innovator, the sentinel, and the protester as well as those who would do harm. And there is always the possibility that the disruptor may be right. It follows that efforts to suppress the disruptor will suppress innovation and options for social change. Adam Smith, in his *Lectures on Jurisprudence*, cautioned that inflicting punishment for a crime in the name of public interest (rather than personal interest) risks restricting freedom of a society in the name of the public good. There are other arguments against egalitarian systems, including the philosophy that taking something from someone and giving it to someone else is immoral, an issue for later discussion. But the perspective here is different: it is not one of ethics or of material gain or loss; it is one of restriction of choice.

Egalitarian systems were rendered acceptable to members of bands and clans not because they were good systems but because the only option was leaving the security of the group. But, if they did leave, their new social structure was preferably small. If the environment was relatively safe for an individual or family, living in individual units or hamlets was preferred, as was done during much of the Bronze Age (*ca.* 3200-600 BC) in Europe and the British Isles. This was possible because the immediate environment permitted the family or extended family a degree of safety with arable land and animal domestication sufficient for survival. There were no large population centers such as were occasionally found in the Neolithic era. The early urbanization in that period can, like the Bronze Age individual settlements in much of Europe, be attributed to development of agriculture. But unlike Bronze Age Europe, Neolithic towns and early cities developed because of social forces requiring monumental construction or a need for security, whereas much of Bronze Age Europe did not feel a necessity to urbanize for security or markets. A market site might, by mutual consent, be free-standing at a crossroads or in a small village, but with nothing likely to occur that would require a more populous center for commerce.

The fact that small egalitarian groups were mankind's representation on earth for thousands of years was not a product of a small total global population, for human population doubling time could have given rise to cities in the Paleolithic had there been no environmental disruptions. If people really wanted the company of their own species close at hand, there would have been cooperation in many facets of life to make the transition to cities possible and rapid. But there were disruptions, and the most important disruption was purposeful: the method meant to control disruption was itself disrupting.

C. Egalitarianism, the move to settled existence, and commerce

What leads hunter-gatherer societies to assume a settled agricultural or herding society when the opportunity presents itself? In certain primitive egalitarian societies it has been proposed that hunter-gatherer groups that rely on an "immediate return" lifestyle employ a system of assertive, meaning "coercive," social control that requires the sharing of work and rewards among its members.¹³ In such a system there is no accumulation of affluence, no hoard of assets of one's own. With such a system of sharing there is no place for personal gain because the planning needed for a "delayed return" on expended effort that is part of an agricultural lifestyle is so different from "immediate return" hunter-gatherer thinking and implementation.

A variety of theories have been presented to explain the shift from a nomadic to a settled existence. In many of the theories the motivating factors have been environmental change or inadequate sustenance available by foraging. Alternatively, this shift may not have been a nomadic group response to external forces, instead merely being an innate preference for a closer association with other encountered groups, a preference prevented until global meteorological changes permitted it. In the balance, foraging wins out over sociability, for it has been noted that nomadism is typically associated with regions having longer growing seasons, thus supporting the foraging theory. There also are numerous theories regarding group formation, but for present purposes socially "needy" theories will be avoided and Maslow's levels of primitive motivation will again

¹³ Woodburn, J., *Egalitarian Societies*, in *Man* (N.S.) 17:431-451, 1981.

be consulted. Maslow's second most profound motivating factor affecting one's choices is safety and security. Should a small nomadic group combine with another the greater will be group strength for protection and for capturing large game. Perhaps this explains why Australian aborigines did not develop settlements; they felt sufficiently secure in small groups, and large game was unavailable for most of their prehistory. It was not a matter of avoiding large hostile populations; they had no experience with such. That human settlement has been viewed as a global phenomenon, enough so that, despite differences in local circumstance, an age of human development has been named for it: the *Neolithic Revolution*. The term suggests that most humans had been looking for the opportunity not only to settle rather than to roam, but to settle in the proximity of others.

But that avoids the issue of those who did not join the rush to polity. As pointed out in the excursus on Australian aborigines (p. 200), humanity's switch to agriculture was gradual and sometimes never occurred. Quantifying that change would be welcome, but in its absence it is proposed herein that it was not the attractiveness of a sedentary existence that caused the change. People were not switching to village life primarily to abide among other people. They were just tired of abiding among their own people and the coercive egalitarian kinships that controlled every aspect of daily life. Furthermore, many preferred not to exchange one onerous system of control, the egalitarian kinship, for another system of control and health threats that might result from living in a larger communal setting. Many therefore chose a third path.

In the Neolithic period and into the Bronze Age, from British Isles to northern and eastern Europe to the original Austronesian population of Taiwan and to many other areas around the globe, human settlements over extensive regions were composed of only one or a few dwellings. The previously hunter-gatherer peoples began to form settlements. But hamlets were tiny and no large towns or cities existed. Each cluster would have been surrounded by sufficient natural resources and enough land for agricultural sustenance of at most a few family units. This pattern might exist for many centuries, and sometimes, like the Jomon culture of Japan, for millennia, without any development other than what might be termed local market towns. Even the occasional natural resource that might be useful for trading was inadequate for stimulating communal commercial exploitation. The extensive (100 acre) flint mining complex at Grime's Graves, located in a farming region in the east of England, was worked for centuries in the Late Neolithic and Bronze ages without an associated commercially active town developing nearby. Flag Fen, a Bronze Age settlement also in east England, required extensive human effort in construction of causeways, weirs, and ritual sites, but only few dwellings built on pilings and scattered roundhouses in a fishing area suggest a settlement (see Fig. 19). The Neolithic site of Durrington Wall several miles from Stonehenge was a settlement of as many as 3,000 persons, but it was occupied primarily for needs of monumental constructions. In the Neolithic Hongshan culture of northeast China (4000-2900 BC) inhabited districts (estimated populations, *ca.* 1,000) are clearly distinguished and some evidence of inequality of prosperity are present, but the population density of a large surveyed area was approximately one household per square kilometer, estimated from the district with the highest overall density.¹⁴ The Bronze Age Bell Beaker culture and early Unetice culture (2300-1600 BC) of Eastern Europe (now the Czech Republic, Poland, Germany and further east), despite a few larger settlements, had the "vast

¹⁴ See: Peteron, C. E., et al., *Hongshan Chiefly Communities in Neolithic Northeastern China*, in *Proc. Nat. Acad. Sci.*, 107:5756-5761, 2010.

majority” of its settlements being “several houses” in a hamlet.¹⁵ This Bronze Age pattern throughout Europe with settlements seldom larger than fifty persons would give way only when population increase led to a need for security and the building of Iron Age hillforts. And in China, with its great emphasis on kinships and clans, the famous *Treatise on Food and Money*, composed in the 1st C AD as part of the *Han Shu*, noted that in preceding centuries families preferred rural life. As winter approached farmers and their families were ordered to leave their farms and live cooped up in close quarter in the cities, a disheartening proposition (“I sigh to my wife and children”), whereas in the spring families happily (“glad as can be”) looked forward to exchanging the crowded city for the detached life of the farm.¹⁶ And even in apparently inhospitable circumstances there is a desire to lead a socially detached life, for the Fayu of Papua, Indonesia, lived in nomadic single family units in a swampy area, only meeting biannually with other Fayu families.¹⁷

That many such scattered populations over large regions did not naturally coalesce into towns and thence to city-states unless there was a pressing need such as security suggests they were in no hurry to get too close to their neighbors. Even in the Early Bronze Age northern Mesopotamia previously large urban sites gave way to regions of much smaller settlements with extensive networks of paths, rather than remain large urban sites with primarily radial roadways.¹⁸ One might even wonder if humans have instilled in their psyche a preference for a degree of distance from one’s neighbors. This could teleologically explain the rapid spread of *Homo sapiens* around the globe shortly after its appearance on Earth. Just as trees branch out permitting leaves better exposure to light, perhaps a basic urge of humans is to branch out to maintain personal liberty. An increase in probability of survival of a society would logically be expected from an increase in fecundity, but as a further guarantee that humans would succeed in establishing their genus and species it would make sense to instill in them a preference for avoiding others of their kind, thus enforcing their spread in small groups inexorably over all the Earth to seek optimal residence and only then to propagate. After all, the strongest factors regulating population growth for most organisms, large or small, are (1) density, in which rate of growth is roughly inversely proportional to population density, and (2) dispersion, in which there is a tendency of an animal species to disperse in one of several patterns that are species specific. In the Orkney Islands north of Scotland the total human population about 3000 BC may have reached 6,000, but its dispersion of family units tended to be peripheral on each island with some distance between each settlement. In ancient Japan, the Jomon hunter-gatherer culture of 3000 BC had a total population estimated at 260,000,¹⁹ yet the largest and probably permanent settlement, Sannai Maruyama, held no more than 500 people, with most of the culture living in clusters of five or six pit-houses, each of which housed about five individuals. Throughout the entire area of the British Isles, 120,000 square miles, and for thousands of years up to the end

¹⁵ See: Makarowicz, P., *The Construction of Social Structure: Bell Beakers and Trzciniec Complex in North-Eastern Part of Central Europe*, in *Przegląd Archeologiczny*, 51:123-158, 2003.

¹⁶ From: *The Book of Poetry* in *The Treatise on Food and Money*, part of the *Book of Han*. The English translation is by Nancy Lee Swann: *Food and Money in Ancient China*, Princeton, 1950.

¹⁷ See: Diamond, J., *Guns, Germs, and Steel*, New York, 1999, a paperback, chapter 14, p. 265.

¹⁸ See: Ur, J., *Emergent Landscapes of Movement in Early Bronze Age Northern Mesopotamia*, in *Landscapes of Movement: Trails, Paths, and Roads in Anthropological Perspective*, 2009, Snead, J. E., Erickson, C. L., and Darling, J. A., editors, chapter 9.

¹⁹ See Koyama, S., *Prehistoric Japanese Populations: A Subsistence-Demographic Approach*, *Senri Ethnological Studies*, 4:187-198, 1992.

of the Bronze Age, only two or three settlements have been described that can be considered small villages, a pattern found throughout northern and southeastern Europe for the same periods. An apparent exception, Durrington Walls, mentioned on the preceding page, dates to *ca.* 2500 BC, was unoccupied after a few centuries, and was not intended to be a permanent commercially self-supporting community. To the argument that settlements remained small because technological immaturity could not support large ones, in other areas of England larger farmed lands have not been consistently associated with larger settlements.²⁰ As the level of personal interaction in such an autonomous dispersion of tiny populations in homesteads and hamlets, some of which were only inhabited intermittently, must have made any higher level of social order unnecessary, it would be inappropriate to designate scattered family units as egalitarian. Indeed, egalitarianism for all intents and purposes did not exist in the Late Neolithic and Bronze Ages in the British Isles and northern Europe. Beyond this, it is presently agreed that the nuclear family is a great hindrance to egalitarianism, and disruption of the nuclear family by enforced separation of its members is a common procedure in communistic societies just as it was in ancient Sparta. There was in many regions, therefore, no egalitarianism from which to escape.

It is thought that the tiny settlements alluded to above were based on kinship and comprised the nuclear or extended family, from which one might also conclude that it was not the kinship structure of the group that people sought to leave, instead being the intellectual limitations and coerciveness of egalitarianism so integral to nomadic hunter-gatherer life. With the greater assurance of proximal sustenance, the option of growing a surplus of a commodity, and the ability to store some commodities the coercive and redistributive components of egalitarianism were evaded but the leadership component of the family, the kinship, small though it was, was retained. There was little desire to crowd. The distinction between kinship and egalitarianism is discussed in the next chapter.

This makes one wonder about the perverse influences that compelled people to join together in the large Late Neolithic and Bronze Age centers of Sumer, ancient China, ancient Egypt, and elsewhere. An important one was the threat of hostile groups, but a new attraction appeared that explained compact populations centered in towns and cities: commerce. Associated with this demographic change, the larger populations that developed from commercial ventures had a division of labor. Decision-making within commercial production and trading networks remained with those actively involved in them rather than with the associated community. A higher level of organization was still unnecessary. Whether in producing ceramics, growing millet or rice, exploiting a local resource such as flint or jade, or producing luxury items, as commerce developed it attracted a larger local population. In a “trickle-down” arrangement, agriculture and herding necessarily increased to support the enlarging population bent on commerce. If local geography and environment were sufficient to support population growth, from clusters of small settlements there was a coalescence of some into a central polity and some entered satellite communities that interacted with that polity, the interdependency representing a city-state, at least as defined on p. 21. Inequality in personal possessions appeared, and personal interests became varied and specialized. In this process the peripheral settlements may have maintained elements of an egalitarian kinship structure, but otherwise this traditional social structure, especially its egalitarianism, was

²⁰ For much information in this paragraph see: Rathbone, S., *A Consideration of Villages in Neolithic and Bronze Age Britain and Ireland*, in *Proceedings of the Prehistoric Society*, 79:39-60, 2013.

diminished. Why did the “great” cities of ancient times appear where they did rather than in Europe, the British Isles, and elsewhere? It was not because of a special gifted local population or a gifted local leader. True, enemies and natural disasters were often the cause for “circling the wagons” for the common defense. But for the voluntary part of urbanization played by mankind one need look no further than the natural human preference to be autonomous and unencumbered by demands of others that interfered with personal choice. If a reasonably safe existence for a free-standing family unit was impossible, either because of environmental threats or marauders, larger egalitarian kinship groups such as the band and the tribe were available for protection. But that protection came with a price: egalitarian conformity within the community. Commercialism with its prosperity and specialization also offered security in numbers, but, importantly, it helped people avoid egalitarian conformity.

Thus, the appeal of prosperity offered by urbanization plus the release of the individual from egalitarian bonds prompted a move to commercial centers, a move acceptable only if a sense of security was not lost. The larger populations seemed to provide that, for now irrigation, walls, large-scale agriculture and specialization became available. For the small surrounding settlements, the only additional issues to be managed were those necessary for maintaining their part in commercial operations. Traditional egalitarianism might locally persist. The central polity, however, now the focus of commercial ventures, devised its own social structure as a spontaneously designed hierarchy and specialization of services responded to a prospering and enlarging urban population. The hierarchy, the consequence of commercial success, was presumably a collaboration among commercial leaders and the labor force, for this early hierarchy, termed by scholars as a “settlement hierarchy,” was not yet hereditary or political. It arose as a way to peacefully coordinate the varieties of communal effort. As for decisions relating to the overall course of the city-state, the presence of several commercial networks would have functioned as a heterarchy or a form of corporatism that included the labor force and would maintain social organization with or without the inevitable evolution of a political hierarchy.

The importance of commercialism cannot be overstated. Without commercial ventures people living within a coercive egalitarian system in an unsafe region had no where to go. The many dusty tells and other heaps of ancient rubble show that once commercial stimulus declined the population also declined as people resumed their traditional kinship-focused ways and moved on.

Catalhoyuk had a large central population but remained profoundly egalitarian, but it is exceptional in that there was little to suggest any commercial activity. Its agricultural sector ensured self-sufficiency but not surplus. It is considered a “proto-city” because it had no leadership; it was but a large town. This is not a criticism, for it probably reflected the lack of safety of the regional environment in that early age (7000 BC). There was no commercial activity to speak of that might decline, for there would have been very limited trading opportunities. Thus, for Catalhoyuk there was no way to escape the egalitarian kinship trap. There is no other way to explain a completely static society the size of Catalhoyuk that existed for over a thousand years, great effort being spent on upkeep and planned renewal of dwellings but no evidence of improvement or progress.²¹

²¹ From recent excavations at Catalhoyuk some scholars feel there is evidence of armed conflict, that the structure of the dwellings was selected to check invasion, and that flint tips of weapons and

Even in those instances, for example the Cucuteni-Trypillia civilization, where large central populations did arise but commercial operations did not exist to an important degree, the “urban” area was inhabited only in time of need, with its families and kinships coming and going according to their individual circumstance. But in areas where food resources were abundant and commerce was established, cities emerged, and it becomes more understandable why the five successful civilizations analyzed in this book formed large cities that later evolved over many centuries to become territorial states with regional identities: they were in very large and fertile alluvial plains.

Yes, this was the time, within the developing city, for transformation, for individualism, for the transferring of allegiances from the coercive egalitarianism of kinships to new social organizations that were less personally intrusive, for liberal interaction of ideas, for progress. But it wouldn’t last long.

D. More on the nature and consequence of egalitarianism

In an egalitarian (immediate-return) society unwritten rules include the core issues of sharing and no accumulation beyond one’s daily need. In less egalitarian (delayed-return) societies some aspects of the immediate return society are also found, but an individual who finds himself more prosperous than his kin will soon be invaded by distant family members who have the right to their share of his good fortune, thus hindering any attempt at self-improvement. This is a common finding in village life in many areas of the world today. Individualism would not be an admirable trait unless one member of the community were superior to all the others in a specific achievement clearly useful to the kinship or community at large. But in immediate-return societies even this can be socially reproachable.

The issue here, however, is the initiation of a novel idea. In describing the immediate-return and delayed-return primitive societies Dr. Woodburn (see footnote, p. 246) observed that “non-competitive, egalitarian hunter-gatherers limit the development of agriculture because rules of sharing restrict the investment and savings necessary for agriculture.” The same would have applied to medical care. The individual who realized the potential of concentrating effort at diagnosing, treating and preventing illness might, on his own, have attempted empirical and rational pursuit of medical knowledge. But that was not his decision to make. The decision was made by his kinship and its tradition, within which there may have been no other person with an interest in the matter when weighed against day-to-day problems. While there was surely freedom in some egalitarian societies to move about, even to leave one’s group and join with another egalitarian group, it was the freedom of a jail-block, with freedom to move around or between prison cells. The early 20th century writer, Elbert Hubbard, defined a prison as: “An example of a Socialist’s Paradise, where equality prevails, everything is supplied, and competition is eliminated.”²² In small egalitarian kinships bent on survival and security there may have been no practical choice, but in larger egalitarian societies there was no permission. Methods to restrain expression of individual superiority by primitive egalitarian societies have been presented by Dr. Boehm, and one mechanism for opposing

other features indicate armed attacks were not rare, although it is not stated by whom. That there might have been marauding bands or roaming bears is not debated, but the overall sense of the previous discussion is unaltered.

²² From: Hubbard, E., *The Roycroft Dictionary*, Aurora (New York), 1914.

inequality is the previously mentioned “reverse dominance” in which the community at large opposes individuality that suggests superiority by mocking or shunning the suspect individual.²³ If this prevailed in ancient egalitarian societies, which were usually small, as it does for modern primitive ones, the final judgment on individual undertakings would have been society itself. Dr. Boehm points out that “such societies are deliberately shaped by their members.” And therein lies the heart of egalitarianism in the early/primitive society: an intentional coerciveness percolating throughout a society that assures all its members will be no more than average. In doing so it ignores a fundamental truth: in one way or another, or at one time or another, *every* person is above average. Although there may indeed be some transient survival value to minimalizing the “Alpha” personality and thereby permitting open group discussion of pressing issues in primitive “egalitarian” societies, the damping effect of egalitarianism and its singular focus on immediate survival, guarantees that survival, while perhaps benefiting the persistence of clan structure, will never improve the quality of life of individuals in the clan nor their clan descendants.²⁴ This, the coercive face of egalitarianism, when added to the negating effect of redistribution of effort and assets on personal motivation, ensure that the sameness of lifestyle will endure for those clan descendants. If to this there is added a system of enforcement, the kinship, that “sameness” may persist thousands of years.

A person in a kinship may be required to fulfill certain duties, but if his opportunity for survival benefits from this arrangement, the issue is a matter of personal choice; losing his kinship status could be fatal (outside the kinship). This is an obligated trade-off, and a way out of kinship was present but not taken. There is also the possibility that leaving a kinship might not be desired because of devotion to the kinship itself, a personal feeling that one does not mind the limitations imposed by the kinship because of a personal attachment to its members. Only when the leadership of the band, or the band membership itself, imposes limitations that are sufficiently onerous might one then wish to leave the group. The kinship then becomes viewed as a prison: it is too dangerous to leave and too burdensome to stay. At a certain point the risk of leaving the kinship may become acceptable and the individual can depart. For those who leave the egalitarian kinship, there are two options: (1) if the environment is relatively safe, establish the nuclear family on a small plot of land sufficient for self-preservation, or (2) if the environment is not friendly, join a larger, non-kinship, group involved in commercial activity, the initial phase of urbanization.

It is the variety of ideas spawned by innumerable perspectives, not just those of a docile herd, that provides the apparatus for a better life for all humanity, including the “common man and woman.” The amalgamation of ideas from an enormous variety of sources is today doing what it was meant to do, one clear measure of success being a remarkable increase in healthy longevity around the world. And the reason this has not previously happened is that overwhelming forces have successfully denied the innate morality of individuality, impressing a docile and obedient sameness to the mass of mankind (excepting, of course, those who fight to be in charge and thereby reap the benefits of the labor of others). Given the conclusions of volume 1 of *The Natural State of Medical Practice*, the many facets of modern western life we now enjoy, including

²³ Boehm, C., *Egalitarian Behavior and Reverse Dominance Hierarchy*, in *Current Anthropology*, 34:227-254, 1993.

²⁴ See: Boehm, C., *Hierarchy in the Forest*, Cambridge (MA), 2001, for Dr. Boehm’s extensive work on primitive humanity and his evidence supporting the essential role of egalitarianism in promoting human social evolution, a view that contrasts markedly with that of the present volume.

medical care, scientific invention, sources of energy, and commerce, have been merely transient novelties in the prehistory and history of mankind and unable to escape the grip of the egalitarian cage to benefit everyone. The grand question is whether the present attempt, so wonderfully instituted by America's Founding Fathers, will this time succeed. For one part of the answer, the grand question must focus on natural law.

E. Egalitarianism and transgression of natural law

Adam was to be a farmer, not a hunter-gatherer, and his progeny started settlements. The first family favored sedentism over hunter-gatherer or horticultural lifestyles. But prosperity was not to be their lot and the farming was ordained to be difficult. Adam, Eve, and family were expected to exist in a social system unrestrained in their daily choices by any secular authority for no such authority existed. Using the metaphor of the previous section, they were the first small branches of the human tree. But they already had instilled in their intellects not only the self-indulgence that led to their downfall but also the moral guidance to help them to live together and survive. The descriptive name of such a society or group, one that was settled but not urbanized is "rural agrarian,"²⁵ but more important is the moral guidance, or "natural law." Although the latter is discussed in detail in the following chapter, here the competition between natural law and egalitarianism is briefly considered. Natural law for the moment will be approximately defined as the Golden Rule, a manifestation of our conscience, a self-awareness of moral goodness or blameworthiness in our actions and intentions. It is often argued that natural law underlies all systems of justice and governance, but at issue here is the coerciveness of egalitarianism. Can egalitarianism be consistent with the message offered by the Golden Rule? And the Golden Rule is "Do unto others as you would have them do unto you." Another version is "Do not do unto others what you would not want done to you." One implication is that one should not take from another what is not freely given. And yet it is in egalitarianism that allocation of effort and redistribution of resources requires the taking, under threat, the industry and products of those most productive in a society and giving it to the less productive. Could it be that egalitarianism includes among its tenets a transgression of natural law? And if the answer is "Yes," perhaps this explains in part the stagnation of Catalhoyuk, the militarism of Sparta, and the absence of progress in all lesser primary civilizations of chapter 8 that were associated with egalitarian kinships.

F. Sparta and imposition of the egalitarian state

Widely regarded in the past as an admirable example of an egalitarian state, Sparta was not always so. Present scholarly opinion supports the notion that Dorian ancestors migrated into the northeast of the Peloponnesian peninsula during the years now identified as the Dark Age of ancient Greece, a time that spans the decline of the Mycenaean empire (1200 BC) to the commencement of Archaic Greece (750 BC). A nearby early center of Dorian prominence was Argos. From 800 to 500 BC this city flourished as a prosperous center for bronze metallurgy, pottery, agriculture, horses, silver

²⁵ The sequence is: Hunter-gatherer, Rural agrarian, Urban, Commercial, Industrial, Post-industrial.

coinage, and an artistic culture. Argos and Sparta were enemies for centuries. Sparta likewise developed into a powerful city-state, and, despite its frequent wars, by the 7th C BC its culture likewise flourished in music, poetry, bronze sculpture, ivory carving, pottery, and figurines. Later in that century the legendary Lycurgus is said to have devised a “constitution” that was meant to produce “internal political equilibrium,” but in doing so provided a mechanism whereby Sparta became a stable but egalitarian and militaristic state. Two initial steps included land redistribution and the withdrawal from the populace of gold and silver to prevent individuals from acquiring wealth.

Apparently in response to concerns about not only its enemies but also its serfs and dependencies, Sparta’s citizenry became in effect a standing army. That the social result was selectively egalitarian has been fully explored by scholars, but sufficient communistic activities and avoidance of displays of opulence were retained that reinforced Sparta admirers’ view of its egalitarianism even though a sizeable and powerful elite class existed. The inequities of the Spartan system regarding land tenure, the relation between citizens and their serfs, and movable wealth have been well described.²⁶ The subsequent decline in Sparta’s power and influence has been attributed to the social inequities thus produced, although a major factor was a marked decline in its population of citizens, due in part to casualties of war. Argos also had a change in governance and acquired a tyrant, Pheidon II, at about the same time as the Spartan “constitution” was instituted. Pheidon is remembered primarily for his expansionist policies, but the city itself continued to prosper and, to a limited extent, allied itself at times with Athens. In contrast, by the 6th C BC Sparta had instituted social controls that led to loss of crafts and a “reduction of non-military wants to the barest minimum.”²⁷ By the 4th C BC Sparta was in political and social decline, but Argos built monumental structures such as the largest theater in ancient Greece, an odeum, a large agora, and became the host of what were formerly the Nemean Games.

Sparta, as can be seen, changed its nature prior to its decline. In its initial Dorian character it was part of just another expansionist population, and when settled in the Peloponnese it initially assumed the general character of many other Greek city-states in its commerce and culture and it flourished. Its “constitution,” however, as voluntarily accepted by the citizens of Sparta, led ultimately to an isolated, militaristic, illiterate, monolithic way of thinking, and, for a great many of its citizens, a superficially egalitarian but divided class society that would persist as Sparta became less and less significant. Egalitarianism proved to be no defense against political authoritarianism, instead becoming its ready partner.

In volume 1 of *The Natural State of Medical Practice*, Sparta was compared to contemporary Athens and other Greek city-states with regard to developing a medical profession. There should have been true physicians in Sparta, given the importance of medical care for its citizen army and nearby examples of Hippocratic medical practice in other city-states, but the only Spartan medical personnel mentioned by historians are those individuals, nonphysicians, who retrieved the wounded in battle. Furthermore, before the time of Hippocrates, citizens of Sparta had restrictions placed on their autonomy. To maintain military readiness they were not permitted to do the physical work unrelated to that readiness. Those tasks were assigned to non-citizens and serfs. This was no setting conducive to group networking by citizens concerned about providing for the

²⁶ See: Hodkinson, S., *Property and Wealth in Classical Sparta*, London, 2000.

²⁷ The source of much information and the quotation in this paragraph are found in: Cartledge, P., *Sparta and Lakonia*, London, 1979, especially chapters 8 and 9.

community's medical needs. All thinking was guided by military priorities, communal oversight, and spying. Whereas elsewhere in early classical Greece the "elite" class did not avoid manual labor as a way to personal wealth, the egalitarian "elite" of Sparta remained aloof, letting slaves and serfs manage the practical matters of the polis. Whereas Hippocratic physicians practicing in different cities around the eastern Mediterranean formed a professional network that produced a volume of medical wisdom that would be admired for centuries, the egalitarian citizens of Sparta were forbidden even to travel to a nearby town without permission.

Such single-mindedness of purpose stunted the growth of whatever knowledge and culture might have sprouted from Spartan ingenuity. And this brings into focus the role of coercive egalitarianism in suppressing progress. Here the problem is not only with "egalite'." For the greater society the problem is the limited number of issues upon which a community will focus. It is the consequence of doing nothing rather than something, the disavowal of change, that is such a damper on progress. The number of issues is necessarily small because of the need for consensus, or at least the concurrence of the larger or more powerful portion of the polity. Those issues that may seem important to one individual, and in fact may be important to all, can be ignored by the community at large because of an enforced preoccupation with a limited set of issues. It is not a matter of dislike of originality or novelty; it is a matter of assigning priorities, and the ever-curious mind of the individual is therefore disregarded by communal demand. But the egalitarian community is not anti-intellectual; it is pro-survival. It is not anti-individual; it is pro-community. It is not anti-progress; it is pro-stability. Egalitarianism is not a matter of redistribution to make all equal; it is redistribution to assure that all in the community are equally prepared to do their part in the next battle. It is not, or should not be, a matter of jealousy or envy; it is a matter of efficient organization to guarantee survival. And if spiritual forces are considered an ally, they too would take precedence over the individual, not because of deep faith in something but because egalitarians would accept an ally from any source. In all these matters egalitarianism that pervades a community is not an intended evil but as a democratic form of authoritarianism in which most of the community resent the unpredictability of individualism and demand unanimity of action in the name of survival of the way things are perceived to be; ingenuity has become an enemy.

Finally, egalitarianism is not instituted as a matter of morality that might be traceable to natural law. By ignoring the natural inclination of humans to individual liberty it is disobeying natural law and thereby narrowing the path to progress. While egalitarianism as a moral political force is a relatively new idea, its use in this way today is but a ploy, for its purpose is the same: a rejection of change and a way to control others. The control over others, *i.e.*, the common man, in an effort to suppress the uncommon man is not urged on by ill will. It is inspired by the fear of what might happen if there is no control or if control is, or might be, put in the hands of others who are viewed as objectionable. Its modern popularity, as stated by Erich Fromm in relation to the 20th C democracies' tendency to embrace dictatorship, is based in part on idea that, when there is a loss of supervisory authority in a person's life and yet there is no freedom to pursue personalized goals, people will chose the populist authoritarian.²⁸ He also noted that the

²⁸ See: Fromm, Erich, *Escape from Freedom*, New York, 1941 (1st American edition, the original, in German, having been published the same year). For a rebuttal to Dr. Fromm's characterization of the mass of mankind with regard to its fear of freedom, at least when it comes to America, see p. 289 of this volume.

ultimate freedom "...the ideal – if only man's nature could rise to it – is communism." What was not mentioned by Dr. Fromm is that communism, a form of social egalitarianism, was, at the time of his writing, pursuing its tragic course.

And what about unexpected threats? It might be a present or future human conflict, a preparation for a natural disaster, or other imminent threat. Egalitarianism would not, however, be prepared for the unexpected. Indeed, the tunnel vision engendered by social control of the individual is a guarantee of susceptibility to the unpredictable, as well as an incoherent response to a threat once realized. Perhaps "abandoned" would not be cited after so many early civilizations listed in Table 4 had incompetence bred by egalitarianism not been in play. As for Sparta, although credited with a survival of one thousand years, its time in the sun was barely two hundred years.²⁹ And so the consequence of Sparta's ascetic rebirth as egalitarian was use of social coercion rather than leadership hierarchy to restrain any individual desire to stray from the normative, and: "... by accentuating social inequalities and the sense of distance between individuals, they aroused envy, produced discord within the group, threatened its equilibrium and cohesion, and divided the city within itself."³⁰ To its external threats Sparta unwittingly added an internal one.

Another element of intellectual restriction has been newly identified, and for convenience it has been categorized as "groupthink." Egalitarianism limits options available to a society by restricting novelty, whereas groupthink, in which a subgroup puts forth its opinion as the superior one and manages to inculcate that opinion throughout a society, also limits options of society, but it causes a further problem: in that the subgroup opinion is the opinion of likeminded people, there is the likelihood that the opinion will be unrealistic or less favorable because the subgroup would not have had an open discussion that could have disclosed faults in its favored opinion. Egalitarianism restricts choice and groupthink can prioritize the wrong choice, a bad combination.³¹

The final common denominator of the various ways that egalitarianism imposes restrictions on society is not one of equalization. It does not equalize; it "stamps out diversity."³² In a primitive stage of existence, therefore, having shut off avenues of escape from a primitive state, a society afflicted with egalitarianism will remain primitive forever, until some inevitable calamity leads to its demise. In the meantime, life in such a society will remain "solitary, poor, nasty, brutish, and short." Whether it be Catalhoyuk or pharaonic Egypt, whether it be egalitarianism of the small group or tyranny of the large, the consequences will be the same, with three important exceptions. (1) Sometimes the authoritarian can be right and a tyrant's actions efficient, and this can lead to willful lack of appreciation of the dangers in political authoritarianism. (2) There may be no place to which to escape. "There is ample evidence that even primitive tribesmen themselves are not fond of their primitivism and take the earliest opportunity to escape from it," wrote Dr. Rothbard (as cited above, p. 270). And thus they do in our age, but in Catalhoyuk that option was absent. (3) In the overt politically authoritarian society, coercive power will be in the hands of a relatively small group, and those individuals will live relatively

²⁹ From the time Chilon of Sparta (fl. ca. 570 BC) to the battle of Leuktra in 371 BC.

³⁰ Jean-Pierre Vernant: *The Origins of Greek Thought*, p. 64, Ithaca, 1996, 4th printing of Cornell Paperback.

³¹ See: Whyte, G., *Recasting Janis's Groupthink Model: The Key Role of Collective Efficacy in Decision Fiascoes*, in *Organizational Behavior and Human Decision Processes*, 73:142-162, 1998.

³² See: Rothbard, M. N., *Egalitarianism as a Revolt against Nature*, Auburn, 2000, 2nd edition, p. 277 in the essay entitled Freedom, Inequality, Primitivism and the Division of Labor.

well, whereas in social egalitarianism none will do well. That is why the citizens of Catalhoyuk remained chained and unchanged for a millennium with a life expectancy of about 30 years, whereas in ancient Egypt the magnificent art and massive monuments of the pharaonic elite with an average life expectancy of 40-50 years looked down upon the simple masses who, over 2,000-3,000 years, also had an average life expectancy of about 30 years. Prominent individuals were memorialized in ancient Egypt and some idea of daily life and problems faced by its people are available to modern scholars. For Catalhoyuk, however, it was but a stroke of luck that the archeological site was discovered, for otherwise Catalhoyuk would have remained an unknown, and in a sense tragic, lesson in the history of mankind.

G. Egalitarianism and spontaneous order

“Spontaneous order” is another consideration that might bear on group behavior and function. It has been likened to the “invisible hand” of Adam Smith that is associated with the effectiveness of free market economics, and it is in this capacity that it is a present-day issue in modern economic theories. Spontaneous order also bears some resemblance to natural law.

Definition of “spontaneous order:” Order which emerges as a result of the voluntary activities of individuals but is neither a product of the execution of human design nor a creation of government.

Spontaneous order represents the unintended but good and proper consequence that results from a certain similarity of action of members of a population in response to a stimulus. The innate tendency that leads to this effect is present in all rational individuals. The idea is not new. Lao-Tsu (6th C BC), in the 57th chapter of *Tao Te Ching*, stated:

Therefore the sage says:
I take no action and people are reformed.
I enjoy peace and people become honest.
I do nothing and the people become rich.
I have no desires and people return to the good and simple life.

Kant (1724-1804) would have the liberty of interplay of ideas, good or bad, in the long run resulting in a good result. He would say it is the back-and-forth nature of arguments more than the quality of the ideas expressed in those arguments that is the key to success, because an initially successful but defective argument may lead to a bad result, but continued interplay and more arguments will automatically and over time lead to a good result, “spontaneous order.”³³ With Kant there is no mysticism or Divine intervention involved. The success of the freedom to argue and disagree in contributing to progress in this context could be framed mathematically. Presumably what appears to be a chaotic mix of opinion will have the possibility of good and bad outcomes. The bad ones will

³³ The value of crossing of swords of opinion as an expression of “unsocial sociability” is clearly explained by Dr. G. H. Smith in Part 12 of his series *Ayn Rand and the History of Philosophy*, “Immanuel Kant on Spontaneous Order,” 2016, <http://www.libertariansim.org/columns/immanuel-kant-spontaneous-order>. In Kant’s philosophy humankind’s inherent antagonism to others who disagree is the basis for human progress.

ultimately wither because they don't work, whereas the good ones will be more likely to work. Thus, the bad will slowly be eliminated, especially as people become more enlightened about the critical nature of individual liberty in promoting progress and about the bad consequences of certain categories of decisions. All this sounds Pollyannaish, and human history suggests that "over time" can be unconscionably long. Other scholars, however, would argue that it is the innate moral sense, or conscience, present in all humans that leads to spontaneous order, and, if abnormal limitations are not imposed, spontaneous order will become apparent because the unopposed moral sense will, in a population over time, lead to the proper result, *i.e.*, it will be consonant with natural law. The critical point here, however, is that, in both approaches, liberty of expression of conscience for all members of society is necessary for progress to occur.

Egalitarian society, therefore, affects spontaneous order in a negative way. In egalitarian society the intolerance of its reign of non-sovereignty can be absolute in the demotion of innovative thought by inhibiting normal interactions, and thus spontaneous order will have no opportunity to emerge. Furthermore, people have different aptitudes, skills, and interests, characteristics that make a person an individual rather than a worker ant. These native talents, if not inhibited, may permit that individual to provide a unique service or perspective, and by that lead to progress, whether in lifestyle improvement, longevity or prosperity. It can open to the rest of the community the good news of his talents. This the coercion of egalitarian society prevents.

H. Egalitarianism and kinship

Throughout this work the term "egalitarian kinship" is commonly applied to early and primitive groups. This differentiates it from "kinship," a term now applied indiscriminately to many groups of all sizes, including larger ones that form around a common cause or ethnicity. Egalitarian kinship has no formal definition and it is therefore defined herein as:

Egalitarian kinship - a consanguineal and affinal group in which assigned status implements opinions and traditions of an egalitarian society.

This definition implies that the prevention of diversity and the equalization of effort and the results of that effort are a product of the egalitarian group, with the kinship, by inserting a hierarchy, being useful in implementation and enforcement.

The pervasive nature of kinship has always influenced attempts to escape coercive egalitarianism. Familial bonds are strong and may override a personal desire for greater freedom of action. Egalitarianism is a characteristic of small kinships, but the larger the kinship institution the less egalitarian is its hold on behavior. Although usually viewed as a compassionate and sensible response to external threats and an admirable interpersonal social bond that helps ensure social stability and continuance, its basic nature was clearly identified by the eminent Scottish jurist, Henry Sumner Maine (1822-1888) when he defined kinship's legal position as depending on a person's "status" whereas Western jurisprudence has replaced "status" in favor of "contract."³⁴ The consequence has been to shift the focus of legal implications of a personal action from one's place in society to the individual himself. By means of contractual understanding

³⁴ See chapter 5 of Sir Henry's famed *Ancient Law*, London, 1861.

one can now make personal choices for personal benefit rather than holding a social position assigned to him by an unyielding social tradition, its enforcement in small societies being, in effect, one's neighbors. It has been noted that kinships standardize social life in a highly prefigured way, and, by regulating the behavior of different categories of kin, "leave little leeway for spontaneity or individual differences."³⁵ In band societies kinships are usually bilateral in that both spouses contribute to the social pattern, and that pattern is inevitably coercively egalitarian, one of family dependency rather than individual obligation. Everyone in such kinships has a role, but not of one's choosing.

But Dr. Nisbet notes that "centralization and bureaucratization of power" is a potent influence against kinship in that persons will identify less with their own kinships and will be more open and tolerant with other individuals.³⁶ In larger groups it is more difficult to maintain the kinship pattern. Thus, the social organization of "corporatism" has been applied to several of the lesser civilizations in chapter 8. This may be confusing inasmuch as there are many forms of corporatism, including liberal, fascist, progressive, absolutist, *etc.* Relevant in present context, however, is kinship corporatism. In the Sintashta civilization dwellings were nestled close together and each household had evidence of contributing to the overall production of metal products. This has recently been described as a corporate arrangement, in which the entire population was entailed, voluntarily it is assumed, in the manufacturing process.³⁷ With little evidence of a social hierarchy other than that adult males may have been warriors when needed in addition to being metallurgists, it might be thought that the villagers represented several kinship groups, each with inherent leadership structure, specific social positions, and an understanding of traditional rights and duties to each other. And this sounds fine until it is realized that the goal of kinship, as mentioned above, is stability and continuance of the kinship, not the needs of the individual. And it is here that corporatism comes into play, for a corporate social structure can replace the intricate kinship system by appealing to the nuclear family to join with other nuclear families within the larger social environment of a corporate social structure in an organization designed specifically to benefit all its members in that the members control the course of the organization rather than a chief of a tribe, elder of a band, or strong-man. Furthermore, its leadership could be held accountable for decisions made. It has been pointed out, after reviewing the evolution of corporations through medieval Europe, that most people belonged to some form of corporation as the centuries went by, and with the economic security of belonging individuals could make personal decisions with less interference from kinships. Dr. Avner Greif has underscored the benefits: "Corporations and nuclear families embody and reinforce a culture of self-governance, cooperation among non-kin, the legitimacy of majority rule, respect for minority rights, the accountability of leaders, and

³⁵ The modern relevance of the change "from status to contract" has been recently analyzed by M. S. Weiner in his book *The Rule of the Clan* (New York, 2013), which supports its significance with modern examples. At the same time, even bands express their egalitarianism in different ways, including the way children are raised, so that it is acknowledged herewith that the generalizations that are the source of criticism of egalitarianism in this volume may not apply to all small groups. But this is not a study of sociology. It is a review of the changes in civilizations/cultures over the ages, from which the importance of the effect of egalitarianism has emerged.

³⁶ See: Nisbet, R., *Prejudices: A Philosophical Dictionary*, Cambridge (MA), 1982, p. 52, in his discussion of social deterioration attributable to capitalism.

³⁷ See: Koryakova, L., and Epimakhov, A., *The Urals and Western Siberia in the Bronze and Iron Ages*, Cambridge, 2014, p.181.

individualism.”³⁸ This may seem irrelevant to ancient societies, but it is to be remembered that the European Dark Ages saw a return to profoundly primitive societies devoid of advances of the Classical Era. Viewed in this light the Sintashta experience might represent an early attempt at a form of “corporate kinship,” an intermediate step away from traditional kinship, a transegalitarian attempt to escape from the injustice of egalitarianism, and toward a degree of personal responsibility, individual choice, and benefits attached thereto.³⁹ It will probably never be known if this is relevant to the present task, for neither the size nor duration of Sintashta civilization were likely to support the development of a network of medical practitioners, the present gauge of progress.

With the exception of Liangzhu, which early on turned its kinship base into a ruling class and politically stratified the society, and Sharh-i Sokhta, which was a straightforward commercial heterarchy that adapted kinships into a corporatism structure, all the other lesser civilizations discussed in chapter 8 involved kinships and were, or can be assumed to have been, subject to powerful social forces from them. Kinships are considered a “cultural universal.” Nevertheless, there are different types of kinships, often quite versatile depending on local circumstance, and biological affiliations could be ignored in the acquisition of members. In ancient Greece, Rome and India specific religious affiliations could serve as the basis for kinship.⁴⁰ The size of kinships varies from the nuclear family to the hereditary phratries of ancient Greece, the latter encompassing thousands of “brothers” within a proposed, sometimes fictional, ancestral lineage, usually attached to a geographical location. Given the various guises and sizes that comprise kinships it is not surprising that their adaptability has brought the kinships great credit as a social model of stability and longevity and as such have become models for guilds, corporations, and religious institutions. There are restrictions in kinships, however, especially in primitive ones, that place significant obligations upon members, including their place in society, *i.e.*, their “status” as referred to by Dr. Maine. For this reason, and based on evidence, Dr. Nisbet noted a “partial decline of the kinship community can be a significant force in the eruption of the golden ages in the history of the mind,” indicating that kinship “affects liberation of the individual spirit and the expansion of individual imagination.”⁴¹ The egalitarian kinship status of all seventeen civilizations is recapitulated here, beginning with the five associated with medical practitioners:

- a. It was the reform of Cleisthenes, who in 508 BC abolished phratries (a form of kinship) in Athens, thereby opening further the door to democracy, increasing individual mobility, and leading to the remarkable phenomenon of Classical Greece. This was a formal acknowledgement of the victory of democracy over tribalism in ancient Greece, a process that had been under

³⁸ See: Greif, A., *Institutions and the Path to Economic Modernity: Lessons from Medieval Trade*, Cambridge, 2006, especially chapters 8, 9, and 12 which deal with family structure, institutions, and growth.

³⁹ See: Hayden, B., *The Dynamics of Wealth and Poverty in the Transegalitarian Societies of Southeast Asia*, in *Antiquity*, 75:571-581, 2001.

⁴⁰ See: Fustel de Coulanges, N. D., *The Ancient City*, Garden City (paperback), n.d. (first published in 1864), as translated by Willard Small, bk. 2, ch. 5.

⁴¹ Nisbet, R., citation on preceding page, p. 115. He also (p. 126) states that “Feudalism is an extension and adaptation of the kinship tie with a protective affiliation...”

way for a century throughout the Greek city-states.⁴² Indeed, the earlier selection of the tyrant, Thrasybulus of Miletos (*ca.* 600 BC), has been viewed as a primitive form of democratic process.

- b. Dr. Jason Ur, in studying the role of households in “urban origins,” noted that while the Ubaid period of Mesopotamia was “characterized by kinship organization,” it is generally held that with the appearance of cities during the succeeding Uruk phase there was a “disappearance of kinship as a structuring principle....” Dr. Ur proposes another explanation that retains the essentials of kinship through “nesting” of households. This interesting idea removes the nuclear family away from the larger extended family, band, and tribe kinship groups and toward a particular household that has, for whatever reason, attained prominence. This alliance, when multiplied, leads to a chief or titular head, *e.g.*, a king, emerging from the prominent household, but one with which the subservient households, not being conquered, can interact as with other households but at the same time benefiting from the new hierarchical arrangement. This freeing up of the nuclear family to make decisions in its own best interests is similar to the evolution of corporatism. The key point to be made is that such an allegiance leaves behind the coercive egalitarianism of the original kinship and, rather than replacing it with bureaucratic and political authoritarianism, it introduces the voluntary interaction of nested households, or at least that is the conclusion *vis-à-vis* Uruk.⁴³ Overall, Dr. Marc Van de Mieroop concludes it is unlikely that familial kinship ties carried over in cities even though persisting in peripheral communities. Documents from Uruk indicate that within the city only rarely were neighbors found to be related. Thus, it was the nuclear family that regained some of its autonomy in the city, whereas the extended family or clan remained active in the smaller settlements outside the city.⁴⁴
- c. In Egypt, the common man in early settlements might have been fully immersed in kinship obligations, although as populations increased it was the nuclear family that predominated, even to the point that there were no status names for those more distantly related. But as Dr. Juan Castillos pointed out, any kinship association weakened as local individuals began to realign themselves with more attractive prospects for their future, namely, commercial and bureaucratic ventures, and the kinship tie, limited as it was, was broken.⁴⁵ It is noteworthy that the three civilizations just cited, late Archaic Greece, predynastic Sumer, and Proto-Dynastic Egypt, were the

⁴² Through the Greek Dark Ages and into the Archaic period low-level kinships (family, extended family) were potent influences in daily life (Varto, E. K., *Early Greek Kinship*, Ph.D. thesis, University of British Columbia, 2009). Although higher level kinships increased in importance as population centers developed, archaic kinship rights, obligations, and penalties retained some force in family structure into the classical period of ancient Greece, a conclusion supported by the Gortyn Law Code (500-450 BC) found on Crete.

⁴³ Ur, J., *Households and the Emergence of Cities in Ancient Mesopotamia*, in *Cambridge Archaeological Journal*, 26:2, 2014.

⁴⁴ See: Van de Mieroop, M., *The Ancient Mesopotamian City*, Oxford, 1997, pp 103-110.

⁴⁵ See: Castillos, J. J., *The Development and Nature of Inequality in Early Egypt*, in *British Museum Studies in Ancient Egypt and Sudan*, 13:73-81, 2009.

source of medical classics postulated to have been compiled or composed during the transition from a coercive egalitarian kinship to central governance.

- d. Even for Liangchengzhen, the city-state representing the age of the Yellow Emperor, Dr. Rheta Lanehart has recently discovered that ceramic production was not under centralized management but was instead made with local, chemically distinct, substances and techniques by dispersed settlements, families or neighborhoods.⁴⁶ While this might be interpreted as an indication of a flurry of activity from small kinships, the fact that it was a local commercial effort within the larger population center identifies it as an entrepreneurial effort of the nuclear family or small extended family that permitted a degree of individual choice uncharacteristic of traditional kinships; they were curtailing aspects of egalitarian kinships for a better life.
- e. The shift away from egalitarian kinship for cities in the Indus River Valley civilization is less uncertain. An urban habitation pattern consistent with extended families is proposed as an explanation of the observed neighborhoods. Corporatism might explain the remarkable design and features of the city, for it suggests its residents had a role, directly or indirectly, in its formation. Corporatism, by enlisting the recommendations of its plebeian organization, would shift allegiance from kinship to a mutual interest, commercial ventures and support structures such as housing. Generic architectural designs in the neighborhoods that mimicked those of central leadership designs suggest their purpose was an enticement to plebeians to reorient their sympathies to their new urban institutions and away from traditional egalitarian kinship.

Within the twelve lesser civilizations described in chapter 8, there was a notable persistence of smaller kinship configurations despite enlarging central populations:

- a. Marajoara – The kinship arrangement of this egalitarian Amazonian civilization was sculpted by the environment in that traditional housing in settlements was on segregated mounds. Also, the work done on many of the mounds was characteristic of each particular settlement, in this way assuring there would be an additional limit on the opportunity for external pressure to alter the traditional social pattern of a mound's small kinship group. The clusters of settlements suggest a higher level of organization was needed in coordinating production and trading: a heterarchy.
- b. Norte Chico – The scattered small settlements along the four rivers emptying into the Pacific, considered egalitarian, contributed to the commercial and ritualistic features of this civilization. With each community having a population in the hundreds, the basic social organization was probably a kinship clan, each community with its own internal controls and an agreed-upon association with an organizational hierarchy that existed for purposes of ritual. Commercial ventures did not

⁴⁶ Lanehart, R. E., *Patterns of Consumption: Ceramic Residue Analysis at Liangchengzhen, Shandong, China*, 2015, Graduate Theses and Dissertations, Graduate School at Scholar Commons, especially chapter 2.

require a large population living in close quarters, thus requiring no separate authoritarian structure for maintaining social order.

- c. Poverty Point – The scattered settlements surrounding the remarkable residential mounds and stretching along the Mississippi River and its tributaries were likewise separated by environmental barriers from any coercive central authority and would have maintained tradition kinship relations.
- d. Cahokia – Despite being the “mall” for the central and southeast North American continent, the individual egalitarian settlements surrounding and supporting a professional hierarchy of ritual specialists retained traditional kinship social structures as evidenced by their ethnic diversity and their coming and going as kinship groups. The permanent peripheral settlements may have owed greater allegiance to a central authority, but if this were a voluntary choice the kinship scenario may have been in effect.
- e. Terramare – The physical separation of villages within a network of riverine channels may have limited the opportunity for central control in this apparently egalitarian civilization. Within the village, each populated by perhaps a thousand people, there would have been local leadership, for each village was a complete production unit in itself, consistent with the idea that metallurgical production was spread via kinships. Commercially each settlement would have functioned as a node in a civilization-wide heterarchical network, but there was no higher level of organizational power to counter or weaken the underlying traditional kinship systems.
- f. Catalhoyuk – This egalitarian community had, based on recent assessments, neighborhoods. To this can be added the proposal that stability for the entire settlement is to be found in the side-by-side association of two distinct kinships in such a way as to permit intermarriage. The “neighborhoods” were small clusters of attached dwellings, each cluster separated by architecturally distinct walls from the otherwise contiguous settlement. There is little reason to consider anything else than kinship organization with all its social stability as the explanation for the longevity of this remarkable civilization.
- g. Sintashta – As noted above, recent assessment of the Sintashta settlement social system suggests this civilization was built around corporatism. Its dwellings were comfortable but physically close and consistent with a homogeneous social pattern. With no evidence of chiefdom, this would therefore represent a voluntary commitment of kinship groups to the purposes of a common commercial venture. While commercial success resided in the cluster of kinships that agreed to function as a single commercial organization with characteristics of corporatism, social cohesion was found in “jural elements in social relations” provided by the individual kinships.
- h. Shahr-i Sokhta – The commercial center that arose from small settlements in the Sistan basin primarily centered on trading, but it was a heterarchy of commercial operations. Presumably life of the common citizen was tied to one of the commercial trading ventures, and with no need for a military, no defensive considerations and a ready supply of food there should have been few limitations from the city itself on activities of its citizens, in other words, no central organizational authority. Its seemingly discreet

neighborhoods were probably based on distinct commercial interests in alliance with kinships.

- i. Djenne-Djenno – Segregated settlement mounds, each settlement a separate production unit of a heterarchical commercial center, were also kinship units within this remarkable egalitarian civilization. Other than some presumed traditional guidance and recommendations from the established earlier families at the site, no centralized power existed. Social cohesion resided in the kinship.
- j. Liangzhu – It would seem, given its early dates, that kinship relations must have been essential to the cohesion and success of this commercial city. It is likely that the marked social stratification found its basis in commercial ventures. A kinship prominent in organizing a venture became elite, thus leading to stratified class distinction, with traditional kinships persisting in the lower classes. Subservience to the kinship was dominant.
- k. Anasazi – Undoubtedly kinship associations were essential as tribes made up the social composition of this commercially-based civilization. Central storage and the ability to acquire the labor of many members for projects oriented toward the public good suggest a form of corporatism, and, as there is no evidence of coercive central governance, a reasonable conclusion is that traditional egalitarian kinships provided the social cohesion necessary for public works. There is the additional factor of geographical separation among the many smaller settlements over a large region, a feature that would favor continuance of local egalitarianism.
- l. Cucuteni-Trypillia – This civilization of egalitarian “cities” and small settlements with no commercial base has been recently analyzed regarding settlement patterns within the cities. It was concluded that one explanation for the unique layout of the large population centers was the localization of each kinship or band to a linear cluster of dwellings.

Table 5 contains the preceding data and will assist in focusing later discussion.

I. Egalitarian kinships

From Table 5 it might be concluded that the pervasiveness of kinship-based organization in evolving civilizations is by itself a powerful nullifying force in pursuing progress. But kinship is a social constant worldwide and underlies the structure and function of myriads of organizations, large and small. Dr. Nisbet has pointed out the following: kinships do not prevent intellectual achievement, and, indeed, rather than struggling against traditional kinships the Founding Fathers of the United States Constitution “incorporated rather than dismissed” the concept. Kinship is not necessarily related to egalitarianism, for he noted that kinship has a strong tradition in authoritarian societies, and it does provide a latticework for social interaction that averts chaos. He states instead that: “Egalitarianism represents the leveling of all those ‘inns and resting places’ of the human spirit which are found in social hierarchy, tradition, kinship and

Table 5: Characteristics of social organization for the twelve primary lesser and the five primary “successful” civilizations* during early urbanization.

Lesser Civilizations	Archeological Egalitarian	Egalitarian Kinship**	Commercial Heterarchy***	Authoritarian Hierarchy	Primitive Corporatism
Marajoara	-	+	+		
Norte Chico	-	+	+		
Poverty Point	+	+	+		
Cahokia	+	+	+		
Terramare	+	+	+		
Catalhoyuk	+	+	-		
Sintashta	+	+	-		+
Shahr-i Sokhta	+	+	+		+
Djenne Djénno	+	+	+		
Liangzhu	-	+	-	+	
Anasazi	+	+	-	+ (late)	+
Cucuteni-Trypillia	+	+	-		
Successful Civilizations****					
Greece (Miletos)	-	-	+		
Sumer (Uruk)	-	-	+		
Egypt (Hierakonpolis)	+	-	+		
India (Mohenjo-daro)	+	-	+		
China (Liangchengzhen)-		-	+		

* Social status of the five “successful” primary civilizations at the proposed time the original compilation and/or composition of their classic medical writings took place. Most of the seventeen civilizations had more than one mechanism in play.

** Low-level kinships (bands, clans and tribes).

*** Heterarchy, often concurrent with hierarchical characteristics.

**** Successful in that a nascent medical profession developed.

institutionalized religion.”⁴⁷

Many attributes of the lesser civilizations are shared by the successful primary civilizations. It is, therefore, not only the observation that all twelve have been designated as primarily “egalitarian kinship” in social order that leads to the conclusion that that designation is highly significant in determining each civilization’s subsequent course. Equally important is the fact that many other factors that might have been thought to be significant have been determined not to be. In other words, by excluding things like total population, durability and extensive trade as factors determining the ultimate social fate of the twelve lesser civilizations/proto-civilizations, the inverse association between “egalitarian kinship” and progress obtains logical strength, if not statistical power.

And this brings us to the relevance of Table 5 and to the attaching of the term “egalitarian” to “kinship.” Chiefdoms, which find their basis in one form or another in kinship, can be a bridge by which egalitarian kinships are transformed from horizontal

⁴⁷ See: Nisbet, R., *Prejudices: A Philosophical Dictionary*, Cambridge (MA), 1982, p. 18, in his discussion of authoritarianism, and p. 125 for egalitarianism.

into hierarchical, or “vertical,” ones. Thus, there are two common paths to a classed society, one being commercial success, a gradual process by which those favorably positioned can rise above the general community by the use of their commercial success to dispense patronage and acquire power. The other, by skillful manipulation of position within the kinship, enables a dominant figure, or “chief,” to dispense patronage and acquire power. In the former, elevation in class is related by social proximity to the source of success, whereas in the latter the assigned status of those within the kinship is arbitrary and unrelated to ability. Over the long term the latter mechanism becomes political and always triumphs over the former. In that a chieftdom is a “vertical” form of egalitarianism, power guiding redistribution no longer rests with the shifting and tractable social interactions of the community but with the permanent power to dispense favors by the chief. Thus, both the horizontal egalitarianism of small kinships and the vertical egalitarianism of larger kinships beholden to a chief are coercive forces designed to manipulate the individual for the benefit of the kinship and its leadership, the former by preventing change, the latter by controlling its course. Egalitarianism is the justification for authority of the kinship, and the kinship provides a mechanism for its enforcement as its size increases. This is implied in the combined terminology of the Table, “egalitarian kinship.”

But if Table 5 has any message to tell, it is that the sorry history of humankind can be viewed in great part as its immobilization by egalitarianism. In *The Natural State of Medical Practice*, volume 1, the *Natural Law Theory of Human Progress* was proposed as the explanation for the brief success of Hippocratic medicine and for the remarkable success of modern Western medicine. For Miletos that success occurred at a time of weakening of kinship structure, for allegiances were shifting from a local to a higher level of organization, from the small group to the large one that was less personal and more profitable for the individual and family. The present analysis suggests that similar circumstances may have existed when medical practitioners first acquired the clinical insights that would end up in the classics of medicine from Mesopotamia, Egypt, China, and India (the latter two being the more tenuous), and it has confirmed their clinical acumen. It has also reviewed twelve lesser civilizations to determine if clinical medicine might not have progressed even earlier in prehistory or at other locations. Despite some metrics akin to five archetypal city-states of the “successful” civilizations, no evidence of a medical profession has been so far discovered in the twelve, with the possible exception of Shahr-i Sokhta. This would at first seem extraordinary.

But from the preceding discussion it can be surmised that the opposite is true; it was even predictable, the reason now appearing obvious:

- a. When considering the five successful primary civilizations of the early chapters of this work there seems to exist a window of opportunity between the successful founding of a primary civilization and the apparently inevitable takeover of governance and control of the population by a centralized political and authoritarian, usually male-dominated, hierarchy. Dr. Rita Wright has captured that moment in a statement about Uruk: “This urbanism occurred in the absence of a strong centralizing state and was able to thrive for at least a brief moment under the control of decentralized local groups.”⁴⁸ During the unfolding of this process the hold of egalitarian

⁴⁸ See: Wright, R., *Prehistory of Urbanism*, in *Encyclopedia of Urban Cultures: Cities and Cultures around the World*, Danbury (CT), 2002.

kinship weakened, traditional duties and responsibilities diminished, and individual action could be taken. It is during this fragile period, flanked by the weakening of the diffuse coercion of egalitarian kinship and the subsequent coercion of a centralized authoritarian State, that can occur the freeing up of minds and bodies to explore new ideas and to actually implement new ways of doing things.

- b. From the twelve lesser primary civilizations the following is discerned. Despite the inception of trading networks and the production of goods and services that followed on agricultural surplus, elements of egalitarianism within the greater community remained unimpaired and inhibited development by retaining an archaic low-level social structure resistant to change. This was aided by inhibitory environmental, geographical, and agricultural factors. But the constraining force of egalitarianism expressed through kinship that caused civilizations like those of Catalhoyuk, Cucuteni-Trypillia, Poverty Point and Djenne-Djenno to remain unchanged for a thousand years was just as profound as the pharaonic regimes of Dynastic Egypt, an authoritarian governance that prevented progress in ancient Egypt for two thousand years. In the lesser primary civilizations like Marajoara, Norte Chico, Terramare, Cahokia and Anasazi the duration of a stable society was not as long, but none were shorter than the average Floruit duration for the primary successful civilizations.⁴⁹ Yet none had evidence of progress as defined herein, and all relied primarily on egalitarian kinship for social control.

Egalitarianism was expressed through kinships, and, when opportunity presented itself in the early development of the five “successful” civilizations, individuals and families were motivated to improve their lives by moving into commercial spheres of influence. In doing so it is proposed they were not moving to something, *e.g.*, a population center, because of its attractiveness. They were moving away from something. The desire was so great that they did this without clear knowledge of the outcome, for this would have been an unusual event in local prehistory. Matters were different in some of the twelve primary civilizations, including Cahokia and Anasazi, for the move proved problematic after two or three centuries and the populations reverted to their egalitarian (tribal) roots, not because it was particularly desirable but because the alternative had proved untenable. But the damping effect of egalitarian kinships, while not quantifiable, led to their social paralysis, for it is the consistent presence of egalitarianism in lesser *vs.* the successful primary civilizations that is statistically the dominant factor. Dr. Trigger states: “In early civilizations, ..., class displaced kinship and ethnicity as the main organizing principle of society.”⁵⁰ According to this sequence kinship affiliations were exchanged for social classes, suggesting little room for individual or group freedom in either camp; the average man merely jumped from the frying pan into the fire. But it can be argued that this profound shift in allegiance was impossible to have been effected immediately, and perhaps in some circumstances it could even be modified. In the interval between the two positions, which might have been years, decades, or centuries, and given the “carrot” of prosperity and the opportunity for relief from traditional

⁴⁹ This is just to reiterate that important feature of the successful primary civilizations: they were successful in initiating progress but unsuccessful in maintaining it.

⁵⁰ Trigger, B., *Understanding Early Civilizations*, Cambridge, 2003, p. 47.

obligations and responsibilities, egalitarian obligations could fade and a degree of individual choice, and thereby progress, could then ensue until such time as inevitable political forces appeared that overpowered early efforts at individual or group autonomy.

J. Conclusion

Egalitarianism has been discussed by Dr. John Kekes as an ideology, one of many “isms” upon which social order has been theoretically constructed.⁵¹ Although Dr. Kekes reveals the irony, the illogical nature, and the human misery that has followed on attempts to impress egalitarianism on populations in recent history, he has also pointed out that the ideological methodology used to promote such a social change is an even more fundamental social defect than egalitarianism itself. This is because ideologues, by stifling alternative thinking, prevent realistic dialogue and openness in relation to other social constructs that might prove practical, if only in part. As a consequence of the work of Dr. Kekes and others in Western society, previously held sympathetic views of egalitarianism are now giving way to a better understanding of its modern authoritarian threat and its tragic historical documentation.

Somewhat different, however, is the context of egalitarianism in the present work. In early and primitive societies alternative “isms” were nonexistent. Ideology and the ideologue were, therefore, not the issue, for there were no competitive alternatives except for group schism or isolation from one’s band or tribe. Likewise, the concept of personal liberty would not have existed, and therefore could not have been infringed in those ancient times because survival of the individual superseded personal fulfillment. And so it is the intrinsically authoritarian nature of egalitarianism itself, rather than its ideological enforcement by marginalization of social alternatives that, at an early and vulnerable state of human social evolution, is at issue in this work.

It has been shown in this volume that, despite the apparent absence of social coercion by ideologues, personal ambitions were still held in check in early societies. Notwithstanding their relatively small size and thereby the necessarily close personal interactions within those societies, the egalitarian threat was omnipresent, whether in physical strength of a headman or in compulsion or expulsion by the kinship itself, the latter recognizable today in single issue political parties and the tyranny of the majority, a concern of democracy that requires constant attention.

One might even view egalitarianism as an example of tyranny of the majority, or vice versa. The course of an egalitarian society may change according to circumstance and with the blessings of the society as a whole, thus giving the appearance of free and equal “egalitarian” competition of ideas. But enforced uniformity of action and the redistribution of resources and effort in production is a feature common to both modern and early/primitive egalitarianism. Such behavior, by its infringement on human liberty, is logically immoral, a point touched on in the next chapter. It is only when the element of kinship enforcement relaxed that an element of individual and group autonomy could occur, and this happened only when a less coercive, albeit temporary, option opened: commercial prosperity and early urbanization. This option was not purposefully devised

⁵¹ Dr. John Kekes, Emeritus Professor of Philosophy, State University of New York, Albany, has exposed, for many years and through many books, the troublesome issues and illogical thinking associated with egalitarianism. See especially his *The Art of Politics: The New Betrayal of America and How to Resist It*, New York, 2008.

or chosen for its attractiveness. It was chosen because it was a way to escape egalitarianism. Unfortunately for twelve of the seventeen civilizations analyzed herein, there was no attempt to escape and no place to escape to. Kinship enforcement remained in place.

CHAPTER TWELVE

NATURAL LAW

Definition of Natural Law: A body of unchanging moral principles regarded as a basis for all human conduct.

Oxford English Dictionary

Following a definition of natural law that includes its applicability to all mankind, it is axiomatic that it must apply equally to both early and modern man, including ancient hunter-gatherers. As far as it is a “law,” it exists to guide the community of man. Because of the varying definitions of natural law, the term as used here is equated with the *moral sense* as described by Dr. James Q. Wilson. Evidence supporting the existence and general applicability of natural law in historical and modern societies is reviewed. Its relevance to early human societies is then discussed in relation to specific areas in which moral valuation is displayed. The consequences of actions in accordance with, or inconsistent with, natural law as they affect the development of early man’s social organizations are then discussed. The conclusion is that coercive egalitarianism and egalitarian kinships (as discussed in the previous chapter) include within their strategies such practices as are inconsistent with natural law, thereby inhibiting proper societal evolution and the realization of progress. Sadly, the felonies of a few have devolved great misery upon the many.

- A. A brief review of the concept of natural law
- B. Spontaneous order and natural law
- C. Natural law in major civilizations
- D. Natural law in recent history
- E. Natural law in early societies

- A. A brief review of the concept of natural law

If there were an innate natural guide that provides mankind with a means for discerning right from wrong in its social interactions, a moral compass that is universal and timeless, it should have applied to the first humans and must have attended the association of individual humans into small, then larger, groups as they moved in ancient times from a nomadic to a settled existence. As a uniform code of just and fair conduct it should have been available to assist group cohesion and protection, the making of decisions, the management of crises and the use of local resources. If the intellect of mankind has not deteriorated over the last ten thousand years, then neither has that internal guide, our conscience. Particularly relevant to present purposes, it should have been available to aid personal interactions and to maintain a nonchaotic balance of interests throughout an early community and all those that followed. Had it been a part of every member in a community it should have helped keep the community communal, assisting in its survival and realization of a better life for its individual members.

Described above in the subjunctive and in view of the generally pathetic course of mankind’s social organizations in providing a better life it may be easy to dismiss the concept of innate moral guidance as fanciful or merely an appendiceal religious

conviction. But nothing could be further from the truth. The innate moral guidance under consideration has been proposed, corroborated and studied for thousands of years. Its traditional name, “natural law,” commonly presented by scholars as first applied by the Stoics in the phrase νομὸς κοινὸς, will be used herein.¹

As an opening statement, the purpose of natural law, as far as human reason can discern, is to help the human community survive and thrive. It is not a guide to personal fulfillment; its role is to help human society overcome obstacles to survival and security. Although directed at the individual, its purpose is to promote the group. And while it is commonly discussed in terms of human interactions within a large society, it should be operative in small groups as well. In this volume it applies both to the urbanization of large populations and to the entrepreneurial function of the small group, the “koinon.”

One might suppose that language development within early communities had to be sufficiently advanced to transmit philosophical concepts among their members for natural law to come into play. But the components of the moral compass ascribed to a “natural law” are few and simple even though a huge bibliography representing untold hours of study and thought on natural law has accumulated over the ages. For example, there has been a distinction made between “natural law” and “natural rights,” with extensive explication and scholarly dialogue attached thereto. Modern references to natural law vary widely, from what quaintly can be termed the wise regulations of Mother Nature to the desire to conflate the basic mathematical structure of the universe with its functioning, including the purpose and future of humankind.² In recent literature an equivalent concept has been called “the moral sense.”³ But the definition of natural law at the beginning of this chapter, short and simple, is useful because it identifies natural law as being a matter of principles, thereby bypassing legal arguments about the popular Western identification of the topic as “law” in common usage.

It is essential that the definition of natural law be understood to mean that certain moral principles are innate in every human being, regardless of time, place, or social setting. It implies that natural law need not be taught; it is already in play in every person, although its expression might be buttressed in an individual raised in an environment consonant with natural law. Because of varied social environments and because expression of natural law must inevitably come via a human agent, characteristics of the times, places, and social settings can be dragged along with that expression, sometimes masking the profound principle involved, sometimes cloaking it within secondary gains of the society or the individual invoking it, and sometimes being explicitly denied because of deemed necessary “human” priorities. The moral principle in question has been characterized as not self-evident. But they are self-evident in human actions because there is no alternative explanation for first principles underlying man’s moral foundation. On the other hand, most persons have never thought much on the matter, and therefore natural law may be indirectly self-evident via its effects even though it goes unrecognized by

¹ Interpretation of the Stoic phrase is usually given as “natural law,” although linguistically its meaning is closer to “common law” or, less likely, “law as commonly understood.” But in reviewing the various ancient Greek statements regarding natural law, it is the statements made in context, more than traditional lexical definitions, that make clear it is an innate moral sense of Divine origin that is meant.

² See: Heisenberg, W. K., *Das Naturgesetz und die Struktur der Materie/Natural Law and the Structure of Matter*, Stuttgart, 1967.

³ See: Wilson, J. Q., *The Moral Sense*, New York, 1993. Wilson uses sympathy, fairness, self-control and duty as chapter headings and addresses them as characteristics of the moral sense.

individuals unaware of the expressed concept but active in its application. While not codified, the commonality of natural law expression throughout the family of man and its independence from genetics and human dialogue underscores its fundamental nature and thereby its chronological precedence and primacy over human law, which hereafter will be termed “positive” law consistent with current scholarly use.⁴ The source of natural law is not a matter for discussion here. Dr. James Q. Wilson generously included natural selection as a potential mechanism for its generation (as cited above, p. 23), although just how natural law happened to have found a place on the list of characteristics usually considered to be naturally selected by an unforgiving state of nature is not pursued in depth. C. S. Lewis cleared up the matter for many by pointing out that natural law is not an instinct, for an instinct is a propensity to act in a specific way, whereas natural law is a guide for what to do, a guide for choices, and it therefore helps us decide the right choice between two instincts.

A profound philosophical basis for natural law is expressed in the writings of Immanuel Kant, the German philosopher. As for its foundation, he stated, “Autonomy is therefore the ground of the dignity of human nature and of every rational nature.” The natural end of man’s actions is his happiness, a goal that requires autonomy, and it is only from a position of autonomy that morality is expressible. Furthermore, as a “principle of reason” independent of circumstances, a morality encasing good will is an expression of a universal law that each individual, on reflection, could conclude by himself. By confusing legislated laws with the moral law, to the extent that the former is inconsistent with the latter, the supposed positive benefits of the former can return negative results on the proposer and all others. What prescient words! Kant avoids identifying the source of moral law beyond the individual, but it has a reason for existing in every human in that reasoning humans exist; it is inherent in all.⁵ From this perspective Kant is providing intellectual and logical support for what mirrors the Golden Rule and our conscience. Indeed, his concept of the Categorical Imperative is in part considered a restatement of the Golden Rule: “Act only in accordance with that maxim through which you can at the same time will that it become a universal law.”⁶ To the extent that he requires autonomy for expression of morality he stands with advocates of political freedom such as John

⁴ Darwin (*The Descent of Man, and Selection in Relation to Sex*, London, 1874, 2nd edition, chapters 4 and 5) commented on the importance of morality as a feature distinguishing man from other animals, and that the basic tenet – “the prime principle of man’s moral constitution” – is, in effect, the Golden Rule. Furthermore, this social instinct was acquired (*i.e.*, not innate) “for the good of the community.” He was puzzled by the proliferation of “absurd” rules of conduct and religious beliefs in the face of “self-regarding virtues” that “now appear to us so natural as to be thought innate....” He also felt that persons whose actions were inconsistent with virtue had a greater mortality rate than the virtuous, and that there was, as a consequence, a gradual but favorable movement in social integration of mankind over time, like the changes in behavior of domesticated animals. Furthermore, he considered virtuous traits transmissible via heredity: “If bad tendencies are transmitted, it is probable that good ones are likewise transmitted.” Natural law in its present context, however, is present in every individual, and its variability in expression bears not on the presence of the “law” (it is always present) but on the awareness and receptivity of the “law” by the individual personality.

⁵ The quotation from Kant is found in *The Moral Law*, a translation and analysis of Kant’s work on morality by H. J. Paton, London, 1964, 2nd edition, p. 103.

⁶ See: Kant, I., *Groundwork of the Metaphysics of Morals*, Cambridge, 1997, as translated by Dr. Mary Gregor.

Locke and other icons standing behind the Framers of the Constitution of the United States.

The intertwining of natural law with positive law in recent years is confusing. Dr. A. Dicey (1835-1922), the famed English jurist whose three principles for the supremacy of the ordinary law of the land over all citizens made no reference to the role of an innate sense of right or wrong in deriving the laws of the land, is nevertheless often stated to base his references to personal freedoms on natural law.⁷ One reason for the confusion is in not realizing that natural law, or moral guidance, is an attribute of an individual, not an organization. The freedom of the individual is not granted him or permitted him by some organization. Nor is it based on what his predecessors have determined by trial and error over centuries is best for that organization and therefore for him. Nor is it part of some social contract under which his freedom is inherently linked with everyone else's in some sort of organizational give and take. Nor is it part of some cosmic idea of how we think things should be run. Rather, his freedom is based on the innate understanding of other individuals around him that he is not to be kept from doing what he wants to do, just as he is not to interfere with them. Natural law is a moral orientation, not a legal document. But if an individual purposely invades the territory of another, whether by preventing an action, taking away a possession, injuring, misrepresentation, or deception in the absence of a provoking invasion of his own territory, there has then been a disregard of his moral guidance, and that is wrong. In its most general expression it is the Golden Rule, variations of which have been found in virtually all cultures, one of the scholarly proofs of the existence of natural law.⁸

It can be argued that, while ignoring natural law carries no penalty for the individual unless there is a positive law of society that is consistent with moral guidance, there is a price extracted from the community, and that price, the consequence of ignoring moral guidance, may be the failure of the community to thrive or survive once sufficient indictments have accrued. The failure is not so much in the nature of a penalty as it is merely the consequence of choosing the bad option. Natural law, or moral sense, or the Golden Rule, provides guidance, through the actions of its members, to a community on how its members should get along with others. It is not an individual's key to the Kingdom or a pathway to Heaven.⁹ It follows that when controverted, a price might be extracted from the community by the turn of events. And that is the reason it is proposed here that the nineteen "great" civilizations of mankind identified by Toynbee have disappeared (the remaining four, including Western civilization, presently in the balance).

⁷ See: Dicey, A. V., *Introduction to the Study of Law of the Constitution*, New York, 1915 (8th ed., initial version published in 1885). He identifies three principles: all citizens are subject to "ordinary" law rather than arbitrary, ordinary courts must apply the ordinary law, and fundamental rights are "rooted in the natural law" rather than abstract constitutional concepts.

⁸ Scholarly descriptions of a maturational path to morality (Kohlberg's stages of moral development) have received much attention in recent decades, and there has been some attempt to compare those stages with morality as acquired by primitive societies. This is not, however, an appropriate analogy, either on principle (adults, primitive or no, are not children) or with regard to natural law (which is innate and complete from its onset, is unlearned, and is not imprinted, although it can become more obvious in a social environment that does not suppress its expression).

⁹ The individual, however, is inevitably involved. Natural law provides for the good of the individual in that the individual is the beneficiary of group action. Put another way, natural law provides guidance for the group, and its transgression can lead to penalties for the group. A murderer may escape punishment, but society will not.

B. Spontaneous order and natural law

General principles of natural law can influence community perspective on a broad front and lead to a general concordance of opinion. For example, the principle of noninterference with another's actions (assuming no harm was intended or predictable) might provide "moral" guidance that would diminish intrusions into each individual's attempt to improve his or her prospects during the early stages of urbanization. The "settlement hierarchy" is an organizational model relevant to urbanization that predicts hierarchical evolution as a consequence of population increase.¹⁰ The greater the population, the greater are the levels of hierarchy needed to provide a level of efficiency and support for the growing population to prosper. This type of hierarchy is not imposed on the community; it is devised by the growing community as needed. And as population increases commensurate with prosperity, existing supports for the community can increase or enlarge and new supports for the community can be acquired. But the key to this change is prosperity. As population increases the increasing prosperity produced by commercial success affects the overall population. At some point, therefore, an individual may find that his ability to effectively treat some medical issues in the community can be used as a source of income. Population continues to increase, other individuals take up the provision of health care as a source of income, and soon a collegial network of commercial medical services can be identified.

All this did not happen because it was ordered by a central bureaucracy. It was made possible because the community became more prosperous. Thus, both urbanization and a medical profession can be attributed to prosperity. But note that the changes developed from the bottom up, not from the top down. This is because those who affected change did so because of self-interest, not because they were commanded to do so. And that is the point to be made about a settlement hierarchy. The modern concept of settlement hierarchy is deceptively simple: a ranking of population centers by size. But for primary urbanization of extraordinary importance is that development of the self-regulating hierarchy is in the hands of the people themselves, not a political, hereditary, or occupying power that dominates society and dictates development. The latter will happen soon enough, but before authoritarian interference takes charge there is a period in development where there is little infringement on normal human interactions that permit coordination, cooperation, disagreement and dissent to the benefit of all. It, like a free market, is an example of spontaneous order as discussed on p. 257. It occurs as a nucleus of people, each working to improve life for themselves and their families (whether or not they act as individuals or as constituents of a commercial venture), seize upon a variety of individual mechanisms for that improvement, but the common outcome of the effort is progress toward an improved condition for all, a feature unintended at the onset. No one said, "Come everyone, we can make a great city if we work together." Instead, the sentiment was, "We will be free of the bullying from the tribe if you and I and the children move to the settlement and help John sell firewood to the folks making those nice ceramic pots." And as situations improved urbanization would continue until

¹⁰ For a recent review of early urbanization see:

Sandeford, D. S., 2018, *Organizational Complexity and Demographic Scale in Primary States*, in *R. Soc. open sci.* 5:171137. <http://dx.doi.org/10.1098/rsos.171137>. The text also includes an overview of specific primary "states," and there will be some demographic data at variance with that included in this volume (e.g., Sandeford reports Hierakonpolis with a greater population), but that is the nature of scientific inquiry when data are limited.

it reached a point where, inevitably, envy and greed would spark a power grab by a few of the overly ambitious.

Earlier the susceptibility of spontaneous order to disruption was discussed in relation to egalitarianism. As has been proposed in this volume, progress was thereby unable to be initiated. The preceding paragraph has described how progress can be stopped by authoritarian strategy, as proposed in volume 1 of this work. But the settlement hierarchy can provide a window of opportunity for improvement in the human condition. It is a point in time sensitive to a variety of human ideas and ambitions that, if left alone, will see a potpourri of individuals work out their differences by compromise (see the Introduction of volume 1), bargaining and bickering. Individuals can seek and find opportunities. This latch pin to progress has been lifted, and spontaneous order, as corollary of natural law, has been permitted to work.

Spontaneous order can be viewed in part as a derivative of innate moral guidance as applied by groups to everyday decisions and in part as a consequence of individual liberty. If an issue with a moral aspect arises in a free people and a vote is taken to initiate action the myriad of votes cast would ideally represent the group's decision within a moral framework that, regardless of their personal motives, would in general be the good rather than the bad decision. Insofar as spontaneous order will be displayed in the actions of a free people, the conflation of spontaneous order and natural law seems logical, for individual liberty is an indispensable feature of both. People must be free in order to ensure that their assent on social direction reflects their unfettered opinions and discussions on any moral issues attached thereto, the key word being "unfettered," a state that has rarely existed in the past. Spontaneous order can be viewed as not complementary to but as a subsidiary of natural law.¹¹

Pertinent to present discussion, spontaneous order should not be an issue in a heterarchy, for the options of members of a heterarchy are primarily technical details relevant to commercial ventures and relevant to relatively few people, whereas spontaneous order is a manifestation of a universal prompt for moral action. In a heterarchy the questions to be solved involve appropriate management, nature of competition, logistics and the like.

Spontaneous order is also not an issue for the specialized group such as the koinon, for the focus of the koinon also is narrow and technical, factors open to discussion are well-defined, and the group size is usually small.

But there is a troubling implication of spontaneous order as a manifestation of controverting natural law that has prompted present discussion. Inasmuch as the consequences of spontaneous order are dependent on a society's openness to natural law, a society that is, for whatever reason, not open to it will receive no benefit from it. And when nonbeneficial consequences inevitably appear all members of society will suffer, whether or not some members would have acted in a way consistent with natural law. One is reminded of the many tragic vicissitudes that befell Biblical populations or cities that must have included among their numbers many individuals who would have chosen a course of action consistent with natural law but were caught up in the consequences of an incorrect alternative selected by authoritarian leaders. The wrath brought down on the heads of innocents was the consequence of their being unable to put forth their arguments

¹¹ This is not just a personal judgment. See: Skoble, A., *Natural Law and Spontaneous Order in the Work of Gary Chartier*, in *Philosophy Faculty Publications*, Paper 49, Bridgewater (CT), 2014.

for correct action.¹² In this sense, their sad endings were, like the denial of progress, a result of communal action they could not avert (or of communal inaction in not replacing defective leadership). In a sense, the untoward results also may be viewed as built into an aberrant human response in such a way that humans, through their errors in judgment, inflict their own punishment. The population or its leaders brought those consequences upon themselves because its form of governance, whether egalitarian or authoritarian, ignored or suppressed opinions of those through which spontaneous order could have been expressed. One can understand, even if not agree with, the ancient claim of the superiority of democracy with equality before the law over hierarchical authoritarian governance, and with the claim, first implemented by the Founding Fathers, that democracy alone is insufficient for the protection of minorities, and therefore protections were provided so that all opinions would have the opportunity for free and open discussion. Without exercising these options, humanity will remain at the whim of authoritarians and will continue to be the recipient of tragic consequences because of their own poor choices or poor choices of authoritarian leadership. It is through the workings of spontaneous order that one can more easily understand that humanity is endowed with natural law in order that societies, rather than individuals, be enabled. It is, however, obvious that, if a society benefits from natural law and spontaneous order, benefits will redound to the individual member as well.

C. Natural Law in Major Civilizations

Much has been written about natural law in recent centuries, with the great impetus coming from the profound analysis by St. Thomas Aquinas (1225-1274 AD), but reference to innate moral guidance that transcends the laws of man is an ancient concept, which one would expect were it a feature of the human mind everywhere and in all times. Historically, Classical antiquity in the West included Sophocles describing its importance and its origin in Antigone's reply to Creon, ruler of Thebes: "Nor did I think that your decrees were of such force, that a mortal could override the unwritten and unfailing statutes given us by the gods. For their life is not of today or yesterday, but for all time, and no man knows when they were first put forth."¹³

Aristotle applies natural law to the political arena, stating that political justice is part legal and part natural: "...; by general laws I mean those based upon nature. In fact, there is a general idea of just and unjust in accordance with nature, as all men in a manner divine, even if there is neither communication nor agreement between them."¹⁴ He then proceeds to offer the analogy of Antigone, just mentioned above, so that there is no question as to the point he was making. And Cicero made numerous references to natural law that are frequently cited and which formed an important part of Roman law, subsequently to be passed on to Western constitutions. This innate moral guide, he said, was born with us: *non scripta, sed nata lex*, and was not a product of the State for it existed

¹² This is identified in Ecclesiastes, 8:14: "... that there are just men to whom it happens according to the work of the wicked; again, there are wicked men to whom it happens according to the work of the righteous." (King James translation.)

¹³ From Sophocles play, *Antigone* (Ant., 476), first performed in 441 BC, translation of Richard Jebb. For a relevant and encompassing review of Greek references to natural law see: Le Bel, M., *Natural Law in the Greek Period*, in *Natural Law Proceedings*, 1949.

¹⁴ Aristotle's *Rhetoric*, 1373b2; translation of J. B. Freese.

before States were established.¹⁵ Furthermore, in *De Officiis* (3.69) it is made clear that moral law supersedes civil law, whether the latter is just or unjust: “The civil law is not necessarily also the universal law, but the universal law ought to be also the civil law.”¹⁶ With regard to slavery, Dr. Muller reminds us that Ulpian (170-223 AD), Tryphonimus and Cicero considered freedom as included under *jus naturale*.¹⁷

St. Thomas defined at length the concept of natural law as a manifestation of God’s omnipresence in his earthly creation, and this has generated much scholarly discussion ever since. Natural law is not Eternal law, the latter representing God’s plan for the Universe and perhaps being closer to Heisenberg’s concept of “natural law” (see p. 271), and it has been suggested that the Mosaic laws were prompted by the insufficient attention given by the favored of God to His internal directives (*i.e.*, natural law). But natural law is the moral compass each individual possesses, and it can be followed or willfully bypassed, its guidance ignored in the face of a complex or chaotic society or undue self-interest. It has been frequently suggested that natural law varies from region to region, from society to society, because each society has its unique history and needs. But natural law does not vary according to region or society. It is found in every individual, and it has been present since the first man and woman. There is a natural inclination to follow natural law. It has made group living successful over the ages and may have been absolutely necessary for survival of our species. Had humans not been the fortunate recipient of natural law, they may have remained, in the mind of the evolutionists, but king of the jungle in a real struggle against gorillas, lions, and cobras for survival. St. Thomas included the following as internal expressions of natural law guidance:¹⁸

1. We know good is to be done, evil to be avoided.
2. We know our actions should be guided by reason.
3. We know we should not harm others.
4. We know we should not kill others.
5. We know we should not commit adultery.
6. We know we should not take from others.

In the writings of St. Thomas circumstances exist whereby these moral prerogatives have been modified, and this has been the source of differences in interpretation of the concept of natural law.

¹⁵ In *Pro Milone* (4.10) Cicero stated the following about law in the context of self-defense: *non scripta, sed nata lex* (“This, therefore, is a law, O judges, not written, but born with us, - which we have not learnt or received by tradition, or read, ... imbibed from nature herself,...”, translation of C. D. Yonge). It is a statement on morality in that Cicero was arguing that it is not immoral to forcibly defend oneself from “plots,” “robbers,” and the like.

¹⁶ “Quod civile, no idem continuo entium, quod autem gentium, idem civile esse debet.” Translation in text by Walter Miller in the Loeb Classical Library, volume XXI, Cicero, *De officiis*, 1.10.31. In *De Officiis*, 3.26 and 3.27, a discussion of the difference between what is right and what is expedient, he notes it is a law of nature not to harm another human. In 3.70, 71 he decries fraudulence and cites civil law as based on a “natural feeling for the right,” therefore suggesting an example of the appropriate conjunction of natural law with civil law, a form of positive law (although the force of the argument is lessened in the section mentioning vending of slaves).

¹⁷ See: Muller, H. J., *Freedom in the Ancient World*, New York, 1961, p. 265.

¹⁸ This list is extracted from: *St. Thomas Aquinas on Politics and Ethics*, New York, 1988 (paperback), translated and edited by Paul E. Sigmund, pp. 48-50. St. Thomas’ comments on natural law and its varying interpretation according to circumstance makes clear understanding difficult for many of its readers.

Within the Judeo-Christian ethos of Western civilization natural law can be discerned *ca.* 1300 BC, the time of Moses. Had Hebrew society abided by natural law just what the consequences would have been over time are unknown, for early Hebrew society was soon transformed by kingship, an undemocratic transition that blunts individual responsibility and choice of each member of the community. The interval between these two events was about two or three centuries. Great troubles followed. Much later the Romano-Jewish historian, Josephus, viewed life itself, insofar as it was desired, as a law of nature, and therefore to take a life was evil.

Regressing further in time, early writings from the four “successful” primary civilizations studied in this work have been interpreted as historical evidence of a universal judicial process consistent with a realization of innate moral guidance, or natural law, although the fit is far from perfect. In ancient Egypt this was manifested through Ma’at, the universal power that regulated physical and moral matters. Although the physical laws were not elucidated by ancient Egyptians, the moral law was clear and was meant to be followed by every individual, including the pharaohs. It was not written down but delivered by the pharaoh or judge who was subject to that innate moral sense and thus guided by Ma’at. Prof. Remi Brague considered this “close to the notion of natural law.”¹⁹

In ancient Sumer expression of an innate natural law is minimally documented. In the *Code of Ur-Nammu*, dated *ca.* 2100 BC, the king of much of southern Mesopotamia listed a number of laws (fifty-seven are known), but relevant to natural law is the prologue. Ur-Nammu indicates that his laws, which were to benefit all the people, were in accord with the god of justice, Utu (the sun-god). This implies a divine origin for the nature of his code of laws, although Ur-Nammu took credit for their pronouncement. An earlier legal writing under an earlier king, Urukagina (24th C BC), is considered a “reform” document rather than a law code, and Urukagina wrote that his kingship was divinely bestowed, but it is unknown if he considered the justice he proclaimed also divinely bestowed.

In predynastic China, contemporaneously with the preceding, similar considerations were expressed in the Huang Lao philosophy. Whereas Confucius (551-479 BC) considered the innate expression of justice to be found in the “discretionary judgment of exemplary persons” rather than being a “universal ethical principle,” the Taoist movement attributed to Lao Tzu (604-521 BC) as incorporated into the Huang Lao philosophy states that ultimate justice is found in the rule of law rather than the rule of man, meaning “...natural law grounded in a foundational natural order.”²⁰ Interestingly, the origin of this philosophy, as indicated by recent excavations, is in some manuscripts attributed in part to the Yellow Emperor, Huang Ti, the mythical sage of *ca.* 2500 BC who is referenced with regard to medical writings discussed in the present work (see p. 93). Even C. S. Lewis has used the word “Tao” (The Way) as a way of expressing natural

¹⁹ Brague, R. *The Law of God: The Philosophical History of an Idea*, Chicago, 2008, English translation by L. G. Cochrane, pp. 16-17, first published in Paris, 2005.

²⁰ This interpretation is based on the relatively recent discovery of the *Huang-Lao Boshu*. See: Shih, H., *The Natural Law in Chinese Tradition*, in *Natural Law Institute Proceedings*, pp. 119-153, 1953, and Peerenboom, R. P., *Law and Morality in Ancient China*, Albany, 1993, the first chapter. Essentially, non-assertion and non-interference were proposed as attributes of good governance. “I do nothing, and the people will be transformed of themselves.” (From p. 127 of the first citation.)

law in terms of beneficence, duties, justice, honesty, mercy, and magnanimity.²¹ Another prominent philosophical religious movement in ancient China was founded by Mo Ti (5th C BC), and its stand that political justice was up to the “Will of God” to judge laws, penalties, and government itself found disfavor with Confucian governments. One might wonder what course Far Eastern Asian culture might have taken had Confucianism not been adopted as its cultural paradigm.

The Indus River Valley is the region associated with the origin of the Vedas, the foundational compositions of Hinduism dated to *ca.* 2000 BC. In the centuries that followed the Vedas Hinduism emerged, and the Laws of Manu were composed, at the earliest, about 500 BC. But with the earliest texts written about 100 BC the most that can be said about the origin of Hinduism is that it is derived from “ancient” precursors. Some of the Dharma writings provide the closest approximation to universal natural law in that there is recognition of what is proper conduct and what is good for society:

“Hindu thought counts *Dharma* as the true Sovereign of the State, as the Rule of Law. The king is the executive called the Danda to uphold and enforce the decree of *Dharma* as the spiritual sovereign. Thus the king or temporal sovereign, is not the source of Law in the Hindu State. The sources of Law are above and beyond him. They are not his creation. He has only to see to their observance.”²²

It is pointed out that *Dharman* is mentioned sixty-three times in the oldest Veda, the Rig-Veda. And it is the term *dharma*, which includes meanings of law, order, and justice, that is most often considered, in its parts, roughly synonymous with natural law. Sometimes written “Rta,” Dr. A. Parpola describes it as the “active positive force of truth” that pervades the universe and controls all behavior of gods and men.²³ In doing so it coordinates “everything,” which can be interpreted that it is also responsible for “spontaneous order,” which has been discussed. But the specificity of the *Dharma sastra* and the range of human guidance it provides has come down to us through the sages and scholars of Hinduism, and the principals of natural law thus evolved have come to encompass lifestyle and civil law, somewhat similar to the way that natural law in the eyes of some refers to the workings of the universe. For example, the rigid class system that evolved in Hinduism prevents any universal relevance to much of the classic writings, as working for the overall good of every individual in society is inconsistent with a society that has been inherently and incredibly inequitable. Hinduism, being a synthesis of Indian religious and philosophical thought, emerged historically no earlier than 500 BC. But what is relevant here is that much of its content comes from prehistoric oral tradition of the Vedas perhaps as much as 2,000 years earlier. It is reasonable to conclude that there is evidence of innate moral guidance (natural law) embedded in the Vedas, the precursors of formal Hinduism, at that early date, even though a succinct statement of natural law has been overgrown with extensions of its interpretation into activities of daily religious

²¹ Lewis, C. S., *The Abolition of Man*, especially chapter 2 and the Appendix. And in chapter 25 of *Teh King* (translated by Dr. Isabella Mears, Glasgow, 1916): “Man finds his law in the Earth. The Earth finds its law in Heaven, Heaven finds its law in Tao, the Tao finds its law in the affirmation of itself.” As for the Tao itself, It “was a Being already perfect before the existence of Heaven and Earth.”

²² Mookerji, R. K., *Chandragupta Maurya and His Times*, 4th ed., New Delhi, 1966, p. 49. (First published in 1945.)

²³ See: Parpola, A., *The Roots of Hinduism: The Early Aryans and the Indus Civilization*, Oxford, 2015.

life.²⁴ Indeed, the very act of composition of the Vedas can be considered the best proof of an awareness of natural law at the time of the early Indus River civilization.

From the above synopsis, the admixture of parochial and universal interests attached to prehistorical origins of historical writings, not to mention insufficiencies in translated definitions, make it awkward to seek out clear-cut features of natural law that would apply to all four successful primary civilizations discussed in this volume. But it can be said, and sufficiently demonstrated, that all of them had considered an innate and overweening moral code as a guide to social behavior that overrides or guides the positive laws devised by mankind, and for this to happen a higher order of existence must have ordained that code which, in the West, is called natural law. It is the confusion produced by man's attempts to apply his specific interpretation of such "law" to the law of the land that has caused great difficulty in understanding or defining natural law. But that moral guidance of natural law supersedes the positive laws of mankind was undisputed among the four civilizations is the point to be made, rather than an analysis of differences in its application.

In the eyes of many, natural law is eternal, irreducible, unchanging, and irreplaceable. In that it precedes and supersedes human law, its moral principles are not the result of consensus, instead being etched into the human conscience from the very beginning. Given this general assessment of the topic of natural law and the physical/literary evidence supporting the existence of natural law in some format in all five of the successful primary civilizations discussed in this section, it is concluded that the presence of moral guidance is indeed a universal human attribute, that the ability to distinguish between what is right and what is wrong is a part of every human conscience, and its presence and consequences therefore can be postulated in early and prehistoric societies to be discussed below.²⁵

D. Natural law in recent history

For an example of the conflation of natural law with positive law it is convenient to review the biography of Dr. Friedrich Hoffmann, the great German physician and philosopher of medical ethics at a time when medicine was about to escape the thralls of medieval authority. A contemporary of Dr. Hermann Boerhaave (1668-1738), the physician who put medicine back on track as a scientific clinical profession and thereby promoting the return of a natural state of medical practice, Dr. Hoffman (1660-1742) wrote an influential work on medical practice, his *Medicus Politicus*, published in 1738, in which he promoted the concept of natural law as part of the justification for his philosophy of ethics. But in his effort to align his ethical philosophy with natural law he permitted his personal biases, including his religious opinions, to influence the final product. As a consequence, he intended that physicians be the public face of his idea of morality to the point that he thought physicians themselves should be natural law

²⁴ See: Sundaram, M. S., *The Natural Law in the Hindu Tradition*, in *Nat. L. Inst. Proc.*, 1951, pp. 69-88. Also see p. 80 of the present work and Dr. D. Chattopadhyaya's view that the original rational intention in medicine of the Atharva Veda was an entreaty for an objective and even democratic approach to knowledge and to medical practice.

²⁵ For an interesting and unexpectedly broad review of natural law with many historical examples see: Dymond, J., *Essays on the Principles of Morality*, New York, 1836, pp. 60-66, first published in London, 1829.

philosophers. So important was their work to be, combining both the science of medicine and its practice, that part of his method was to prepare physicians for public office, and in fact a number of his students did just that.²⁶ This is entirely consistent with the cosmic role of the physician put forth by Dr. Rudolph Virchow (1821-1902) a century later, as discussed in *The Natural State of Medical Practice*, volume 1, p. 32-33. It is this sort of confusion that is sowed when personal opinions intrude on the moral orientation of natural law; we cannot help but bring our own perspectives to bear on its expression so that we might improve others and impress on them our superior personal insights.²⁷

The eminent 17th C jurist, Hugo Grotius, based much of his work on natural law, although despite extensive writings it is not always clear what he means. The reason is that he uses natural law as an argument for relatively specific 17th C problems, and a clear “general” definition of the term is not easily extracted. But in his opinion natural law was a trait implanted in all of mankind, not just Christians, and was implied in man’s ability to reason. He did not indicate that natural law was of Divine origin, but, as he was prominent in contemporary Christian theological issues, his writings, being of international relevance at the time, may have been an attempt to avoid stirring up partisanship based on culture.²⁸ Montesquieu (1689-1755) expressed a premonition of natural law when he not only wrote that primitive man, before he made any laws whatever, would have had a sense of justice, but that, like laws of physics, a law of justice predated the existence “of intelligent beings” (*des Etres intelligens*). This gentle suggestion of a natural law pertaining to justice being equated with, but distinct from, laws of physics, is further validated by his description of its invariability: “To say there is nothing of just or unjust, but what is commanded or forbidden by positive law, is the same as saying that, before the describing of a circle, all the radii were not equal.”²⁹

²⁶ See: Baril, T. E., *Philosophical Analysis of the Concept of the Politic Physician in Friedrich Hoffmann’s Medicus Politicus*, University of Texas, 2008, a PhD dissertation.

²⁷ Darwin did not deny the importance of conscience and morality in forming human communities, and, consistent with natural law, he considered a significant part of human conscience as innate, a genetic trait with an expression that was variably expressed, even in different ethnic or racial groups. But, like intelligence, he viewed it as a “gradual advance” from man’s hominid ancestors, and there are some who have postulated that there has been continued improvement in morality in historic man up to the present, presumably by the same mechanism (*North British Review*, July 1869, p. 531; also Lecky (*History of Morals*, vol. 1, p. 143). Darwin names that mechanism “social instinct.” It is clear from his commentary, however, that his idea of the source of morality is distinct from the definition herein. See: Darwin, C., *The Descent of Man*, Chicago, ca. 1874, Pt. 1, chapter 4, “Moral Sense.”

²⁸ See his famous work, *De Iure Belli ac Pacis* (the Rights of war and peace), first published in 1625.

²⁹ Montesquieu, *The Spirit of Laws*, I, i, translation of Thomas Nugent. The first publication of work, in French, was in 1748. Nugent’s translation of that first edition was published in 1750. But to imply that a sense of justice, and therefore a sense of right and wrong, was imbued in the Creation suggests an acknowledgement of the Creator, whereas Montesquieu’s commitment to religion has been questioned. Interestingly, in Book I, chapter 2, Montesquieu discusses laws of nature as they apply to primitive man, of which he lists four. The first, based on fear, deals with survival, the second with security/safety (includes nutrition), the third with social interaction (direct, interpersonal), and the fourth with a desire to live within a society. Except for the fourth, the list reflects the first three levels of motivation proposed by Maslow (see footnote, p. 243), his fourth being the motivation for esteem of others, which, of course, can only occur within a society. This list of Montesquieu’s, however, is not a formulation of natural law but a response to laws of nature.

But the orientation of natural law, *i.e.*, its moral guidance, is not subject to personal interpretation, and its purpose is to provide a latticework on which to build man's positive laws. There is no contradiction here, for if a particular positive law is consistent with our innate moral guidance the resulting structure is more likely to stand the tests of time, whereas a positive law that is inconsistent with our moral nature is likely at some point to invite disavowal and to fail. Such a description, of course, is too simplistic, for improper positive laws abound in most societies, yet many seem to thrive. This is deceptive, however, for survival today does not mean survival in ten years or a century from now. The history of the world is the history of fallen civilizations, and our own history is now being composed. Inconsistencies between natural law and authoritarian directives, as discussed in this chapter, can be blamed for failed policies that repeatedly return civilizations to a primitive state, for there seems to be some powerful yet undefinable force declaring those civilizations were on the wrong path rather than merely an alternative pathway and that their misbegotten ventures must be brought to an end. The great hope, of course, is that someday there will be a congruence between natural law and positive law, that previous inconsistencies, some by their nature deemed malevolent and some for the moment deemed necessary, will become obsolete, and that all of mankind's disagreements will then be minor ones.

This brief section, however, has not been inserted to opine on mankind's future. Its purpose here is to propose one reason for the decline of civilizations, and not only the nineteen great ones identified by Toynbee, but also a myriad of minor ones, including all twelve that were described in chapter 8. But one cannot help but consider that the work of the present four volumes is in effect a verification, however burdened its analysis with human error and ignorance, of not only the existence of, but the critical role of adhering, through democratic governance, to natural law and thereby contributing to, if not actually causing, the global intellectual dominance of Western thought and beneficence, as well as being the sole arbiter and architect of human progress.³⁰

³⁰ See also: Wilson, J. Q., *The Moral Sense*, New York, 1993. In this excellent book evidence is collected to show that humans have an innate moral sense. He does not mention natural law in his book, but the objective evidence accessible to mankind for both is similar. Dr. Wilson does not specifically state that the origins of the moral sense and of natural law are different, and separately he has indicated he hoped they were the same (see interview at Acton Institute in *Religion and Liberty*, Vol. 9, No. 4, *The Free Society Requires a Moral Sense, Social Capital*). But in doing so he has avoided a formal listing of "absolute" natural laws sometimes given by others in descriptions of natural law, preferring more generic mechanisms of moral guidance: sympathy, fairness, self-control, and duty, each of the four being a title of a chapter in his book. This is a convenient way to look at the issue, for specific laws suggested by scholars can be interpreted in various, often confusing, ways, not always good or helpful, that support of their preferred dogma or positive laws, *i.e.*, laws propagated by man. And who would want to make a law against sympathy? Wilson also stated that in the West there has been an increase in scope of the moral sense. It is flourishing as a concept, and its precepts for moral guidance in the West are considered relevant in more and more circumstances, including international ones. A major area is in laws governing the use of the seas. All this is not a result of the teaching of natural law or moral sense to modern generations. This cannot be done and is irrelevant. It means, instead, that the universality and reality of natural law is beginning to emerge through millennia of layers of human (positive) law. And with an appreciation that intrinsic moral guidance, spontaneous order (see p.257), and natural law are perspectives of the same innate counseling all humans possess, the potential role they can play in shepherding human events becomes even more powerful. At the same time, an understanding of the history of and the

E. Natural Law in Early Society

Innate guidance on human interactions should have made its effects apparent in those prehistoric attempts at communal living at a time before social complexity and population size began to camouflage the internal conscience residing in all persons. This has been pointed out by James A. Donald, who stresses that early society knew natural law because it had to know it for survival.³¹ It is because many other factors, including man-made laws, impinge today on natural law that make its effects so difficult to assess that its very existence is questioned by many. Although Donald argues that natural law is more a method than a list of laws, for purposes of discussion of its relevance in primitive society some reasonably implied attributes have been summarized as follows:³²

1. protection of life
2. keep promises
3. do not wrong another
4. trust
5. individual liberty
6. protection of property

From the subjects on this list it is clear, for example, that protection of life in its various forms, primarily human life, is a fact of life in ancient civilizations as well as modern, anthropological detail that jumps out at us from burial practices, monumental ritual structures, religious and mythical artistic renderings of females relevant to birth, death, and transfigurations, and matrilineal societies. The primacy and veneration of life and birth before all things is unassailable. Issues of infanticide, geronticide, human sacrifice, and wars of conquest are the warped superimpositions on mankind of the positive laws of

potential role of human agencies in preventing their effects becoming manifest have also become more obvious. This is a debate that requires further discussion, but the present work supports the critical role of liberty in permitting natural law to be felt and followed.

But it is not natural law *ipso facto* that leads to progress, for, as discussed earlier, progress is primarily a consequence of group liberty, and the focused nature of small group interests is less likely to benefit from natural law guidance than those interests that are distributed throughout the general population. On the other hand, when human reason has proposed positive laws consistent with natural law it will naturally follow that individual and group liberty and thereby progress are more likely to become manifest. The period of greatest liberty in the development of a civilization is the same period in which progress in medical knowledge has emerged, doing so coincident with the flourishing of medical practice best exemplified historically in the ancient Greece of Hippocrates. All of this can be seen to be integrated into a philosophical unity that can explain not only the repetitive cycling of civilizations but also the thousands of years of delay in evolution of, at long last, a civilization capable of immense progress in all areas affecting mankind. And that progress has occurred over a very short time, but several centuries, and with no assistance from any other agency, nor sword nor prayer, except the one that counts most: natural law. Beginning with religious freedom in the 16th C, its propagation in the 17th C, proceeding to parliamentary governance of the 18th C, and thence to the consequent widespread shower of knowledge and commercial prosperity of the 19th C, the West has been the fortunate recipient of the consequences of obedience to natural law, and it has done so despite the great wounds to our civilization imposed by desperate attempts of a long list of prominent villains and fanatics who have ignored moral guidance and imposed their blinded visions on hapless millions.

³¹ See: Donald, J. A., *Natural Law and Natural Rights*, from the James's Liberty file collection index, licensed under the Creative Commons Attribution-Share Alike 3.0 License, n.d.

³² Johnston, J. F., Jr., *Natural Law and the Rule of Law*, 2003, The Philadelphia Society.

man. It is indeed the awesome magnitude of this evil that in turn inflicts on the powerless the conclusion that those few in charge who ordain what would otherwise be evil must be supported by some unearthly power. People view an execution for its profundity, not its fun. To think that people in any age would view human sacrifice as a good thing is incorrect. It is considered merely a better thing than the reason for the sacrifice in the first place, which must have been very bad indeed. Human sacrifice is, therefore, an entirely human production, a particularly grotesque formulation of positive law.

Item 2 on the list can be similarly treated. The inviolability of certain social interactions is universal, such as the trading routes and message sticks used over centuries by Australian aborigines under time-honored rules of safe passage. The keeping of promises is topical in that its political relevance is being debated even today, but its relevance to the formation of early societies must have been as fundamental then as now. The importance of keeping of a promise would have applied to all members of ancient and primitive societies, and this reciprocity is commonly displayed in barter and exchange and other commercial trading. It can be implied in gift-giving, courtesies and reputations. Items 3 and 4 are issues of doing wrong to another and of trust are somewhat related items and are not discussed here.

But the last two items on the list of the inferred moral guides would have been in conflict between natural law and communal survival. They involve individual liberty and personal property. Just as moral sense can be veiled or superseded by a desire for something that may be amoral or immoral, the natural desire of an individual to follow a benign personal inclination or to own something of personal value may not have been considered acceptable behavior by other members of an egalitarian society. Egalitarianism and its coveted security founded in homogeneity of thought and action would have been a way to minimize conflict or to control distribution within the community, and behavior to the contrary would have resulted in efforts to stop it. By redistribution of material needs, greed would not have a chance to progress to robbery and conflict even though greed may have been an unspoken part-and-parcel of the decision for redistribution in the first place. This might be considered a fair trade-off: on one hand greed was confined by social coercion, but on the other hand greed was acknowledged. But what might have been the consequences of primitive egalitarianism in the overriding the two inferred moral principles of natural law?

Individualism may have been considered antisocial or irrational behavior in egalitarian societies where every member was expected to contribute to communal goals. But there is a natural desire of the individual to think, travel, explore, and attempt based on personal inclinations, *i.e.*, to be at liberty to act on one's own behalf, whether out of curiosity, interest, or self-interest. As this is constrained in egalitarian society, there must have been continuous tension between anyone expressing novel interests and the rest of the community. The cry of the egalitarian to this day is for a predictable homogeneity of society, although this wish for homogeneity often is made to masquerade as a humanitarian desire for economic equality.³³ But this came at a price, the confusion of

³³ The opposite end of this social spectrum is the free society, where individual freedom is prized and censorship abhorred. Lack of homogeneity results in a social analogue of Brownian motion that contrasts sharply with enforced homogeneity of egalitarianism. As a static society contrasts with an enterprising one, it is the former that is the more organized, unified, and easily commanded, whereas the latter, when healthy, is of such varied interests that it is more difficult to organize, impossible to reach unanimity, and, because of intrinsic differences, fractious. To outsiders it will

what is “good” according to our conscience to not interfere with the actions of others and supported by early mankind’s tendency to disperse in small independent groups with the “opinion of what is good” for our convenience and supported by the illusion of fairness.³⁴ The resulting loss of innovative ideas ensured a static society and prevented progress. Catalhoyuk is an example of this. Over a thousand years, approximately the time from the Battle of Hastings to the present day, roughly fifty generations of its people followed the same unwritten social directives. One consequence was that few reached the age of 45 years. There is no way to judge whether they were a happy people, but if they were it was because they knew not what they were missing. Egalitarian society, by disarming the moral consciences of its members in its infringement of individual liberty, is inadequate in defense, unprepared for the unexpected, incapable of progress, and, while perhaps not overtly intemperate, chronically disgruntled.

The protection of property is an equally complex and important issue in that acquiring property, whether land, an invention, a special tool, or a secret cache of something desirable would have been contentious in strictly egalitarian societies. In them, attempts at ownership, if successful, are presently thought to have introduced a propensity for permanent settlements.³⁵ Thus, by obstructing ownership, nomadic populations were guaranteed a future of nomadism and forever denied any possibility of progress within their societies.

Natural law, in summary, provides a moral guide for every individual in a society and, as a consequence, a judicial way of life, a protection, and a guide for society itself. Self-interest is very much served if all in a society are permitted to respond to their own moral compass, for it is the same moral compass in all. It is, therefore, not only a stabilizing influence on society’s individual membership but one that quietly works, through human reason, to the benefit of everyone, not just the few in charge or the few who make or interpret the laws. In a sense it allows society to function as a *koinon*: by permitting all in a society to freely give their opinions in open forum discussion, the final decision will have had the benefit of many minds concentrating on the problem at hand. And democracy can permit natural law/moral guidance to emerge because in a democracy each individual should have a protected freedom of expression. In this sense natural law can never find adequate expression under egalitarian and authoritarian governance, for in the latter the individual cannot speak for himself, and in egalitarianism the individual cannot speak.

Natural law will, however, lose that influence if enough members do not observe it or are prevented from observing it. Among the variables that can destabilize a society a difficult one is the refractory member, and it has been suggested that as many as one in twenty-five persons in modern society can be considered a sociopath, *i.e.*, a person with

seem disorganized and lacking a communal sensibility and common goal. This can quickly change, however, when a point is reached where its freedoms are threatened.

³⁴ The “activities of others” is not an invitation to libertines. But it needs repeating that individual liberty under natural law does not include the liberty to do wrong. This distinction and its philosophical support and political implications are lucidly discussed by Dr. Hadley Arkes in *A Natural Law Manifesto*, available on the website of the *James Wilson Institute on Natural Rights and the American Founding*.

³⁵ Woodburn, J., *Egalitarian Societies*, in *Man* (N.S.) 17:431-451, 1981.

an unclear distinction between right and wrong.³⁶ These individuals, who will be more likely to consider the end to justify the means, have bedeviled all societies over the ages, especially when in positions of leadership. They can be managed at an early stage by social pressures if they can be identified, but as populations increase such individuals become lost in the crowd and can proceed to mischievous ends by attracting similar persons into their cause and become sufficiently powerful to the point of destabilizing society. It has been truly said that “the bigger the pack, the meaner the dog.”

In conclusion, natural law is not a scientific construct, and its origin can be debated. But if it is a uniquely human quality then its origin must be traced back to mankind's creation. Darwinian natural selection based on genetics, particularly genetics relevant to neurological function and thus affected by millions of nucleotides, seems an unlikely explanation for any survival advantage. Any relevant genetic changes from selective pressure would necessarily have gradually evolved, step by step, over many thousands of years. As a way of explaining behavioral characteristics and the human conscience this seems unreasonable, especially as, based on life expectancy, any claim of survival advantage is disingenuous. It is not surprising, therefore, that natural law is considered an argument in support of creationism. And insofar as egalitarianism undermines the moral conscience (natural law), egalitarianism itself can be considered logically immoral. If this is the case, the perpetuation of human misery within its purview can be blamed on that immorality. The epithet of “immoral” has often been cast at promoters of egalitarianism. But note the timing in the evolution of society of this particular type of immorality. It begets two distinct forms of expression. In an established society, egalitarianism undermines individualism and is used as a tool to control the common man, whereas in early/primitive society communal coercion prevents his development.

In recent history natural law has been invoked in English common law and the laws of the United States protecting individual liberty. This aspect of natural law, if active in a primitive society, should have prompted efforts to improve that society by permitting progress in that individuals in that society could search out what was personally best. Everyone could then benefit from one individual's effort or discovery, the benefits being more enduring than occasionally sharing a good meal. But this did not happen until egalitarian kinship was abandoned, with the consequences now to be discussed.

³⁶ Let the population of a small ancient settlement comprise 100 persons, of whom there are 10 infants, 20 children, 30 subadults, and 40 adults. Of the 40 adults, half would be men. Of the twenty men 5% (*i.e.*, one) might be a sociopath/psychopath or functional equivalent. (A recent book by a Harvard psychologist estimates 1 in 25 Americans is sociopathic.) That person would easily be controlled or ostracized by the others in the settlement. And if there were 1000 people in a village, each of whom knew most of the others, and 10 were sociopaths and worked in concert, they would be dangerous, but the other 390 adults would know of them, recognize them, and could probably contain them. But if there were a small city of 10,000 and miscreants numbered 100, there would be a big problem. They could be unrecognizable within the larger population and able to foment fear and attract others to join with them to control part or all of the community. But as a civilization expands, it appears that the opportunity for authoritarian personalities to control events in a population arises. If sociopathic behavior were merely the lower end of a Gaussian curve of normal human behavior rather than an aberrancy, then their authoritarian risk to a society would be inherent in all societies, a risk of danger that will increase proportionally as the population increases unless there is a form of governance that does not restrict individual liberty for the great majority but is able to prevent antisocial behavior in the few. That risk should be susceptible to calculation and thereby quantifiable.

CHAPTER THIRTEEN

HETERARCHY AND THE KOINON

“Organized data collection and analysis, not dogma, now guide Western medicine, and there is now at least some intellectual control over concepts of causation. How came this to medicine? It came about because of medical organization. And the history of medical organization is the key to any true history of medicine.”

The Natural State of Medical Practice, vol. 1, p. 165

The role of writing in promoting progress is reviewed and it is concluded that inscribed symbols first develop as a tool for commercial operation, but proper writing is a sign of progress rather than a cause of progress. In this sense it can be equated with a medical practice as an early marker of progress. Once matured, the usefulness of the tool is remarkable to the point that it becomes an intellectual end in itself. In contrast to writing, it is the formation of small autonomous groups promoting individual self-interest that, although developing in parallel with writing, are the true initiators of progress. Both writing and the small autonomous group were conceived by breaking egalitarian kinship bonds as commerce first appeared in settled societies. The optimal small autonomous group is the koinon and its features are discussed here. It is proposed that independent self-interest groups are more likely in a heterarchical society because such a society permits individuals to forego their allegiances to egalitarian kinships and thereby be free to pursue specialized self-interests that evolve as part of a settlement hierarchy.

- A. Writing systems and societal progress
- B. Which came first, the individualist or the group?
- C. The essential role of the “group” in societal progress; the koinon
- D. Heterarchy
- E. Conclusion: the city, city-state, and heterarchy

- A. Writing systems and societal progress

Writing is routinely ascribed a pivotal point in human progress, but is that accurate? One reason for such an opinion is that it is through ancient writings that we know of ancient happenings. This is quite different from attributing to those writings a causal role in the happenings themselves. Writing systems develop from simple markings, but, simple or complex, their modern translations display considerable imagination and literary license. The gifted prose and poetry of translators of ancient texts, especially myths and religious experiences, are wonderful to read because literal translations are rudimentary, leaving great scope for the imagination and personal bias of the creative translator. The *Iliad* in Homeric Greek may be an exception, but even it went through the redacting hands of experts of the Library of Alexandria.

It takes time for complex language to evolve from its simple roots, and writing evolves more slowly still. For example, spoken language is quickly affected by interaction with other languages, but a writing system is inherently conservative, in part because its value lies in providing historical records that remain accessible for a long time. It may have taken but two or three hundred years for spoken Vulgar Latin to replace

Classical Latin, then another two or three hundred years for spoken Romance Languages to replace Vulgar Latin, but the same Greek script, Chinese logograms, and Sumerian cuneiform are identifiable over a span of 3,000 years. Yet society moves on regardless. The rapid evolution of Hippocratic medicine occurred despite the absence of a medical vocabulary.¹ The converse occurred: the subsequent written medical vocabulary that developed was the consequence, not the cause, of Hippocratic clinical prowess.

Writing systems change in response to changes in society, not vice versa, for a change in a writing system, meaning an increase in its vocabulary or complexity, is prompted by need, whether in commerce, managing a dominion, or advances in crafts and trades. It is as society changes that a writing system evolves, for writing is the consequence, not the cause, of change. The great advance of written characters representing solely syllabic sounds that would evolve into classical Greek not surprisingly occurred in the 12th C BC with the master traders of the Mediterranean and beyond, the Phoenicians. It is for such practical reasons that writing should be relegated to a secondary place in mankind's march to progress.

A writing system is, like a medical profession, a marker of progress, for it is an advancing society's response to an essential need. It should be expected, therefore, that the two would develop concurrently, especially when the volume of information in a particular area increases beyond an individual's capability to remember and to master, regardless of whether that information is commercial or medical. It should also not be unexpected that the absence of one parallels absence of the other. And if both are absent, as they appear to be in eleven, and probably all, of the twelve lesser primary civilizations studied herein, there is likely a common explanation. It is argued here that the lack of a writing system in the twelve civilizations is an indication that in none had there been any societal progress, regardless of their civilizations' duration or size. Things may have gotten bigger, but not better. (A crude statistical analysis of some of these points is presented in Appendix A.) It is no surprise, therefore, that egalitarian status was not associated with writing.

Where commercial activity existed, identification seals, numbers, and other marks were needed and were invented. There were tactical items relating to commerce, but the sphere of influence of the persons involved was often spanned by personal contact or a messenger. Simple inscribed forms were sufficient for tallying. But writing is a symbolization of language, and it was unnecessary if there was nothing about which to write, if direct communication was convenient and sufficient, or if the number of camels required for a number of bags of grain or the number of bricks needed for a wall was the level of complexity needed. It was only when specialization of goods and services occurred in a community and the knowledge so acquired expanded to the point that those providing special services could function better with access to permanent records that proper writing appeared. Statistical analysis earlier in this volume indicated a strong association between writing and "progress" using a nascent medical profession as a marker. But whether medicine preceded writing is not analyzable with information at hand. Restated, it is likely that societal prosperity and specialization resulting from commercial success, not commercial success itself, that led to the invention of writing.

Another reason for assigning lesser significance to a writing system as a cause of progress is that there were hundreds of Neolithic and Bronze Age cultures/civilizations that completely disappeared. The ancient writings of the four great riverine civilizations

¹ Hippocratic medicine nevertheless deserved a dictionary. See the Appendix to volume 2 of this work.

of chapters 3-6 suggest a written language a requisite for prolonged survival and progress because they had greater populations and greater commercial development. But an alternative explanation is that it was only their initial primary civilizations (*i.e.*, predynastic Sumer, Proto-Dynastic Egypt, predynastic China, and [probably] the Indus River civilization) that developed writing for commercial use, and it was because of the military successes that their succeeding authoritarian civilizations found writing useful for secret knowledge and for commanding their dominions. We view writing differently now, but for the building of early empires writing was a tool for domination as well as for commerce and occasionally entertainment, but not progress.

It can be proposed, therefore, that had any of the twelve lesser civilizations expanded in population and commerce, neither a writing system nor a medical profession would have been expected unless there was a point during the phase of commercial development that was sufficiently tempting so that egalitarian kinship bonds were weakened and progress could ensue. That point was not reached, and probably never would have been reached in any, for all twelve retained prominent kinship elements, Shahr-i Sokhta being a possible exception. Complexity and perhaps extent of commercial activity was insufficient to require anything more than seals or enumeration mnemonics such as the Norte Chico civilization “quipu,” a device of strings that served as for numeric memory. This does not in any way imply that the lesser civilizations could not have devised true writing systems. It merely indicates that their civilizations never approached, even in a thousand years, the complexity of commercial prosperity and specialization that needed it. Expressions of ingenuity are not a characteristic of egalitarianism.

Seven thousand languages are known today, of which approximately 4,000 have writing systems, many including writing systems of primitive or recently extinct cultures/civilizations. It is thought, however, that most are neither used nor useful, and of the 7,000 languages fully half of them are spoken by no more than a few thousand persons. If a writing system is a requirement for societal progress, it is surely not apparent in those primitive or recently extinct cultures/civilizations that had, or have, one.

Finally, a number of written languages are recognized from the Bronze Age, but most, including the Cypro-Minoan syllabary, Linear A of the Minoan civilization, and the Harappan “script” of the Indus River Valley civilization, disappeared when their parent cultures disappeared. It is not being argued that written languages are of little use to their cultures, but it is obvious that a writing system is not essential to initiation of progress and that the presence of a writing system is no guarantor of survival.

The question is whether the lack of a written language prevents progress at an early stage, and the answer is “no.” It is the lack of progress that prevents emergence of a writing system. In the realization of progress, the decisive factor is the autonomous group with a common self-interest and thereby something to write about.

B. Which came first, the individualist or the group?

Did early humans promptly see benefit in organizing into groups? It would seem the presence of children and the importance of family and kinship as a sympathetic force for ensuring security and survival would have prompted such behavior, although that may be judging the past by present standards. One might have expected to see a large settlement not too far from Eden’s gate, with colonies gradually extending the inhabited region town by town as local subsistence became insufficient for the concentrated population. Instead, what seems to have been a purposeful flight from others of the same

species occurred, although this would help explain the relentless early global spread of *Homo sapiens* in the absence of crowding. How/why did humans reach such disparate geographical regions rather than developing a flourishing large egalitarian society in one locale, and yet retain a pattern of thinking that produced similar results so far afield? Why did not Africa become fully inhabited first, with subsequent human colonization elsewhere a planned event? What was the Tower of Babel that pushed mankind apart?² Was there something inherent in humans that, like cats, preferred a more solitary existence? Or, as proposed earlier, was it a flight to liberty?

One aspect of the issue is group size, the observation by some that humans have little aggressiveness in small hunter-gatherer groups, that it is the appearance of larger communities that is associated with the tendency of some humans to control others, a trait primarily observed in males.³ A perspective of the small group preference is that all humans desire to control their own destinies and that it is not part of their nature to subject themselves to other humans. Thus, the tendency to disperse in small groups, as discussed earlier (see p. 247f) and envisaged in the Book of *Genesis*.

The original group of two humans, which science has nicely placed in Africa but inconveniently well apart, has since been followed by ever larger groups.⁴ This volume so far has concentrated on large groups of socially or genetically related individuals, from bands, tribes, and chiefdoms to states, from small settlements to giant cities and empires. Now, however, focus is on a specific kind of small group, a subgroup with a common interest that is operating within a large group. In volume 1 of *The Natural State of Medical Practice* an excursus was dedicated to a description of this particular group, the *koinon*, considered an ancient Greek invention as applied to a communal polity or to a federation of city-states. The open and equal expression of opinions and ideas permitted in these freely-entered-into groups is proposed to have been applied to a variety of other organizations by the Greeks, one being a group of professional medical practitioners organized by Hippocrates (see p. 168 ff of volume 1). Because each physician-member was autonomous this grouping of physicians was not an example of “groupism,” which is a desire to belong to a group and thereby share in that group’s particular value-system and goals. In groupism members relinquish their individuality because the group becomes more important than any one individual and, in setting its course for members, the group achieves authority over them that either forces a member to act in a way that may not be in his best interest or, for the indecisive, uses the power of rhetoric or intrigue to make certain that what leadership considers the proper decision is taken. The Hippocratic physicians, on the other hand, functioned as a network of individuals who shared a common goal in that each wished to improve the medical service he offered, but the group had no purpose other than to provide open exchange of ideas and experience which each member might or might not elect to incorporate into his medical practice. There was no

² The *Book of Genesis* states that the Tower of Babel, Babel being the incipient Babylon, was a sign to God that humankind was opposing the command to disperse about the earth. The metaphorical application of different languages to halt this process was to ensure the desired dispersion.

³ Prof. T. W. Luke, in his book, *Social Theory and Modernity* (Newbury Park (CA), 1990), comments on p. 107 that “natural man”, who was once free by being a part of Nature, becomes unfree in society as social artifice works to dominate Nature. By accepting new social needs and duties, social man becomes something he really is not and generates a false objectivity that robs him of his true essence.

⁴ See: Poznik, G. D., et al., *Sequencing Y Chromosomes Resolves Discrepancy in Time to Common Ancestors of Males Versus Females*, in *Science*: 341:562-565, 2013.

other goal but to serve as a reservoir of ever-increasing knowledge into which any member could dip. And that is the uniqueness of the koinon: it had no goal that was not consonant with the goal of every member and it had no role that could be commandeered for any one or a few members' personal benefit. The koinon was a network of autonomous individuals rather than an alliance or a consortium.

The point made here is that, in the order of things, independent action by a group in exploiting a commodity for gain was, in the primitive experience, the first expression of what would ultimately lead to individualism and to individual liberty, for it revealed the value of ideas as developed, agreed to, and implemented not by the society at large but by a faction. Previously a person's innovation, and thereby the person, was judged on its benefit to the entire society, a benefit that could be coerced. But now the beneficiary was not society at large, instead being a small group that could more efficiently exploit an innovation. Whether that faction was tasked with the process by the community at large or proceeded on its own to exploit an expertise, commodity or idea is not relevant here, for either would have revealed the superior actions of a focused group effort, in effect the *magic of the* (subsequently to be developed) *koinon*. There is inherent desire for personal liberty, but it was the group that preceded the individualist, indeed made the individualist possible. A sense of individual identity with a desire for personal advancement produced the group founded on a common interest, but it was the group that would permit the individualist to appear in public.

C. The essential role of the "group" in progress of a society; the koinon

The reason that a span of about 200 years was mentioned early in this work as the time needed for a newly maturing medical profession to begin to acquire complex clinical knowledge is not an issue of duration of a civilization or its size. Why is there no evidence of medical practitioners given the long duration of the many lesser civilizations discussed herein? Once a small network of practitioners was formed, perhaps four or five individuals, the growth of knowledge would have been at least additive rather than a constant, and the potential for observation, discovery, experimentation, exchange of ideas and rational decision to produce an effective and scientific medical practice would have been under way. Unencumbered, in two centuries much in a civilization could undergo extensive change, for networking knowledge in other areas could have followed medicine's example.

The conclusion of the present analysis of many civilizations, large and small, indicates progress was not a consequence of egalitarian society. It was the networking of small groups engaged in endeavors of common interest who realized their combined efforts would permit improved function and efficiency beyond that of individual effort. The sharing of ideas and experience prompted new ideas or new ways of implementing old ones.⁵ This was possible only when egalitarianism was out of the way.

There is a recently published book, *The Age of the Network*, that refers to ancient networking of small groups as a time of major progress of early civilization, their face-to-face techniques that led to our present enviable state now finally being acknowledged.⁶

⁵ This is consistent with the Aristotelian phrase, κοινὸν συμφέρον (koinei sumpheron), or "mutual advantage." See: Morrison, D., *The Common Good*, in *The Cambridge Companion to Aristotle's Politics*, Cambridge, 2013, M. Deslauriers and P. Destree, editors, p. 177.

⁶ Lipnack, J., and Stamps, J., *The Age of the Network*, Essex Jct., Vermont, 1994, p. 48.

While this may be true, two points should be considered. (1) Mankind has since its inception been desirous of and capable of personal interactions to improve its condition. This capability is not brilliant or unexpected; it is a normal response to motivating circumstances. “Two heads are better than one” is not a new idea, although leave it to modern scholarship to confirm it as true.⁷ The issue is not its ingenuity; the issue is what prevented it from happening, a theme that runs throughout the present work. (2) There are many types of human networks that fulfill a common need for a subpopulation, for example, a common interest such as ethnicity or dogma. The function of these groups is usually not only social interaction within the confines of the group, but also the amplification of the group’s presence and voice in the greater society.⁸ But the networks relevant to present topic are two: networks of individuals and networks of groups. One is the *koinon*; the other is the heterarchy.

A heterarchy does not speak for the individual; it speaks for the organization. It also does not speak for a group. Instead, it speaks for a network of groups, *i.e.*, the organization. Its power is related to the size of the organization, and it is discussed in detail below. In contrast, a *koinon* represents a single group that is a network of individuals. There are some semantic difficulties with this definition, for Greek confederations of city-states were called *koinons*, and yet they functioned more as a heterarchy. Thus, it is the process, rather than composition, of the *koinon* that is used to define the term’s meaning in these three volumes.

As it is presently understood, the ancient Greeks first developed this novel type of network. It may have existed earlier, perhaps even in prehistory, although there is no way of knowing. Indeed, as the concept of individual liberty would have been anathema to most primitive and prehistoric societies, it is unlikely that at an egalitarian stage of society a single individual would have initiated an enterprise that put his personal benefit ahead of the rest of his society. It is even more unlikely that he would have established a network of like-minded individuals. But as a society edged toward urbanization a person could well have made contact with like-minded individuals. Prosperity promotes specialization, and, as population increased, networks could more easily form to further common goals of self-interest, a desideratum previously unavailable to the smaller egalitarian unit that lived and planned from day to day or worked within the confines of kinship that assigned obligations and social status that left no room for personal betterment. The commercial networks so formed would have benefited a subgroup of the total population and that subgroup would have probably acquired an unintended benefit: influence and power. The subunits of power that thereby arose within the community might then affect society as a whole as their particular commodities or services became popular, and more personnel would be enlisted in their production. Again, this is something that could not have happened in an egalitarian society.⁹

⁷ See: Wooley, A. W., et al., *Collective Intelligence and Group Performance*, in *Current Directions in Psychological Science*, 24:420-424, 2015. And there is the common sense interpretation of C. S. Lewis: “Two heads are better than one, not because either is infallible, but because they are unlikely to go wrong in the same direction.”

⁸ See: Katz, N., et al., *Network Theory and Small Groups*, in *Small Group Research*, 35:307-332, 2004.

⁹ This does not hold today as there are egalitarian communities that avoid capitalistic ventures while residing within modern democracies, for those democracies provide the physical, legal, and economic security that enables small egalitarian communities to exist and thrive, something previously impossible.

The koinon, usually related to a group of craft, trade, or professional service, tends to be small relative to the size of the society. And there are, in the koinon as meant here, no subgroups; each member speaks for himself and social interactions are irrelevant as the purpose of a koinon is improving the member's productivity, not building a bigger or more powerful koinon. And probably in one vicinity there need be only one koinon for a specific service or product; *i.e.*, there is no reason other than the inconvenience of distance that should require two equivalent koinons. There is no inherent competition between koinons for the same product or service, so there is no reason to have two in proximity.

What is necessary for a koinon to form and successfully function? The definition of a koinon as used herein and in *The Natural State of Medical Practice*, volume 1, requires as few as two persons. As a koinon is not a populist group or political party, and, as it represents a group of people who provide specialized services or products, the upper limit of a koinon's size is, as stated above, small relative to the size of its community. Its members are equals when it comes to the function of the koinon: equal voice, equal opportunity to exploit the koinon's knowledge. For physicians, they might be dispersed throughout the community rather than living and working in proximity to each other. The koinon can function regardless of the type of community governance, *e.g.*, hierarchy, oligarchy, tyranny, democracy, unless it or its members are directly threatened by that governance, for its network is apolitical. But it could not exist in an egalitarian society because the mere presence of specialization leading to personal aggrandizement inserts an inequality into the community that would be leveled, either by thwarting its development or by having koinon members treat all in the community as their egalitarian duty. The individualism of koinon members would thereby be nullified.

Although unity of action is no requirement for a koinon, by far its most important tool is communication between members. Indeed, it is the only implement used. There is also a chronological requirement, and, based on analysis of ancient Greece and the modern West, a medical koinon needs about two or three centuries to develop in a primary society and function as a profession with an established capability to progress. Modern English-language dictionaries have fifty or more synonyms for "group," but none satisfactorily encompass the composition and function of the koinon. For this reason the ancient Greek word has been retained in romanized form and in restricted usage for the present work.

D. Heterarchy

The concept of heterarchy has been applied to many scholarly areas, including mathematics and neural physiology.¹⁰ The importance of global informational exchange and business management also has prompted great interest in networking and heterarchies. There are general attributes that have been ascribed to hierarchy and heterarchy, and the differences can be profound in archetypal models. A summary of real or inferred characteristics of hierarchic and heterarchic "dynamics" concludes the former tends to rigidity, gender stratification, centralized control, a rigid class system, a focus on violence, imposed solutions, a predisposition to imperialism, authoritarianism, and a

¹⁰ For an introduction to heterarchy as it applies to anthropology see the overview of the concept by its early advocate, Dr. Carole Crumley, *Heterarchy and the Analysis of Complex Societies*, in *Archeological Papers of the American Archeological Association*, 6:1-5, 1995.

steady state, whereas the latter tends to flexibility, equal gender access, multi-modal market economy, multiple avenues for advancement, a focus on peace, pluralism, consensus orientation, and temporal fluctuation.¹¹ Presumably the more polarized a society is the more the attributes will apply. But to avoid caricatures, both hierarchy and heterarchy inevitably coexist in social symbiosis. Thus, there is a degree of confusion in its definition. The *Encyclopedia Britannica's* definition of heterarchy is: “(a) form of management or rule in which any unit can govern or be governed...,” a definition that properly conflates heterarchy with management of a population. Present context, however, is the role of heterarchy in the organization and function of subsets within larger human settlements such as the city-states as described in chapter 8. It is important, therefore, to restrictively define the term:

Heterarchy: A nongovernmental form of management by networking units in which over time there can be a shift in the center of operations or status from one unit to another.

The function of a heterarchy is management of a network of nodes, each node being a group that may or may not have a chosen leader. But it is key that heterarchy is a network of subgroups (nodes), not individuals. A *network of individuals* who are specialists is a koinon. This differs from a *network of groups*, i.e., a heterarchy, whereby each group has a leader and the overweening goal is the security and prosperity of all the groups and their members. And a hierarchy is a pyramidal *network of decreasing authority*. Shifting guidance of a production network that operates independently of government is heterarchical, with each node's function being the product of a variety of skills in its workforce and likely to have an internal hierarchy of its own to provide organizational efficiency. And all these are the product of focused planning and design and unrelated to spontaneous order.¹²

Archeological support for heterarchy is primarily based on the absence of evidence for a political hierarchy and elite groups. Heterarchy is a managerial mechanism now thought to better explain prosperity and social order in large archeologically egalitarian societies than hierarchies, and this association is obvious in Table 5 (p. 265). If heterarchy is proposed as the principal form of social organization in many of the lesser civilizations of chapter 8, it means there should have been a degree of freedom to act in self-interest through at least a segment of society, the reason not being the presence of *heterarchy* but the absence of *hierarchy*.

The medical koinon is quite different, as extensively characterized in volume 1 of *The Natural State of Medical Practice* and in the preceding section. There are, however, some similarities. The koinon, like a heterarchy, has no permanent head. On

¹¹ See: Gill, R. B., *The Great Maya Droughts*, Albuquerque, 2000. This listing is a summary of the Table found on p. 65 of that publication.

¹² There is an important theory in social management that applies to economics: spontaneous order. This refers, in the opinion of many experts, to the “invisible hand” of Adam Smith, the guiding force that results in free markets producing better results than those originating from centralized government. The “invisible hand” is not a mystical force, although the details of its effectiveness are not fully understood. At its core is the idea that a group of free individuals in a free market, on its own and without direction from either external or internal organizing forces and with no particular goal or planning, will, by the commercial activity of individuals left alone to make their own decisions, arrive at an optimally functioning market. It produces order out of chaos, and there is no leadership whatsoever. The good result is the consequence of the conglomerate action of individuals, each acting without compulsion.

the other hand, the role of a leader in a koinon, should there be one, is that of a panel moderator rather than leadership directed by a policy. Like a heterarchy it is a network, but it is a network of individuals rather than groups, and those individuals are functionally independent and not dependent in the delivery of their service upon the interventions of another member of the koinon. It resembles a heterarchy in that competition can provide a stimulus, although its response to the stimulus is to improve its function rather than obliterate competition. A koinon differs from a heterarchy in that all members of a koinon are, within operational boundaries, independent, whereas in a heterarchical network of groups each group member (1) has some degree of subservience to the other members of his group, and (2) each group is to some degree subservient to the purpose of the overriding network. There is a group purpose which may or may not fit comfortably with the individual member, whereas in a koinon each member has the option of saying “take it or leave it” and suffers no consequence if the latter is chosen. In volume 1 of this series the local Chamber of Commerce in an American town can likened to a koinon.

Very different, therefore, is the koinon from the heterarchical group. Another difference is its size. The koinon of a craft, service, or trade might number just a few members and function very well, although its social influence in comparison to other organizations would be diminutive. The significance of a heterarchical group, however, increases with group size: more work is done, more things produced, a greater population is reached, a spin-off group to add to the existing heterarchical structure more likely. Accumulation of power is inevitable, although its setting is variable. And this leads to an unexpected conclusion that bears on the history of civilizations.

E. Conclusion – cities, the city-state, and heterarchy

As a prelude to this Section, Dr. Ingolf Thuesen has proposed a four-stage process in which a community can evolve over time that may encompass heterarchy.¹³ In the earliest stage a settlement develops that over time interacts with proximal settlements in such a way as to become the regional “central city.” This process requires no chief or bureaucratic structure, as it is, in effect, the result of networks that develop at the individual or small group level. The subsequent three stages are the city-state, the city-state empire and the provincial city. According to this scheme, the stage that provides the window of opportunity for individual and group enterprise is the first stage. The general thesis of the first stage by Dr. Thuesen is similar to the role and effect of heterarchy, with the notable exception that he has the nuclear settlement preceding the development of trade patterns, whereas it is here posited that no cluster of settlements developed into a larger nuclear center until one was purposely formed by commercial interests, probably arising in market towns. His subsequent three stages are the consequence of political and military force. As the history of politics and warfare attract the most attention, it is no surprise that the first and transient entrepreneurial phase usually goes unmentioned in history, the final three stages chronologically engulfing the flickering beginning of progress. But it is that first networking stage, or shortly thereafter, that is proposed as the likely time for the initial collection of data that would appear in the classics of medicine in the five successful civilizations.

¹³ See: Thuesen, I., *The City-State in Ancient Western Syria*, in *Comparative Study of thirty City-State Cultures*, Copenhagen, 2000, M. H. Hansen, editor, p. 64.

The role of heterarchy as an important force on the path to progress has been implied in this and preceding chapters, sometimes in the context of city-states and at times in hierarchies and egalitarian societies. From this it may be suspected that heterarchy can be viewed as a tool, one that is useful in any society but one that, while a capable temporary substitute for decision-making in a society, cannot be considered a permanent mechanism of governance. One reason for this thinking is that heterarchy in present context refers not to management of an entire society but only to a slice of that society, usually a commercial one. This is reasonable, for it seems unrealistic to suppose that an entire society, or civilization, can have as its primary governance a managerial policy that shifts from place to place, from department to department, or even from city-state to city-state, depending on trade or a manufactured product or other external event that causes the locus of power to shift from one place to another. Even if it were possible to be peacefully accomplished, the effort would be monumentally inefficient. But working within a larger social structure it can be monumentally efficient. In contrast to Erich Fromm's pessimistic opinion of the common man in his book, *Escape from Freedom* (see p. 255 of the present volume), the American experience revealed a population that, once it escaped authoritarian European bondage, reveled in its freedom and flourished, rather than seeking but another master.¹⁴ In doing this the diverse social organizations in America that developed throughout much of its history, including religious, commercial, industrial, and ethnic, can be considered an amalgamation of heterarchies in that they provided a contractual structure for local prosperity and growth that averted chaos while little central bureaucratic authority existed. Even today it is the prospering of autonomous industries, trades, crafts, organizations, guilds, sects, and brotherhoods/sisterhoods that, free from controls of the State, provide a continuity of culture, freedom and personal choice despite the unending political avarice and turmoil that attends each generation.¹⁵

The role of heterarchy and its implied authority within the structure of a civilization can be traced to mankind's earliest settlements. As archeological studies in the last century have disclosed, the move from hunter-gatherer to sedentism, while a global phenomenon chronologically related to the retreat of glaciation about twelve thousand years ago, was for centuries hesitant and the original settlements small. Rather than acting like a stab-inoculated culture of a bacterium and promptly extending its circumference homogeneously, humans chose instead to stay in small units, or settlements. Like the small nomadic hunter-gatherer groups, early human settlements were smaller still, and this happened around the world in many cultures. People did not say, "Ah, the weather is improving, crops are bountiful, so let's move closer together so we can enjoy the pleasure of human company." No, thousands of years went by before cities came into being, and even then they did not come into being because they were desired. They came into being, despite the inconveniences they presented, because they were opportunities. As the small human settlements matured and prospered, networks

¹⁴ In a sense, Dr. Fromm is not completely contradicted, because the 20th C European populations upon which he based his analysis had nowhere to go to find freedom, nowhere to escape *to*. But in addition to his analytical error of misinterpreting the tragic position many found themselves after WW I and unable to see any credible prospects for "self-realization," he not only confused a fear of freedom with a fear of chaos, but he also missed presenting the American experience, which might have led him to refrain from positing that communism would be mankind's ideal governance if only mankind would adjust its behavior accordingly.

¹⁵ For extensive discussion of this point see Excursus 15 in volume 4 of *The Natural State of Medical Practice*, p.155.

were formed between settlements, some near, some distant. Then, because of some commercial needs and benefits, including access to a workforce, efficiency in trading, security, and access to a convenience of transportation, the nodes of one commercial venture sought to coalesce with the nodes of other commercial ventures. Mutual benefit was to be found when several commercial ventures were conveniently located near each other. It was this commercially useful pattern that prompted enlarging settlements. The development of irrigation on a large scale was not intended as a nucleus about which urbanization would crystallize. Large-scale irrigation was a secondary response to an enlarging population fueled by commercialism. Thus, the early large towns and then cities were confederations of commercial enterprises. The larger aggregations of a population were not sought because of social enjoyments. Who, in those ancient days and in the absence of external threats of violence, would have preferred to live in a crowded walled city rather than a small village in the countryside. No, the attraction was not city lights. It was what the commercial nodes provided: security, the hope of prosperity, and freedom from the regulated status of the egalitarian kinship. Cities were commercial, not social, inventions.¹⁶ City-states represented a logical form of this process, for products and services were integrated between the central population and the agricultural sustenance of peripheral settlements. And once the benefits of these commercial confederations vanished, so did the population.

This, then, was the great contribution by heterarchy to civilization. Given the social pattern just described, all city-states and cities find their origins in heterarchy provided by confederations of commercial ventures.¹⁷ This includes cities that sprang from colonies and modern cities purposefully designed to exploit a particular raw material or convenient piece of valuable geography. It is the pattern of commerce that has always been the spark of progress, of prosperity, of population increase, and thereby the city. The exciting idea of the city being a wonderful development, a fount of enjoyment, learning, great institutions, and opportunity is a relatively modern perspective. For most people most of the time cities have instead been necessary institutions, often unhealthful ones. It is true, however, that for the elite classes things have been different. Prosperity permitted some to have the leisure to delve into philosophy, sculpture, complex music, cotillions, and many other aspects of a happy society such as we in the West now find ourselves, but until recent times that elite class was small. It is important to remember that present

¹⁶ This possibility was raised by Blanton, et al., (*A Dual Processual Theory for the Evolution of Mesoamerican Civilization*, in *Anthropology*, 37:1-14, 1996) who identified a “corporate political strategy” whereby the sum of power in a population center was shared over a network of commercial interests that predated the rise of a leadership hierarchy. Also see the definition of “city” on p. 21, which requires only a discrete population in a defined space brought together for commercial purposes. With this functional definition even size is not a characteristic of a city. Obviously the distinction between “town” and “city” becomes blurred, but (1) it is blurred anyway, and (2) a small town built around a commercial product can grow to be a large city, in which case “small” and “big” as arbitrarily assigned is the only adjectival distinction needed. All this does not deny the importance of attendant social needs, associations, and designs that develop in and contribute to city life, but at its heart the city, large or small, is a concentrated population that has crystallized around a commercial product.

¹⁷ Or, to abbreviate the statement of Dr. Monica Smith, “...cities in the premodern world did not require a state level of political organization, only an initial impetus for settlement, ...” See: Smith, M. L., *The Social Construction of Ancient Cities*, Washington DC, 2010, the Introduction, p. 15. The only difference here is the author’s opinion that this statement can be extended to include all cities.

discussion concerns primary civilizations and the initiation of a centralized population that would evolve into a city. For urbanization during subsequent phases of civilizations up to modern times Dr. Monica Smith (cited above, p. 3) has stated that in cities “kinship ties are reaffirmed and augmented, rather than destroyed” as neighborhoods and social interactions develop over time. This is not contested, although kinship in the ghetto should not necessarily be considered a positive attribute of cities.

The important effect of heterarchy in forging a path for progress during the early formation of cities was that it provided a domain that was relatively protected from either egalitarian and political authoritarian influences. The source of power, limited as it was, resided in those who organized the production of bronze implements or those who bartered for a local storable crop and then “sold” it to a distant population that in return asked for more. It resided in those who had to invite, rather than to command, the local population to join in their commercial enterprise.

As a focus of power, heterarchy is to be reckoned with in originating what would become cities. But, as a piton upon which to attach the fragile thread of human liberty and the progress of mankind, it will fail the test. Its transcendental value in this effort lies in (1) providing an attractive haven for members of egalitarian kinships to leave the security of the band or clan, (2) providing a finite window of opportunity for progress during the development of a settlement hierarchy, (3) providing a level of protection against hierarchical overreach once the latter does emerge, (4) providing a degree of durability that might give sufficient time for specialization and nascent professions to appear, (5) providing a degree of stability within a community in times of hierarchical disruption, and (6) providing a safety net in the life of the common man over thousands of years. A great debt is owed to heterarchy because the commercial world it harbored prompted mankind’s escape from egalitarianism.

CHAPTER FOURTEEN

ESCAPE FROM EGALITARIANISM

Ἐλευθέρους ἔθηκα
"I set them free."

Solon (638-558 BC), 36.15
 Translation of John Lewis, from
 his book, *Solon the Thinker*,
 London, 2006

After a definition of historicism and a review of its criticisms, it is argued that historicism may justifiably identify some basic threats to human progress and as an aspect of social science should not be discarded. It is further argued that historicism has yet to be fairly tested, for history has never recorded a "satisfactory" civilization. The negative social consequences of egalitarianism and the importance of smaller groups to progress are discussed, and the wide gap between democracy and individualism is noted. Progress which emerged from release of the plebeian class is not the consequence of democracy. It is the consequence of the voluntary autonomous group fed and led by self-interest. That group is the *koinon*. Democracy is nonetheless useful, for it is the only form of governance that can accommodate the existence of *koinons*, meaning that it is the only form of governance that up to a point can resist the temptation to interfere with self-interest group activity. It is the not-so-subtle threat of today that such support can be withdrawn.

- A. Historicism, this book thus far, and anticipating the future
- B. *Natural law theory of human progress* as historicism
- C. Democracy, its origins; its roll in progress

- A. Historicism, this book thus far, and anticipating the future

Historicism has been a focus of attention by sociologists over the last two centuries in that it has been proposed that the study of historical patterns of human behavior and societal change should make it possible to predict not only the consequences of those patterns but the subsequent course of events. Dr. Karl Popper defined historicism thus: "... an approach to the social sciences which assumes that *historical prediction* is their primary aim, and which assumes that this aim is attainable by discovering the "rhythms" of the "patterns," the "laws" or the "trends" that underlie the evolution of history (*sic*)."¹ There are prominent sociologists, Dr. Popper in particular, who disagree with this theory, arguing that the future of mankind cannot be known unless all the factors that produced its course to date are understood, and they are not.

Not to counter the arguments of experts, yet there does seem reason to consider some factors more important than others in determining the course of human events. If this is true, at least some factors that seem inordinately important, especially if malevolent, might be identified and perhaps controlled or avoided to the benefit of future

¹ See: Popper, K., *The Poverty of Historicism*, London, 2004, p. 3. The book was first published in 1957.

generations. It would be tragic if a lesson from the past that can keep us from repeating what demonstrably is an error is ignored. The final product, in agreement with Popper, will be unknown, but the path there may be made less painful. It is in accord with that end that these three volumes are presented for deliberation.

It is proposed that there is a critical juncture in the evolution of human society that, if the right moment is seized upon and right action taken, can provide the spark for triggering an intrinsic mechanism of society to improve its chances not only of survival but improvement in the lives of all its members. That moment does not occur in the earliest societies because populations are too small and life expectancy too short to accumulate knowledge. But once a predictable surplus of a crop or a product provides the opportunity for commerce and prosperity the option of groups forming in conjunction with this new phenomenon appears. Prosperity in turn fosters an increase in local population that can in turn support specialization, perhaps some focusing on communal needs such as irrigation, sanitation, and organization. Specialization emerges as an individual can now make the personal decision to become an expert and to join with others having a similar interest to exploit this good fortune. *The critical juncture is at hand and the basic tool for progress can be obtained, for now several individuals can focus their collective minds on single issues.* For example, several individuals can combine their experiences in managing trauma and disease among their families and friends, and thus form a nascent society of medical practitioners.² Progress is beginning in this theoretical community.

Such success is not attributable to the individual, for reasons described in volume 1 of *The Natural State of Medical Practice*. The success is attributable to a group of individuals, and it is the ability of a society to conceive, permit, support, and exploit the good news of such dedicated groups that will lead to the flowering of a society. The importance of the group in initiating and furthering medical progress was proven in volume 1 of *The Natural State of Medical Practice*, and this volume extends the significance of the dedicated group to progress generally. Although the particular group that led to Hippocratic medicine was termed a “koinon,” the critical feature for its founding and success was the freedom of members of society to come together to formulate solutions for problems and to exploit ideas and discoveries for benefit to themselves by providing services that benefit others. Volume 1 mentioned the initial progress of medical practice in ancient civilizations of Mesopotamia, Egypt, India, and China, but the focus was on medicine’s obliteration. In this volume the emphasis has instead been on its creation. In reviewing twelve lesser primary civilizations selected in part because of some similarity in their metrics to the five early civilizations that realized, however limited, true progress in medicine, the remarkable finding, completely unexpected, was the absence of any evidence for medical practice in any of the twelve.

The cause of the loss of rational medical practice as described in volume 1 was authoritarianism in some form. In this volume the nature of the forces that prevented

² The implied nascent medical profession does not require an office or signage for its founding and success. At its earliest stage it might be face-to-face deliberation on what to do about a particular problem, the initial response being something like “I think Joe tried to once, and it turned out OK. Let’s ask him.” It takes little for a person to be identified as qualified in medicine (which has its good and bad points). See for example p. 67 of volume 1 of *The Natural State of Medical Practice* where the popularity of the quasi-medical expertise of Heinrich Schliemann (1822-1890) during his excavations at Troy attracted ailing individuals from a large surrounding area, so desperate are we to find relief and an explanation for our ills and our pains.

rational medicine from developing is postulated, from the limited information available on prehistoric civilizations, to be the same. This time, however, the nature of authoritarianism comes in a different guise. In volume 1 authoritarianism, by its policies, either usurped or undid the structures that produced a rational medical practice. It was not purposely destructive of the concept; at times, as in pharaonic Egypt, it even integrated early medical practitioners into the mechanism of governance. In contrast, the twelve lesser civilizations faced a different authoritarian threat: egalitarianism. The issue was not purposeful misapplication of an initially successful group effort; egalitarianism instead prevented the group from forming. In these early civilizations there could have been no inherent antagonism to a group of medical practitioners, as such a profession had yet to be envisioned. It was, instead, coercion of a more general nature, a negation of the idea that an individual could have a personal goal that was not integrated into the goal of society. Whereas egalitarianism is inherently redistributive in those things considered beneficial to society, today this being at the core of “socialized” medicine, by redistributing its narrow perception of beneficences throughout a society, egalitarianism could never advance to the point that a system of medical practice could even develop, much less be made available to all.³ The profound stagnation inherent in egalitarianism is in part based on the assumption that, as bad as things are, things are as good as they will ever get or, in modern times, should be allowed to get. To the egalitarian, time and change will merely allow more power and wealth to be concentrated in fewer and fewer people, and this is not tolerable. It is better to equitably distribute what we have. Such a philosophy becomes even more powerful if change is viewed not only as possible but even dangerous: political activism can then add to the destructive nature of egalitarianism.

As the present work has reinforced, there has yet to be a long-lived satisfactory civilization. Some of the civilizations discussed in this volume surely persisted, several for a thousand years, but they were not “satisfactory.” Living to an average age of 35 years, not knowing one’s grandparents (and frequently not even parents) nor having their wisdom imparted, helplessly bearing the pain and suffering of trauma, disease, infirmity, and childbirth with nothing but hope or the risk of toxic botanicals as treatment, and serving as living tools of the powerful and fodder for the warriors is no way to pass one’s life. As we have no history of a satisfactory civilization, how will we know when one has arrived? The question is moot. The best to be expected is some sort of gradual improvement over what previously existed. A more realistic question is how can we avoid losing what has already been gained, for this is what has happened in the five successful civilizations described in chapters 2-6. And which threat is the greater, egalitarian stagnation or authoritarian misappropriation.

It is proposed, therefore, that historicism has yet to be given a fair trial, that initially successful human civilizations have been consistently aborted or superseded or conquered within a century or two. As a result there is no predictability to the course of

³ To be clear, the source of the problem is not the provision of medical care to all members of society. No one would ever make that argument. The source of the problem is, instead, the provider. With a central government as the provider, all benefits of the interested group, the *koinon*, are lost. Clinical medicine becomes a job rather than a profession. The judge of any attempt at innovation will be a central committee of disinterested persons guided by personal financial considerations, national economic policy, limited knowledge, and friendships. But the arguments against socialism are so vast and have been apparent for so long it is clear that logic is not an issue for the forces that daily march us closer to the intellectual stagnation that kept ancient kinships picking berries for thousands of years.

human societies because those initially successful civilizations, shortly after their birth, were perverted. That very unpredictability has been the product of elite factions or external forces rather than the preference of population of the societies based on self-interest. Should societies evolve that proceed with actions dependent more on the canvassed response or thoughtful opinion of the full membership (*i.e.*, a free democratic republic) rather than an elite few or class, the options for action will be more focused, less extreme, and thereby more predictable. In other words, historicism has yet to be put to the test for the purpose intended, that purpose being the promotion of the best way forward to a “satisfactory” society. Put in the context of chapter 12 of this volume, there has been no society that has yet permitted, over an extended period, the operation of natural law. There is the possibility, of course, that such a test is presently under way, characterized appropriately by Dr. William McNeill (and unfortunately recanted to a certain extent in his 1991 retrospective preface) in his popular 1963 book, *The Rise of the West: A History of the Human Community*, and will turn out to be “satisfactory.”⁴

B. *Natural law theory of human progress* as historicism

Definition of the Natural Law Theory of Human Progress: A theory ascribing all apolitical advances for the betterment of mankind to autonomous self-interest groups in which each member has equal opportunity to speak freely and share ideas about the group’s common interest without fear of retribution. Axiomatically it excludes “betterments” that have been stolen, copied, derived by exploitation, or used for subjugation of others.

In determining the relevance of the natural law theory of human progress in predicting the course of societies, the requirements arbitrarily selected to support a civilization’s capability for progress were derived by an analysis of the ancient Greek city-state, Miletos. Similar data were then sought in a variety of civilizations, large and small, ancient and recent, four being historically considered “successful” civilizations and twelve being “lesser.” Virtually all the largest communities of the lesser civilizations described in this volume were abandoned within one or two centuries of their flourishing period; they did not gently meld into a new cultural phase. Some unexpected event occurred, although no event has been conclusively identified. No evidence of a medical profession has yet to be identified in them. In contrast, the five successful primary civilizations evolved in large alluvial regions where sequential civilizations (manifested as conquests, dynasties, or periods) spanned thousands of years. (Dr. Toynbee’s *A Study of History*, for example, cites Sumerian, Babylonian, Persian and Arabic as distinct major civilizations even though they occupied, within limits, much common geography.)

⁴ Dr. McNeill’s excellent and thoughtful book is, nevertheless, quite different in its focus and its conclusions than the present four-volume work, for he assigns the mechanism for progress to the interactions of civilizations, interactions that tend to be clashes. Humankind’s progress, therefore, based on his analysis of the histories of mature civilizations, is the result of contributions from them all. This, of course, is completely at odds with the present work. And even though Dr. McNeill discusses progress in terms of all mankind (the “human community”), by combining the knowledge acquired by “clashes” (including physical coercion and war) with the realization that all human governance up to recent times has been strictly authoritarian, knowledge becomes a tool that benefits an elite class, not the total of the human community. The mass of humankind is still without benefits of that knowledge except for such access as the elite class permits. “Progress” thus acquired is not considered progress in this book.

Evidence of progress as presented in classical medical writings was found or is postulated to have occurred in the primary civilization of each of the five. Four of the five successful primary civilizations were subsequently forcefully assimilated into secondary civilizations. Had those primary civilizations simply disappeared rather than being conquered or assimilated, their evidence of medical progress might well have been lost, for in all four civilizations the existence of medical progress is known only from much later copies of those earliest writings, writings that would not have remained available for discovery had there not been such an assimilation. Nevertheless, the initial work that was incorporated in the medical classics was frozen in time or diminished in consequence as generations passed. A complex form of writing preceded Hippocratic medical practice in Greece, thereby permitting preservation of direct evidence of its existence.⁵ But even with such an extensive written record, the perverted assimilation of Greek progress by the Roman Empire resulted in loss of Hippocratic medicine as Europe entered its Dark Ages; the presence of writing did not avert its loss. Although some Hippocratic treatises were preserved and copied in the East, limited dissemination and authoritarian realities inhibited their restoration to the West. The partially intuitive conclusion, necessary because the archeological record is so limited, is that in the formative years of early civilizations progress can occur once a certain size and level of prosperity are reached, but unnatural forces, for the most part undetermined, bring those civilizations to a relatively abrupt end. In civilizations assimilated by conquest, political authoritarianism can provide physical continuance of aspects of culture, but (1) it prevents further progress by the primary civilization, and (2) it is in itself inherently unable to progress. At least that is what happened to medical practice.

Survival of the concept of progress has, therefore, never had a chance to persist unimpeded for more than one or two centuries. Even today's massive expansion of knowledge in medicine that began in the modern West is but the work of little more than two centuries, doubts about its survival into the next century being a subject of debate. Despite a mechanism for transmission, *i.e.*, writing, the concept of "progress" as manifested in the ancient medical treatises was lost even though the works themselves were transmitted. But it is commonly claimed that forceful assimilation, including the Akkadian overthrow of Sumer in Mesopotamia, the incorporation of predynastic Egyptian civilization by Pharaonic authority, the incorporation of Shandong civilization into the Shang Dynasty in the Yellow River region of China, and the subjugation and assimilation of Greece by the Roman Empire, was necessary for our modern age to reap the benefit of ancient reason. This, however, is not the case. Once forceful assimilation occurred the assimilating power was unable to build upon and benefit from the formulation of progress it had received. This explains why the modern age of science, including medicine, was reinvented anew in the 18th C rather than an improvement on the rediscovered

⁵ In the preceding chapter it was claimed that writing followed on the initiation of progress and, using medical practice as its gauge, was therefore a later sign of progress within a society. That writing (Linear B) existed in the Mycenaean Empire which preceded Hippocratic medicine by six centuries or more might suggest the opposite. But the term for "physician" is one of the words identified in Linear B (see this volume, footnote, p. 36). If it is confirmed, it would be additional evidence that writing and medical practice are concurrent markers of progress as discussed on p. 287. But note that while the Greek "Dark Ages" intervened between the Mycenaean era (1600-1100 BC) and that of Hippocratic medicine, the usefulness of a written form of language would have been common knowledge for many centuries throughout the peri-Mediterranean region and not a totally unique development of a primary city-state.

Hippocratic medicine of 4th C BC. A functional transfer of advances from a primary civilization to subsequent civilizations is apparently difficult, if not impossible.

What, then, is the relevance of the *Natural Law Theory of Human Progress* if progress must be repeatedly born, phoenix-like, over the ages only to fade away or evolve into meaningless canon? What must present generations think about the changes their progeny will encounter if today's civilization follows the path of all preceding civilizations and dissipates or, more likely, is taken not so gently under authoritarian wings? The following points might be considered: (1) The greater the size of a population, the smaller is the significance of the individual. The primary "successful" civilizations of chapters 2-6 can be considered politically classless at the time their medical knowledge was initially being collected and the total populations were relatively small. Such hierarchical controls as existed had evolved within the enlarging settlements by negotiation between common interests unimpeded by authoritarian politics, and they impinged little on networks of production and trade. But authoritarian hegemony superseded this as those civilizations increased in size, and the average person became less and less significant, both numerically and functionally. It is, therefore, important to minimize centralization of power. (2) Egalitarian societies were present in all of the lesser civilizations analyzed herein, including the most long-lived (>1,000 years) and unchanging societies. If there is any feature identifiable with the inability of ancient or primitive civilizations to progress, it is egalitarianism. Egalitarian policies are to be avoided. (3) It is the unique role of the individual to innovate and enter with like-minded people into groups to further the development of good ideas. There is only one civilization that can be cited as promoting individual liberty, and that is Western civilization. It is this respect for the individual that has placed the West in such a commanding position in the history of mankind. The third point is, therefore, to approximate Western, especially American, constitutional governance as originally designed to defend the inherent freedom of the individual. But if individual liberty cannot be maintained, another authoritarian relapse can be reliably predicted and the respectability of historicism will unfortunately be restored.

C. Democracy and its origins; its role in progress

Dr. Barbara Geddes discusses various explanations for shifts to democracy, but a satisfactory one she feels is not available because the contexts of the various theories are narrow and specific, being tailored around a particular mechanism. She thinks explanations will vary according to the type of preceding authoritarianism.⁶ Some consider economic development not to be a cause of democracy, but once the switch occurs prosperity stabilizes it.⁷ Generally the assumption seems to be that democracy flows from a prior political state rather than by *de novo* design.

But is democratization the issue? Democracy has its etymological origin in the Greek *δημοκρατία* (*demokratia*), "demos" referring to the people and "kratia" to political power. One of the earliest uses of the term was by Herodotus in his hypothetical discussion between Greeks and Persians of the merits of several types of governance. The

⁶ See: Geddes, B., *What Causes Democratization?*, in *Oxford Handbook of Comparative Politics*, Oxford, 2009, C. Boix and S. C. Stokes, editors, p. 612.

⁷ See: Przeworski, A., et al., *Democracy and Development: Political Institutions and Well-Being in the World, 1950-1990*, Princeton, 2000.

word “demos” refers to the people of a place, not a person, in particular the people “of a deme,” the deme at that time being defined geographically rather than ethnically and the defined place being either rural or urban. Ancient Athens had more than one hundred demes. Thus, the power in managing the course of the city-state was spread throughout the length and breadth of society regardless of wealth or status, although the right to vote rested solely with male citizens. Important to present discussion, democracy gave each voting citizen a vested interest in the success of his city-state by investing a small slice of political power in him, but it did not grant him individual liberties. The laws of that city-state were a separate issue, and while they may have granted him equal rights before the law they were no Bill of Rights. In effect, democracy granted power to eligible citizens of active membership in a political group. There were usually subgroups of varying political perspectives as well, but individual liberty was not an issue. True, citizens were considered free-born, and therefore “free.” But the basic definition of being born free meant not to be born a slave rather than to be born with certain unalienable rights which all mankind should share. To citizens of classical Greece, democracy in a city-state was not an invitation to function as a free agent but as a member of a large *koinon* (see definition of *koinon*, p. 22) with self-betterment primarily meaning physical survival. Having said that, Pericles’ funeral oration makes it clear that the great virtue of democracy was its ability to stimulate individual motivation because self-interest was involved. But that individual motivation was good because it contributed to the winning of battles and assisting the survival of the Athenian city-state. It was not intended to promote the significance of the individual for that individual’s benefit; it was use of self-interest as a tool for winning battles. In battle the motivated side was the one where personal interest was involved, not the interests of a distant king. But, as in political assembly, an army composed of the more motivated troops still had group interests at heart, namely the winning of the battle, something that an individual acting alone could not do. In this sense Athens and Sparta were as one in their desire to impel their soldiers to victory. They merely differed in the means: Sparta by indoctrination, Athens by motivation.

The importance of the individual also was not carried forward by ancient Greece when it became a minion of the Roman Empire, or by the Roman Empire itself. Cicero declared “We are servants of the law in order that we may be free.” The idea of the individual as a free agent was there, but it was as defined and permitted by the State. The concept of individualism came from a separate source: the evolution of Judeo-Christian ethic. But the onset of the European Dark Ages quashed past evidence of progress and put in place an authoritarian pan-European institution, the Church, for reasons expressed in volume 1 of this work (p. 458). It is argued here that the significance of the individual within society as presently understood finds its initiation solely in the Reformation; that it was the individual being free to determine his personal association with God that highlighted the significance of the individual and, inasmuch as this association was more important than any other human consideration and applied to every human, it could not be infringed by secular authority. Thus, the push for political democracy in the West had its origins in religious “rights” as first put forward in medieval times and officially declared by Martin Luther. Although tributes regarding democracy are routinely and profusely given to the early Greek city-states, their governments ended up failing. There has been generous attribution by Western scholars ever since the 17th C to the Constitution of Athens and to ancient Greek democracy as models for modern Western democracies. It represents, however, a *post hoc, ergo propter hoc* form of reasoning. It was the Reformation, by identifying the individual as having private access to a dialogue with God, that was the spark that would unite collective action to protect that individual against

authoritarian forces that would have had it contained. Martin Luther made no literary or intellectual appeals to the rise of classical Greek democracy. He was a scholar of classical Greek, but his orientation was solely apropos translation of the Bible from the Greek. There had been many attempts, mostly brief, to foster democratic reform in earlier societies, but with the Reformation's force of moral righteousness and an appeal to conscience as an additional motivation, parliamentary governments came into being in Europe over the next two centuries. Bit by bit democratic process was instilled into Western governance, and ultimately "universal" suffrage was obtained. We can appreciate what the ancient Greeks accomplished in the realm of democracy. They were the first to show what was possible.⁸ But it is proposed here that, even without any knowledge of Greek genius, it was Western civilization and the Reformation that invented, again, democratic governance and brought it to fruition. This is a restatement, although on a grander scale, of the same course of history that accompanied the modern evolution of medical practice: Greek medicine of Hippocrates flowered in the 5th and 4th centuries and then promptly declined, disappearing altogether, but in the 18th C in the West medical practice again began to flourish, again unrelated to the Greek experience, and it has brought us to where we are today even though it is common to, again, incorrectly give credit for our Western success to "standing on the shoulders" of the ancient Greeks. No, our civilization is distinct in every way from that of ancient Greece, and, in contrast to other civilizations, Western medicine in the 18th C did not turn into professional canon the original Hippocratic writings. It is true that the appearance of autonomous small groups in ancient Greece were free to surface, one being a network of medical practitioners (Hippocratic physicians), but this had occurred previously two thousand years previously in the four "successful" primary civilizations highlighted in this book. As a consequence, progress, as expressed in the markers of medical practice and writing, was a concomitant of the freedom to form self-interest groups within the larger society, thus demonstrating that group freedom preceded freedom of the individual. Only after the Reformation did the individual begin to receive the same attention and liberty of action. Mankind's freedom was not granted by the State. It was free men who, by using their innate ability to reason, determined to grant certain rights to the State.

To summarize, democracy, the placing of political power in the hands of the governed, was never devised to foster individualism. In contrast, the Reformation, as a revolt against a pan-European authoritarian institution, established a concept of the primacy of the individual's conscience in relation to God. The praise of this maturation of a free society is appropriately unbounded in the West. But it must be remembered that "progress" was first expressed thousands of years earlier in small self-interest groups that developed in a commercial environment that freed common people from egalitarian kinship. Indeed, the immediate result of Martin Luther's *Theses* can be viewed as a splintering of the bonds of a vast and powerful institutional kinship that had contained, coercively when necessary, the consciences of an entire continent. The response was the

⁸ Ancient Greeks viewed democracy less as being favored than monarchy and tyranny being disfavored, monarchy being the rule of one man and tyranny being rule by one man supported by a segment of the populace, thus being polar opposites. Each citizen, therefore, wanted to be part of the decision-making process. In doing so they were joining with like-thinking persons to form a larger bloc of political influence rather than fostering individual liberty. Democracy truly was a matter of power to the "people," meaning all the (voting) people, quite different from individual or group liberty.

formation of numerous and heterogeneous smaller groups formed by people joining with others of similar religious conviction. Similar attempts in preceding centuries had been met with defeat or extinction, but with the expanding ability to speak out in public and debate the issue, intellectuals and parliaments over two or three centuries would recognize an individual's natural rights extended beyond one's relationship with God; it was also a desirable political and intellectual goal. There is no prior human experience with such a thing. And so today we can appropriately praise the genius of certain individuals prominent in many fields, a praise of the individual, and we can benefit from their inventions and discoveries. But this is possible only because the freedom of self-interest groups was, within legal limits, unrestricted, groups in which individual genius was now able to manifest and propagate itself without patronage. The small groups have now become, in the West, universities, professions, and corporations, institutions that rely, and indeed exist, on the equal and open expression of opinion from all their members and constituents who can speak freely without fear of retribution. Thus, of all the intellectual dangers facing modern society, the greatest is a restriction on the functioning of autonomous groups in which each member has the goal of self-betterment. Whether imposed externally or internally, the purposeful hobbling of the individual's right to free expression within the confines of a group by restricting him or her to what experts will designate as a greater institutional good is a denunciation of natural law and will have dire consequences.

The association of democracies and progress gives the impression that there is a direct cause and effect between the two, and that the former led to the latter. This is incorrect. (1) One of the problems of democracy is the well-known tyranny of a majority, surely inimical to the individual and to progress.⁹ One of the glories of the Constitution of the United States is its protection of minorities and individuals that might be assaulted by majority opinion. Such a safe-guard is not found in the Athenian constitution, but it underlies the equal representation of the States in the United States Senate as a counterpoise to the popular representation of the House of Representatives, although equality before the law, a bed-rock requirement of that protection, was provided the Athenian citizen class. (2) That democracy did not provide the window of opportunity for group liberty and subsequent progress seems obvious in that four of the five "successful" early civilizations (Sumer, dynastic Egypt, Indus Valley civilization, and Longshan culture) democracy had not yet been invented, *i.e.*, long before ancient Greece. (3) Individual freedom had nothing to do with progress, even in ancient Greece. True, Pericles praised Athenian tolerance of differences among people; clearly there was a range of freedom of action that was tolerated, and it isn't likely that this was unique to Athens. There also was the famous Greek aphorism: γνῶθι σεαυτόν, "know thyself,"

⁹ Remember: J. S. Mill noted that "Society can and does execute.... a social tyranny more formidable than many kinds of political oppression." See: *On Liberty*, 1859, and as footnoted in volume 1, pp. 307, 308. In a functional sense, the social tyranny of the majority can be likened to coercive egalitarianism. In the ante-bellum South, enslavement of a racial minority by a (voting) racial majority not only represented physical coercion by political authoritarian governance. It also was the purposeful denial of the ability of the enslaved to improve their lot resulting in a diminished ability to accommodate opportunity when freedom was obtained. In other words, just as egalitarian social pressure kept ancient and primitive peoples in a social prison of their own making that lasted for centuries, the tyranny of the majority, by keeping a racial minority in a social prison (but *not* of their own making), produced an equivalent effect that contributed in many quarters to continued victimization for several more generations.

an expression of the increasing realization of self-worth that was also popular in medieval times. But the tolerance of others was voluntary and surely was not intended to be unanimously applied. More likely, it was the breakup of the phratry structure. Once kinship allegiances were not locally mandated and citizens could view their new position within a polity rather than a tribe, each person became an individual rather than a cipher. Then was the time for group freedom to make its appearance, for individuals could join in local groups of their own choosing. After all, the Greek polis was run by assemblies of citizens, *i.e.*, large groups in which there were small group interests that could make their political voice heard. The innovative small group, the apolitical koinon, was just another manifestation of this group freedom. The propitious time for an innovative group to make its appearance was during the least authoritarian interlude. But while it represented a time of small group activity it was not intended as a function of individual liberty. Unexpectedly, however, the koinon was not only democratic; it also provided a platform for expressing individual experiences and ideas of its members. It was in the koinon, the small group itself, that the individual could communicate an innovative idea based on personal self-interest rather than group self-interest, and all could benefit.

And so the Argument has now been elucidated. It was first discerned in volume 1 of this work during study of Hippocratic texts from early Classical Greece, namely that only a committed and unrestricted group of medical practitioners could have produced the early Hippocratic works, and that group was identified by the Greek word “koinon,” an acephalous small and democratic organization committed to improving and promoting a common self-interest.¹⁰ In the present volume, by generalizing its relevance to all civilizations, by assuming humankind is no more intelligent or moral than it was ten thousand years ago, and using medicine as a sentinel species, it is clear that the inability to develop or sustain the koinon is a marker of aberrant social evolution. A major and well-defined corrective appeared in the West with the Reformation and recognition of natural rights of the individual.¹¹ The beneficence is now felt globally. It is concluded that the great value of individual liberty to a society resides in the individual’s participation in small common interest group activity within the larger society. It is further concluded that egalitarianism, as a negating influence on progress, has unnaturally prevented human development just as political authoritarianism has prevented its proper maturation. Authoritarianism, in either its egalitarian or political camouflage, is to blame for the misery endured by the unprivileged man and woman of all ages who, left alone to pursue their best interests and able to freely contribute to the course of society under the

¹⁰ The koinon can be likened to the classic American town meeting. All opinions could be heard free from fear of retribution. But when used in the context of urbanization and specialization the apolitical koinon has a more focused self-interest function.

¹¹ A clear-cut medical example of the chronological schism is described in *English Medical Humanists* by C. D. O’Malley (Lawrence, KS, 1965). Prominent English physicians were Thomas Linacre (1460-1524) and John Caius (1510-1573), the former recognized for his translations of Galen and Aristotle and the latter a Galen devotee noted for his “strong, if not ruthless, direction of the College (of Physicians),” his opposition to Vesalius, and indifference to the Reformation. Their Humanism played no role whatever in the great post-Reformation events just getting under way. And the earliest formal politicization of human rights in Prof. J. H. W. Verzijl’s book, *Human Rights* (Haarlem, 1958), written for the tenth anniversary of the United Nations *Universal Declaration of Human Rights* (1948), is the *Bill of Rights* on the accession to the throne of England of William and Mary (1688), although the clearest statements are found in the *Declaration of Rights* for Virginia (June 1776) and the *American Declaration of Independence* (July 1776).

subtle guidance of natural law, could have obtained the betterment of all mankind thousands of years ago.

Epilogue

The subtitle of this volume is: *Escape from Egalitarianism*. In recounting the history and prehistory of medical practice a pattern has fallen into place that was unintended at this work's inception, namely an insight into the social circumstances surrounding the evolution of medical practice. As demonstrated in volume 1 and with the additional support of the present volume it is proposed that medical progress, used in this volume as a surrogate for both pragmatic and intellectual progress, is, and always has been, prepared to emerge from the shadow of existential threats that can be acute, poignant, and demanding, but that the window of opportunity for that emergence is small and vulnerable. Had it been otherwise, much advanced knowledge of a modern nature might have been available in what we now call prehistory. Indeed, prehistoric human existence might have been significantly shorter had the escape from egalitarianism by our ancient forbears been permanently successful. It has been estimated that nearly 100 billion humans died between 50,000 BC and the 18th C AD, at which time the natural state of medical practice was reinstituted in the West and modern medicine and its scientific ramifications proceeded to mollify or prevent many of the miseries of humankind, doing so on a global scale. It is a fair deduction, given the evidence in these four volumes, that a large proportion of those billions dying before the age of modern medicine would have had access to improved medical care had the escape from egalitarianism been permanently successful thousands of years earlier. The scope of this tragedy is beyond imagining.

Nevertheless, with the remarkable progress that has been made in the past three centuries, perhaps mankind has finally, and permanently, ridded itself of a self-imposed serfdom that has led to entrapment of the mass of humanity and has shuffled off all past civilizations to their demise, in doing so leaving to historians only the history of authoritarian machinations and the monuments recording the tragedies of human folly, rather than the story of the common man, from which to untangle the story of mankind. But the root problem, having heretofore been overlooked, is demonstrated in the present work: authoritarianism in its many nefarious forms, one being social egalitarianism. Thus, the question to be posed is not what happened in our past. It is, instead, what did not happen. Although what did not happen will never be known, why matters happened as they did is now known.

It is proposed that the recent efforts of the West, successful so far, and in retrospect the few and temporary successes of ancient times, can be attributed solely to liberty, not of just the individual but, more importantly for human progress, the autonomous group with a focused self-interest. The desire for and appreciation of liberty is inherent in every human heart, a component of the individual conscience traceable to natural law, that subtle human attribute that is neither genetic nor learned but has been available to all mankind since the first man and woman. Always, in the past, have authoritarian policies or doctrines pushed the good genie of our conscience back into the bottle. In our age, however, a marvelous expansion of both progress and of an appreciation of liberty in promoting the welfare of all mankind can be dated to the

commencement of the Reformation.¹² Indeed, it may be stated that *The Natural State of Medical Practice*, as defined and historically interpreted herein, has contributed to unprecedented healthful longevity because of beneficent consequences from adherence to natural law.¹³ Let us, then, reconsider our attribution of today's manifold successes to great empires and great cities, to ethnic forbears, and to central planning. It is nothing like that; they are but the headline-catching flotsam on the far more interesting sea of humanity. Rejoice in the accomplishments of genius, but forget not that genius has abounded in every age and in every people as a well-kept secret, and that every person, in the appropriate place and at the appropriate time, can be considered a genius at something. Indeed, the unique genius of *Homo sapiens* is expressed best in the ability of that species to recognize the benefits of peaceful group deliberation by free individuals of their varied ideas with a goal of self-interest focusing on the problem at hand. Unfortunately, it has been the rule of the jungle or the mob, *i.e.*, to take from or to control others, that has consistently delayed the establishment or speeded the demise of that principle of genius.

Briefly put, the broad-based success we enjoy in the West today, especially in healthful longevity, has been acquired in little more than two or three centuries. The road-map for that success has been identified in these four volumes: the course of the history and prehistory of *The Natural State of Medical Practice* coincides with the course of freedom, and freedom of conscience allows natural law and its corollary, spontaneous order, to be expressed in various human agencies. But present success is sporadic and human history suggests it is not permanent, for the unceasing authoritarian quest for control over, and uniformity of, every human endeavor using all necessary means of coercion remains today a threatening presence at home and globally. As we look about us today and witness the massive influx of foreign populations into Western democracies, an influx variously attributed to seeking asylum, fleeing poverty, and evading humanitarian disasters, what we are seeing is nothing more than an escape from egalitarianism and its consequences, the principal difference today being both the magnitude of the problem and the frantic efforts being made by egalitarian's emigrants who now know, by virtue of modern communication, that they need not chance survival alone in the savage jungle or on the endless savannah when they leave their kinship or

¹² Although one must wonder what the consequences of the early 19th C "invention" of socialism would have been had it been more successful in shaping social policies in the West prior to the work of Pasteur, Maxwell, Curie, Roentgen, Edison, and Einstein, among many others. It is possible that many of the great discoveries and inventions that have produced our brave new world would never have transpired if egalitarian policies had full play. The idea that somehow those discoveries and inventions would have been inevitable is a catastrophic misinterpretation of history. In their absence we might still have been living in Dickensian times. But there is an even greater revelation here. The Reformation initiated two parallel but complementary events: (1) it set the West on the path toward technical progress as mankind was gradually able to display its collective genius, and (2) by freeing up mankind's ability to freely consult its collective conscience, it directed that path toward a secular Eden. Unfortunately, features of modern times indicate that path to be less and less likely to be travelled for long.

¹³ The cause of the "healthful longevity" is due, of course, not just to medical diagnosis and treatment, but also to biological knowledge and supportive sciences upon which rest disease prevention, sanitation, epidemiology, nutrition and food supply, and veterinary services, among many. The success of medicine is but a marker for the status of progress on many fronts within a population.

comradeship, but that in that country just across that border there is a better life, liberty, and the possibility of happiness. More than just medical practice is in the balance.

THE END

Appendix A

Statistical Analysis of Metrics and Other Characteristics of Seventeen Primary Civilizations

The following statistical analysis, based as it is on acknowledged but presently unavoidable uncertainties, is subject to arbitrary definitions, approximations, and interpretations. Arguably, therefore, much of the data might be considered unworthy of statistical analysis. This is one reason for the simple statistical tests applied; complex tests are unmerited. As a result, all statistical conclusions come *caveat emptor*. “Successful” refers to those five civilizations, each represented by an archetypal city of their age, that are presumed to have had networks of medical practitioners whose knowledge is, in part, found in famous ancient medical classics. “Unsuccessful” refers to the twelve lesser civilizations arbitrarily chosen for reasons cited herein, but from whom no known medical presence emerged. That distinction is used only in this Appendix. The term “lesser,” used elsewhere in this volume, was retained because it reflects the “null hypothesis” status of those civilizations before it was known that they had no medical presence. The volume has concluded, so now we know! Numbers and some “p” values have been rounded for convenience. Tests used were the two-tailed Z-test (Z) for comparing two population proportions and the two-tailed Student’s t-test for differences between two independent samples (S). All values are drawn from Table 4 (p. 236).

a. Size of central population

Successful (n = 5): Mean – 43,000

Unsuccessful (n = 12): Mean – 14,000

Difference (S): Significant, $p < 0.01$

Conclusion: **Central populations were significantly larger, on average, in the successful civilizations.**

b. Size of central population of those identified as city-states

Successful (n = 5): Mean - 43,000

Unsuccessful (n = 4): Mean – 18,750

Difference (S): Not significant, $p = 0.07$

Conclusion: **There was no statistically significant difference in size of representative polities between the successful and unsuccessful civilizations identified as city-states: Anasazi (Chaco Canyon),**

Cahokia, Sharh-i Sokhta, and Liangzhu. The following conclusion can be drawn: it is possible but unlikely that the success of the five successful city-state civilizations can be attributed to the size of their urban centers.

c. Population density, excluding suspect values

Successful (n = 5): Mean – 56 persons/acre

Unsuccessful (n = 9) Mean – 65 persons/acre

Difference (S): Not significant, $p = .75$

Conclusion: Population density shows no association with successful civilizations. Inadequate data exclude the Anasazi, Poverty Point and Cahokia civilizations from the calculations (Pueblo Bonito of Anasazi being too small, Poverty Point not being urbanized, Cahokia because of extensive central ritual areas), although all the estimates are crude and of suspect validity.

d. Presence of city-state status

Successful (n = 5): 5

Unsuccessful (n = 12): 4

Difference (Z): Significant, $p = 0.01$

Conclusion: There was a significant correlation between city-state status, as defined herein, and a successful civilization status, *i.e.*, being a city-state improved the chances of a civilization becoming successful. In fairness, however, the present definition of “city-state” is very broad. The excluded civilizations were Cucuteni-Trypillia and Catalhoyuk (no commercial interaction with surrounding communities), Sintashta and Terramare (no networks of interdependent peripheral villages), and Poverty Point, Norte Chico and Djenne-Djenno (no evidence of central coordination of commercial operations with peripheral communities).

e. Presence of monumental structures (commonly attributed to hierarchical authoritarian governance)

Successful: 2 (of 5)

Unsuccessful: 4 (of 12)

Difference (Z): Not significant, $p = 0.795$

Conclusion: There is no significance difference in the erection of monumental structures between successful and unsuccessful civilizations (includes massive functional constructions, shrines, and temples).

f. Presence of writing

Successful: (n = 5) 3

Unsuccessful: (n = 12) 0

Difference (Z): Significant, $p = < 0.01$

Conclusion: There is a significant association between the successful civilizations and proven evidence of writing, a significance that persists ($p = .02$) even if Sharh-i Sokhta in the “unsuccessful” grouping is credited with a form of writing. But if it is confirmed that the “inscriptions” found on oracle bones from the Longshan era and on seals and copper plates in the Indus River Valley civilization constitute early writing, the association will be even more significant.

g. Medical practice and egalitarian kinship in nuclear populations

Not egalitarian (n = 5) 5

Egalitarian (n = 12) 0

Significance (Z): Significant, $p = < .01$

Conclusion: There is a highly significant negative association of a formal medical practice with prominent plebeian egalitarian kinships. “Not egalitarian” describes Miletos, Uruk, Hierakonpolis, Mohenjo-daro, and Liangchengzhen. The latter two are classified as “not egalitarian” based on more circumstantial grounds, but even if they are excluded from the calculation the p value remains $< .01$.

h. Archeological egalitarianism

Successful (n = 5): 2

Unsuccessful (n = 12) 7

Significance (Z): Not significant; $p = 0.49$

Conclusion: Traditional archeological findings associated with the designation of “egalitarian” (from inhumations, dwellings, absence of monumental structures, no inner walls for elites) do not significantly differ between the successful and unsuccessful civilizations described in this work.

i. Egalitarian kinship (*i.e.*, strong kinship presence in the centralized population)

Successful (n = 5) 0

Unsuccessful (n = 12) 10

Significance (Z): Significant; $p < 0.01$

Conclusion: There is a strongly positive correlation between prominent egalitarian social groupings and the unsuccessful civilizations. This refers to centralized populations rather than peripheral settlements where kinship ties would be expected to persist. The exceptions in the unsuccessful group are the Sintashta civilization (status uncertain; could be solely corporatism) and Poverty Point (role of the central population regarding peripheral villages is uncertain, although all the riverside villages in the region would have their own egalitarian kinship management). Liangzhu has been included even though the egalitarian aspect of egalitarian kinship may have decreased as a dominant kinship claimed political control. Shahr-i Sokhta was included because the city neighborhoods may have been kinship enclaves.

j. Association of egalitarian kinship with writing

Nonegalitarian (n = 5) 3

Egalitarian (n=12) 0

Significance (Z): Significant; $p < .01$

Conclusion: The invention of writing is statistically unassociated with egalitarian kinships. Mohenjo-daro and Liangchengzhen are not included among the nonegalitarian civilizations because of the circumstantial nature of the existence of writing.

k. Importance of heterarchy

Successful (n = 5): 5

Unsuccessful (n = 12): 5

Significance (Z): Marginally significant; $p = 0.03$

Conclusion: Heterarchy, in this case meaning municipal guidance primarily by commercial interests, is likely to be a significant contributor to the success of a civilization. Reworded, the absence of heterarchy is significantly associated with unsuccessful civilizations (level of significance is unchanged).

l. Importance of the duration of the FORMATIVE PERIOD

Successful (4): Mean: 825 years

Unsuccessful (11): Mean: 740 years

Significance (S): Not significant; $p = 0.31$

Conclusion: The length of the FORMATIVE PERIOD (from early established settlement to a flourishing polity with population growth) is unlikely to be related to development of a successful civilization.

m. Importance of the duration of the FLORUIT PERIOD

Successful (n = 5): Mean: 470

Unsuccessful (n = 12): Mean: 660

Significance (S): Not significant, $p = 0.18$

Conclusion: It is unlikely that a longer duration of a civilization's flourishing period (growing or sustained prospering of a central population) will contribute to the success of a civilization if it has not happened within the first few centuries.

n. Writing and population size

Successful (n = 3) Mean: 41,600

Unsuccessful (n = 12) Mean: 14,000

Significance (S): Significant; $p = 0.05$

Conclusion: Writing, in this small sample, is marginally associated with a larger population. ("Successful" in this context indicates the presence of writing. Mohenjo-daro and Liangchengzhen are

excluded because of circumstantial nature of writing.)

o. Writing and FLORUIT

Successful (n = 3): Mean: 420 years
 Unsuccessful (n = 12): Mean: 660
 Significance (S): Not significant; $p = 0.18$

Conclusion: Writing, in this small sample, is not significantly associated with duration of a prospering and growing polity.

p. Writing and egalitarianism

Nonegalitarian (n = 5): 3
 Egalitarian (n = 12): 0
 Significance (Z): Significant; $p < .01$

Conclusion: In this calculation neither Mohenjo-daro nor Liangchengzhen is included as having a form of writing, although Dr. Paola DeMatte considers the Longshan culture of China to have had “incipient forms of writing.” The p-value indicates a significant association between nonegalitarian societies and the development of writing.

q. Prominent commercial activity

Successful (n=5) 5
 Unsuccessful (n=12) 10
 Significance (Z) Not significant; $p = 0.33$

Conclusion: Commercial activity as a prominent social feature was not significantly different between successful and unsuccessful civilizations. Excluded from the “unsuccessful” category were Cucuteni-Trypillia and Catalhoyuk, neither of which had evidence of commercially significant external trade. It is concluded that commerce alone is insufficient stimulus for a civilization to progress.

r. Writing and a network of medical practitioners, the latter being considered “successful”

Network (n = 5)	3
No network (n = 12)	0
Significance (Z)	Significant; $p < 0.01$

Conclusion: Writing is strongly associated with “progress” as identified in this work by evidence of a network of medical practitioners, excluding two (Mohenjo-daro and Liangchengzhen), both with limited evidence of writing.

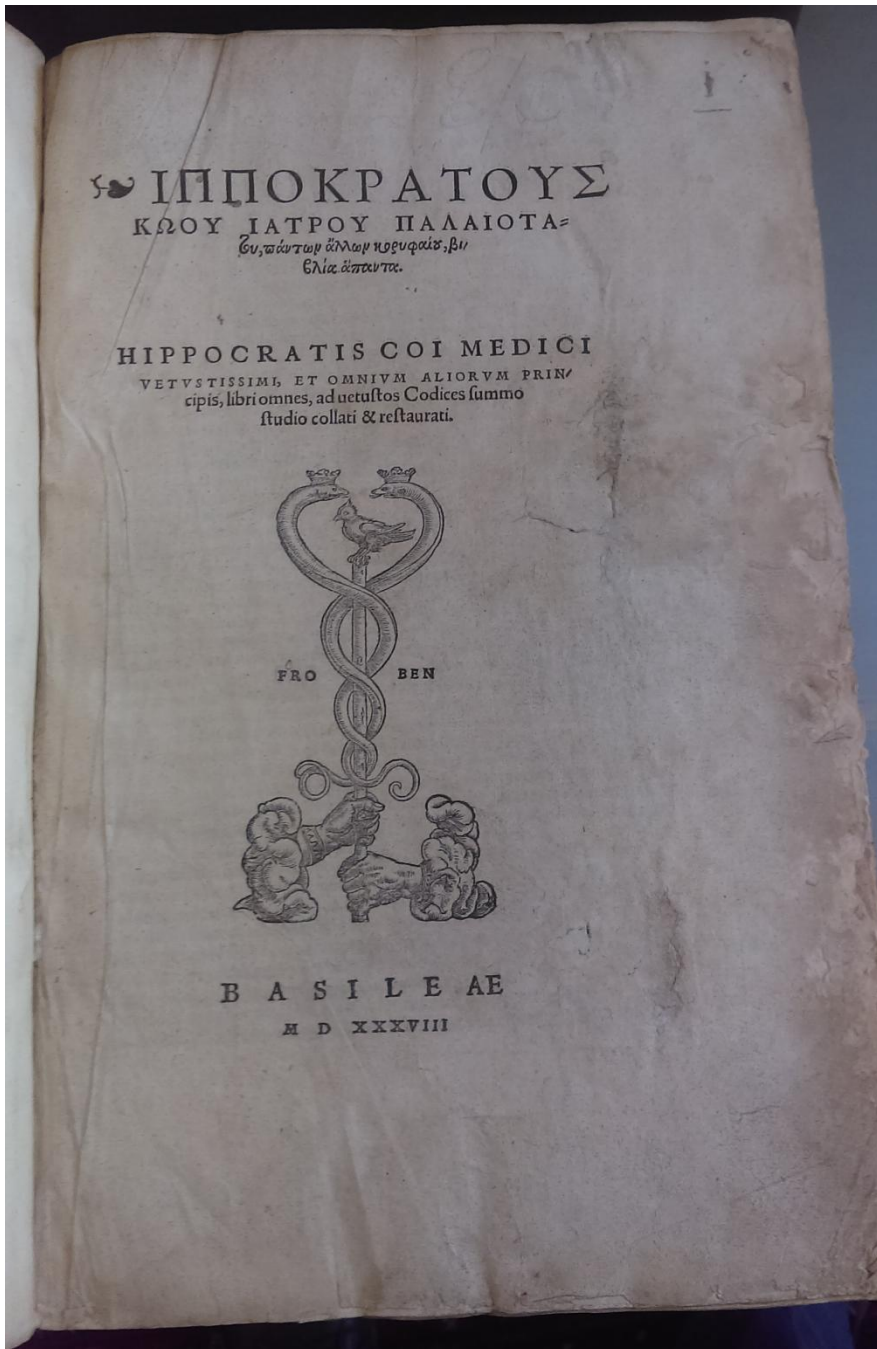
s. Writing and commerce

Commercial (n = 15)	3
Noncommercial (n = 2)	0
Significance (Z)	Not significant; $p = 0.48$

Conclusion: Writing was found only in civilizations/proto-civilizations with a commercial base, but, with only two having no such base, the quality of any statistical result is poor. Nevertheless, there is no significant difference. The association of medical practice with commerce would give the same statistical result.

Appendix B

**ΠΕΡΙ ΝΟΥΣΩΝ Α – DISEASES I: HUMORS
OF HIPPOCRATES AS A METAPHOR FOR INFLAMMATION**



Title page of the second printed edition of the collected works of Hippocrates, edited by Janus Cornarius and published by Froben in 1538. This photograph and that on *verso* by the author.

First page of *Diseases I* (ΠΕΡΙ ΝΟΥΣΩΝ Α) as published in the 1538 Froben edition. Section 2 of the work begins near the middle of line 24, Αἱ μὲν. That section is translated on pp. 337-338.

INTRODUCTION

AN OVERVIEW OF THE TRANSLATION AND THE RELATION OF HUMORAL THEORY TO INFLAMMATION

Summary: This new translation of *Diseases I* provides support for the assertion that Hippocratic medicine, had not classical Greek democracy been lost, might have achieved a level of medical competence by the time of Christ that would have rivaled that of the 19th C Western civilization. Moreover, the absence of any mention of the theory of “four humors” in *Diseases I* supports scholarly opinion that humoralism, as a system of medicine in which disease is explained by imbalances among four distinct liquids (the four humors: (yellow) bile, phlegm, blood, and black bile), was irrelevant to the medical practices of Hippocratic physicians. The present translation also indicates that three of the four “humors” fit nicely into a hypothetical framework describing a mechanism for what is now known as “inflammation.” The clinical value of this Hippocratic knowledge was subsequently appropriated by others in an attempt to instill sense into humoral theory, thereby providing it with a panache that permitted that theory to attract devotees up to the present day.

Accuracy in technical translation is essential to accurate assessments of the historical past, and a translation into English by the author of several Hippocratic treatises in volume 2 of the present work provides evidence of perceptive clinical observations by Hippocratic physicians that indicate some of their theoretical constructs in physiology were based on well-founded inductive reasoning. This translation of *Diseases I*, an important component of the *Corpus Hippocraticum*, presents additional confirmation of their clinical competence. An updated version of the Wordlist at the end of volume 2 includes additional words extracted from this translation.

It is hoped that this translation of *Diseases I* will help free Hippocratic medicine from the modern notion that its clinical practice was based on sophistic concepts of disease that seem absurd. One persistent notion in the popular perception of Hippocrates has been his preoccupation with humoral theory:

Table 1: The four humors of Hippocrates, their elemental equivalents, sources, and temperaments as subsequently surmised or restated by other writers.

Yellow bile (gall)	Fire	Spleen	Choleric
Phlegm (mucus)	Water	Brain	Phlegmatic
Blood	Air	Liver	Sanguine
Black bile (lymph)	Earth	Gall bladder	Melancholic

Yet there is solid scholarly evidence that actual clinical dependence on humoral theory by Hippocratic physicians was minimal, and that it is to Galen (129-200 AD) that the post-Roman and even modern appeal of humoral theory can be credited.¹ There have also been perennial attempts to search out the source of the original humoral concept, whether

¹ For a scholarly review of the many and complex versions of humoral theory see chapter 5 of *Ancient Medicine* (New York, 2005) by Dr. Vivian Nutton, and *The Body in Balance: Humoral Medicines in Practice*, Oxford, 2013, Horden, P. and Hsu, E., editors, especially chapter 1, *Female Fluids in the Hippocratic Corpus* by Helen King.

it be from India, the Far East, or Egypt, as if venerability would add anything to its veracity or value. Pertinent to these reflections, *Diseases I* mentions four substances, three of them extensively, that are typically identified as the “four humors:” yellow bile, phlegm, blood, and black bile. But they are identified in this Hippocratic work only by their names and are not specified as “humors,” nor are “humors” invoked to describe homeostatic imbalances that lead to disease. Paul Potter notes the traditional date of ca. 400 BC for the composition of *Diseases I*.² Perhaps this avoidance of the term for “humor” (χυμός) in *Diseases I* indicates that the text predates a general acceptance of the Greek version of humoral theory, or perhaps its author was ignorant of the theory. A more likely explanation is that most Hippocratic physicians simply ignored humoral theory, for they were too busy acquiring practical knowledge of the human body and its diseases to let humoral theory befog their judgment.

But how can this be reconciled with the extensive discussion of the same four humors found in a contemporary Hippocratic work, *Nature of Man*, as presented and translated by W. H. S. Jones in the fourth volume of the Loeb Classical Library series on *Hippocrates*? It is proposed herein that the terms used by Hippocratic physicians to define clinical features of what would come to be known as “inflammation” were misappropriated by those who would develop, or later invoke, Greek humoral theory. As Hippocratic physicians collected clinical information and attempted to explain and predict clinical events, they would hypothesize rather than theorize. But Charles Daremberg commented, “They tried to explain Nature while shutting their eyes.”³ The present translation of *Diseases I* will add to the mounting evidence that his opinion reflected in no way the thinking of Hippocratic physicians. It furthermore may explain in part the subsequent intellectual attachment to a theory of health and disease that now seems, and is, absurd.

As a preliminary statement on this aspect of humoral theory, the Hippocratic physicians had not developed a germ theory of disease and were ignorant of the existence of microbes.⁴ The source of many diseases in man wanted an explanation. A framework was needed for them to initiate a systematic organization of internal diseases that might be useful in prognostication and therapy. In the absence of an obvious external cause, the idea of an internal source was entertained. The possibility was raised that man intrinsically carried promoters of disease, especially “bile” and “phlegm,” these being translated terms applied by ancients and moderns alike to represent the Greek χολή and φλέγμα, respectively. Why were these names chosen?

“Bile” is thought to be highly irritating, and its colors come in a variety of shades often seen in pus from wounds, drainage from abscesses, greenish pharyngeal drainage from nasal sinuses and respiratory catarrhs, diarrheal stools with rapid transit times, jaundiced skin, and some urine and urine sediments in persons with urinary symptoms. The word itself is of Latin derivation (bilis), used by the playwright, Plautus (255-185 BC), in the sense of “black bile” as a personality trait. It therefore may represent at that date the Greek χολή as employed in humoral theory. But the origin of the term χολή as used in ancient Greek medicine is uncertain, for its root meaning is “wrath” and “bitter

² Potter, Paul, *Hippocrates*, V, the fifth volume of the series on Hippocrates as published in the Loeb Classical Library in 1988 by Harvard University Press, p. xi.

³ Kitto, H. D. F., *The Greeks*, Middlesex, 1951 p. 190.

⁴ Like many ancient cultures, however, the Hippocratics did recognize an association between certain outbreaks of disease and airborne transmission of disease, noting in the work *Nature of Man* that this was distinct from disease caused by personal regimen.

anger.” In the *Iliad* its anatomic location was in the chest (the source of Achilles’ wrath), and in the *Septuagint*, translated into koine (common) Greek in the early 3rd C BC, it is used to describe hemlock, a poison that had an “unpleasant” and “rank” taste. Also, linguistic investigation indicates an Indo-European etymological association between *χολή* and *χλόη*, the latter being the color “yellow-green.” This suggests, therefore, that Hippocratic “bile” referred to the biliary system tangentially at best, terminology that unfortunately gained currency in descriptions amassed as the centuries passed, for the popular identification of *χολή* as the gallbladder fluid, bile, is to a great extent dependent on later interpretations of Hippocratic works. It may be that any reference to *χολή* as the fluid content of the gallbladder was unintended by early Hippocratic authors. If this is so, it should be permissible to consider Hippocratic use of the term one of convenience, perhaps almost a euphemism, for a substance that was bitter, irritating, tinted, and at times dangerous. It is proposed, therefore, that *χολή* did not imply an association with biliary disease, the gall bladder, or even bile itself. It was instead impressed into service to describe two categories of disease: (1) “green/yellow bile” being reserved for internal diseases associated with purulence and signs of inflammation, and (2) “black bile” for those internal diseases that did not display purulence and signs of inflammation (more discussion on this point is to be found on p. 332).⁵

“Phlegm,” the usual modern denomination of nasal mucus or mucoid expectoration, is the traditional translation of *φλέγμα* even though the Greek noun and its verb *φλέγω* primarily signify “fire/blaze.” This presents a quandary, but it may be that the “fire” attribution refers to the biting and bitter nature of a pathological postnasal drip, one that is often associated in viral catarrhs with a sore throat, or with the acid reflux of gastric contents into the mouth. Thus the fiery “phlegm,” as a variably viscous fluid, was perhaps equated with fluids found at times throughout the body such as pharyngeal drainage, the “thin” (nonparticulate, plasma) part of blood, cystic fluids of various pathological lesions including hydrocephalus, the fluid part of abscesses and empyemas, transudates of wounds, burns (blisters) and eczemas, a mix of exudates, transudates, and mucosal secretions whose common feature was fluidity, a non-greenish color, and often a biting or irritating presence. But the modern use of “phlegm” comes from Late Latin describing it as moist and cold, those being its characteristic features as one of the four humors. When did this change in apparent meaning occur? Greek synonyms of “phlegm” include *μύξα*, a later derivative being “mucus,” and *βλεννός* (*blennos*), meaning “slime.” With such alternatives why would the modern term “phlegm” be the translation of *φλέγμα*, a word derived from fire? Homer (active *ca.* 800 BC) had used *φλέγμα* to describe an unquestionably fiery “evil flame” in his *Iliad* (21.337). Perhaps *φλέγμα* was not like phlegm and was perhaps not even mucoid. Herodotus (484-425 BC), however, in his *Histories* (Bk. 4, 187) describes it in children as draining from the head, Hippocrates (460-380 BC) in his *Aphorisms* (7.54), describes it as reabsorbable, in *Nature of Man* 5 as something to be vomited, and in *Air, Water, and Places* (sections 3 and 10) as moist and flowing down from the head, and Aristotle (384-322 BC) in his *Metaphysics* (8.1044a, 20) describes it as “viscous” (or “oily,” *λιπαρός*). Thus, it is likely that *φλέγμα*, despite its fiery etymology, was generally accepted as having physical characteristics of a mucoid substance by the time of Herodotus, abnormal in that its fiery nature was not expressed in heat but in taste or irritative effect. This would have been,

⁵ For a scholarly review of the many and complex versions of humoral theory see chapter 5 of *Ancient Medicine* (New York, 2005) by Dr. Vivian Nutton, especially the concept of “black bile.”

therefore, its distinction from normal mucus, a distinction made in the Hippocratic work, *The Sacred Disease*, 8. The “cold, moist” characteristic of phlegm, essential in later humoral theory, seems to have been a post-Hippocratic depiction. The substance was intellectually transformed but the name remained unchanged.

The clinically relevant roles of bile and phlegm can now be addressed. What happened when either or both bile and phlegm were in the blood? Both were liquids (Section 20g), soluble (Sections 7b and 26a) in and distributed and dispersed by the blood. Both were considered cooler than blood (Section 23a) and were factors in causing chills. And when blood was cooled by them and returned centrally to be heated, more heat energy was required to bring the mixture up to the normal temperature. Although the mixture did then warm up, perhaps the blood itself, being innately hotter at baseline, became overheated relative to bile and phlegm when they were present. A more likely explanation is that bile and/or phlegm triggered the body’s central heating mechanism to turn up the heat, thereby superheating the blood and activating bile and phlegm to promote the signs of inflammation to be discussed below. When the over-warmed blood was distributed throughout the body it gave rise to fever.

Of their place of production in the body, *Diseases I* makes no comment. Tissue fluid is to be found throughout the body and surrounds every individual cell (all 20,000,000,000,000 of them), whereas φλέγμα seems to have been located where there was a problem. There is a suggestion that it was the normal systemic moisture, *i.e.*, tissue fluid and/or a transudate of blood plasma, that became phlegm when it was concentrated (Section 15e)⁶, but elsewhere (*The Sacred Disease*, 8) it is an “impurity” even though the same literary citation paradoxically states it was to be found even in a fetus. The Hippocratics were aware that bodily constituents required moisture to function, and perhaps they thought φλέγμα wasn’t necessarily bad. This makes sense today, for one to two quarts of mucus are produced daily by mucus membranes of the respiratory and gastrointestinal tracts, much of which is involuntarily swallowed throughout the day. It became a problem only when it was excessive, either locally, as in a swollen abscess, or systemically, as in anasarca, or if it was concentrated, thickened, and thereby blocked anatomical passages. The same could be said of χολή; when dispersed at low levels there was no problem (Section 20g), but when it became concentrated it produced pain, misery and fever. There was some logic, therefore, in the idea that by phlebotomy both of these agents could be lowered to less dangerous levels. It is unnecessary to postulate their removal as a mechanism to repair any “imbalance” of the humors. It is proposed, therefore, that the Hippocratics thought that “bile” and “phlegm” were not necessarily noxious but could become so when locally concentrated and/or activated, a contention explained in footnotes accompanying the following translation. In this sense they would be considered enablers of disease, now to be discussed.

Consider as an example a patient with an abscess on his neck. That abscess is caused by a pathogenic bacterium, often *Staphylococcus aureus*. The disease is the abscess, the cause is the staphylococcus. But if there were no bodily defenses against bacteria the staphylococcus would proliferate exponentially, invade deeper into the body, then rapidly spread throughout the body and quickly kill the patient before any obvious physical evidence of disease was apparent. The body, however, does have defenses, and those defenses include the prompt release of mediators that dilate blood vessels and

⁶ Sections mentioned parenthetically in the text refer to the 34 divisions of *Diseases I*, and the accompanying lower case letters refer to the alphabetically arranged paragraphs in a Section.

increase blood flow near the site of the bacterial invasion. Many substances are then released from the blood that fight infection, one being bradykinin, which dilates blood vessels, thereby increasing the redness of the surrounding area and also making it warm because blood from deeper tissues is shunted to the affected area. Bradykinin also makes blood vessel walls more permeable, thereby permitting easy passage of fluid out of the blood and into the affected area. While that fluid carries in it many proteins that help fight the developing infection the fluid itself leads to swelling in the area. Finally, some of those infection-fighting substances, especially bradykinin, trigger pain receptors and thus cause the developing lesion to be painful, the value of pain being that the patient now knows there is a problem with his neck and will avoid its further injury. The features of inflammation, namely pain, swelling, redness, and heat, are, on the one hand an indication that the body's defense mechanism is at work, but on the other hand they are producing an abscess which is generally considered the disease.⁷ Ask a patient with an abscess if he has a health problem and he will answer, "Yes, I have a bad infection," and he will point to the abscess. And yet the "abscess" is not the infection; it is the body's response to the infecting organism. We cannot blame the Hippocratic physician for considering an abscess a manifestation of a disease rather than its containment. We cannot blame him for thinking those agents that produced clinical manifestations of disease were the problem and should be the object of therapy.

Table 2: The cardinal features of inflammation of Celsus (25 BC-50 AD) compared to Hippocratic descriptors and modern facilitators of inflammation.

Celsus	Hippocratic etiological descriptors	Modern facilitators, examples*
Dolor (pain)	χολή (translation: bile)	Bradykinin
Tumor (swelling)	φλέγμα (translation: phlegm)	Histamine, vascular permeability
Calor (heat)	αἷμα (blood)	Histamine, vascular dilation that
Rubor (redness)	"	causes local warmth and redness

*The two components listed here (bradykinin and histamine) are often cited in simplistic descriptions of acute inflammation in the body's response to bacterial invasion, but the entire mechanism of inflammation, including its cellular responses, is exceedingly complex, with components, stages, systems, and processes that are triggered, stimulated, regulated, retarded, and resolved, factors that number into the thousands and encompass the panoply of human disease.

Once bile and/or phlegm collected at a disease site they produced the four markers that Celsus designated "inflammation" (see preceding Table). Inflammation is now known to be a response of the body to rid itself of foreign or noxious agents, including pathogenic bacteria. The Hippocratics, as discussed in *The Natural State of Medical Practice*, volume 2, p. 13ff, not only identified the clinical features of inflammation (although they did not use a group name that combined those features in the manner of Celsus, *i.e.*, *inflammatio*) but also designated mechanisms that produced them.⁸ In proposing mediators of those actions, pain was caused primarily by χολή (an irritating

⁷ For the sake of simplicity there is no mention here of the role of blood platelets and white blood cells in development of an abscess, an enormously complex phenomenon.

⁸ Celsus, *de Medicina*, Bk. I, proemion, states the Hippocratics used the term φλεγμὸν as the equivalent of his use of "inflammation," but see both the Wordlist and p. 13 of volume 2 of *The Natural State of Medical Practice* for an opinion to the contrary, that φλεγμὸν is properly translated as a "localized soft-tissue swelling."

fluid), swelling was caused primarily by φλέγμα (mucus, tissue fluid), and those two fluids were distributed by and squeezed out of the αἷμα (blood), the latter producing the redness (hyperemia) and heat associated with local inflammation. Whether the author of *Diseases I* noted the similarity between his explanation of what is now called “inflammation” with the “four humors” in humoral theory is unknown, but an integrated concept of four humors is neither presented nor suggested by him. Indeed, the absence of any discussion of the four substances in the context of humoral theory relegates that theory to irrelevance at the time of, or in the mind of, the author of *Diseases I*. This does not support the idea that to him health was viewed as a consequence of the normal balance of the four humors or that imbalance produced disease, but it does support the idea that he had a sophisticated understanding of what would be called “inflammation” independent of any general theory of body homeostasis.

The Hippocratic framework, as expressed in the works translated in volume 2 of *The Natural State of Medical Practice* and expanded and modified by *Diseases I* in Appendix B of this volume, entails, therefore, a system of enablers of disease that, while crude, bears some semblance to modern concepts of disease. Those enablers were χολή, φλέγμα, and αἷμα for inflammatory or purulent processes, and μελαίνα χολή for noninflammatory disease, although supporting evidence for the latter is limited in the works translated so far by the author.

Hippocratic understanding is also displayed in *Diseases I* in other ways. First, it applied observations obtained from external disease, especially abscesses and wounds that were inflamed and probably infected, to diseases that were unable to be seen, such as pneumonia. An attempt was then made to correlate the results with findings on physical examination, gross anatomical examination of open wounds, and probably postmortem observations.⁹ Second, and perhaps more remarkable, mechanisms were proposed that the body used to control and limit its “inflammation:” (1) The heat resulting from the activation of or action by bile/phlegm served to evaporate the “phlegm” component (Sections 19c and 20c). (2) Blood flow delivered bile and mucus to a lesion, but, the flow being increased, it also could disperse excessive bile/phlegm throughout the body so that the diluted and cooled bile/phlegm levels that resulted were no longer pathogenic (Section 20d, e, f, g). (3) The blood, by dispersing a focus of bile throughout the tissues and under the skin, eliminated bile in the sweat (7b, 25a). (4) Bile was deemed irritating to the bowel, which in turn caused a short transit time of bowel contents leading to expeditious excretion (Section 15d). The concept of feedback and self-limiting control mechanisms in biology is a relatively new, mainly 20th C, phenomenon, but it was hinted at in the mechanisms proposed by the Hippocratics: the increased heat led to a decrease in phlegm, one of the causes of the heat; the blood that transported bile and phlegm to the injured area could also transport them away for the area if their quantity became excessive because there was increased blood flow through dilated blood vessels, and their concentration could be reduced by the same mechanism and thereby their effect mitigated,

⁹ Several points will be raised in the following translations that suggest some observations were made that would have been improbable in living subjects (Sections 19c, 20d, features of a sterile pleural effusion, footnote p. 372). Such observations necessitate no comprehensive postmortem dissection. It is suggested that chance observations of open wounds (e.g., the famous study of gastric function made by William Beaumont (1785-1853) on a patient having a healed but open gun-shot wound with a large fistula in the wall of the stomach) or perhaps a focused and limited opening incision between the ribs and into the chest cavity to see what internal lesion might have killed the patient.

and the bowel, although adversely affected by either bile or phlegm, expedited their excretion.¹⁰

In conclusion, Hippocratic physicians appear to have devised a framework, a work in progress, that supported a temporary but plausible explanation for their clinical observations of various disease states that manifested what is now known as inflammation. They impressed familiar terms into service to explain their clinical observations. Concurrently, however, those same terms were being applied to a theoretical construct of human health and disease, humoral theory. What *Diseases I* makes clear is that the distinguished reputation of Hippocratic medicine rests in no way on humoral theory, and that the subsequent promoters of Greek humoral theory would have had no story to tell if they hadn't appropriated Hippocratic achievements.

In view of the preceding interpretation of *Diseases I*, a redefinition of relevant terminology as understood by Hippocratic physicians is required in describing what is now considered the acute inflammatory response. The four names attached to humoral theory are defined here in the sense meant by Hippocratic clinicians:

1. $\chiολή$ = gall. To minimize traditional inferences suggesting a biliary system origin, the following translation will not use "bile." It will instead insert the term "gall" for $\chiολή$. This should not pose a problem for classicists, for, as a medieval term, "gall," as one of the four humors, was the term for "bile." Gall, an irritative or painful substance, is the "bright wrath" seen in diarrheal stools, vomitus, urine, jaundice, mild cyanosis, ear and sinus infections, and purulent drainage of any kind. Pain from inflammatory lesions is now known to be caused by kinins, compounds that diffuse out of permeable blood vessels that stimulate local pain receptors during an inflammatory response. The Hippocratics thought the source of pain/irritation in inflammation was gall. "Gall" is related to $\chiολή$ in that both share an Indo-European linguistic origin, thought to be expressing that something is "bright." Please note that $\chiολή$ in previous translations by the author was often termed "green matter." In the present translation "green matter" has been replaced by "gall" not because the latter is superior or more accurate but because it is brief and less obtuse.
2. $\phiλέγμα$ = mucus. This is roughly equivalent to today's "phlegm," the common expectorate, and a $\phiλεγμόνη$ is a focus of mucus derived from transudative or exudative fluid extracted from other tissues or from blood vessels. Such fluid causes tissues to swell because of the added mass of fluid to the extracellular fluid that normally surrounds every cell. The source of that swelling is now known to be due to local release of histamine and other compounds that dilate small blood vessels during an inflammatory response and that increase their permeability to blood plasma components. Mucus technically should not be included as tissue fluid for it is a secretion of mucosal goblet cells, although it is a more inclusive term than phlegm. This distinction was not made by the Hippocratics, however, who considered mucus to be derived from the "thinnest" part of the blood squeezed out of narrowed blood vessels, *i.e.*, a transudate, which was then concentrated (Section 15e). For present purposes and despite a statement in *The Sacred Disease*, 8, suggesting mucus is not identical with $\phiλέγμα$, the term "mucus" will be used to translate $\phiλέγμα$ and will

¹⁰ It is admitted that in a sense the standard humoral theory, being one of balance and imbalance, could be viewed as vaguely implying a self-regulating system.

comprise all forms of extracellular fluid that have the capability of being concentrated into the more viscous φλέγμα.

3. αἷμα = blood. Blood is a distribution system which disseminates nutrition, warmth (θερμιά), pneuma (a functional equivalent of oxygen), and dissolved constituents, including gall and mucus, throughout the body. It also congeals (clots) and, by vasodilation, causes locally increased redness (hyperemia) and warmth. Like gall and mucus, a static collection of blood can decompose and then evolve into purulence (Sections 14a, 17a, 19a), an indication that gall, mucus, and blood can each be a focus of disease in certain situations, but only if they are concentrated and cannot be drained.
4. μέλαινα χολή = “black” bile, dark wrath, perhaps even “lymph.” As used herein, μέλαινα χολή describes a noninflammatory disease process. It is mentioned only once in *Diseases I* (Section 3e) where it is stated to be a cause of stroke (mechanism, appearance and source not identified) with necrosis of part of the brain. The color was unlikely to have been black, however, and black/brown/sepia, colors of cephalopod inks, better cover the range intended by the Hippocratics for damaged/dead nonpurulent tissue. It may be no coincidence, therefore, that cephalopod ink is one of the translations for χολή listed in the Liddell and Scott Lexicon. Some later translations consider lymph, the interstitial fluid around cells that drains into the lymphatic system, to be “black bile,” but lymph is a pale limpid yellow. There are several very dark, sometimes black, fluids associated with disease states: black tarry stools from major upper gastrointestinal bleeding, vomitus that contains material looking like coffee-grounds that is partially digested blood from serious upper gastrointestinal bleeding, black-brown urine in hemolytic anemias, and blackish growth on biological tissue such as the tongue surface by *Aspergillus niger*, as briefly mentioned on p. 49 of this volume. Infarcted tissue also can become quite blackened (as in dry gangrene). Because the source of the ancient term is unknown and as μέλαινα χολή is mentioned but once in *Diseases I* it is given no metaphorical name of convenience herein. But its scope has been broadened to include infarcted tissue. A common feature of all black bile pathology is the absence of evidence for inflammation, whereas bile, phlegm, and blood are all mentioned in relation to diseases associated with signs of inflammation. It is tentatively proposed, therefore, that black bile be designated the cause, or enabler, of noninflammatory disease. This could have included, in Hippocratic thinking, diseases due to ischemia or infarction, degenerative disorders such as osteoarthritis, delayed consequences of trauma, some genetic disorders, and internal disorders such as bleeding gastrointestinal ulcerations which they had no way of determining whether signs of what now is recognized as inflammation were internally present. Its clinical effects may have been viewed as of mysterious origin (as posed by Nutton in citation on p. 326, its footnote, p. 11), and perhaps “black bile” should be considered the ancient equivalent of today’s “idiopathic” as applied to diseases without any connection with any known cause, of which there are many.

The following terms may help in the initial reading or translation of this work, for they differ significantly from traditional definitions. The preferred translation, chosen in part for brevity and inclusiveness, has been **bolded**. Further

explanations and details offering a justification for these selections will be found in the footnotes and text.

1. περιπνευμονία - peripneumonia – bronchitis, nonpurulent lung disease; **nonpurulent pneumonia**; *characteristic feature – incessant nonproductive cough*
2. ἐμπύος - empuos – **internal collection of pus**; when applied to the lungs, purulent lung disease; **purulent pneumonia**;¹¹ *characteristic feature – productive cough with purulent sputum*
 - a. ἄνω – **empyema of the chest**
 - b. κάτω – **abdominal abscess**
3. πλευρίτις - pleuritis – **disease affecting, or adjacent to, the chest wall**; *characteristic – localized chest pain with respiration* (pleurisy)¹²
4. ἐρυσιπέλας - erysipelas - **abscess**
5. φῶμα – a **palpable mass**, well-demarcated, tending to enlargement¹³

¹¹ The transition from nonpurulent lung disease to purulent lung disease, if it happens, is gradual and overlapping in clinical presentation and significance, but the distinction is real and might be likened, in popular parlance, to the difference between bronchitis or a “walking” pneumonia seen with many viral and mycoplasma agents characterized by a relatively benign but severe **nonproductive cough** and a fatal full-blown bacterial pneumonia **productive of grossly purulent sputum**. The shortest phrases that make this distinction, **nonpurulent pneumonia** and **purulent pneumonia**, are used herein not because they are superior definitions but because they are the least objectionable and most inclusive, although Section 29b (p. 412) makes clear there is a distinction. It is important to realize that the former ranges from the modest bronchitis to nonpurulent pneumonia or “walking pneumonia” to fatal whooping cough and also can include nonpulmonary disease such as congestive heart failure or pulmonary embolus/infarction. Furthermore, bronchitis or a mild nonpurulent pneumonia may gradually evolve into a fulminant pneumonia, a point recognized by the Hippocratic physicians (Section 12), and so temporal relations can be relevant.

¹² “Pleurisy” has been used as a translation of πλευρίτις but the former reflects only the specific type of pain associated with chest wall involvement by disease rather than disease itself. “Chest wall disease” is awkward but more accurate.

¹³ This lesion could be inflammatory (although not a diffuse process with extension into adjacent tissue), cystic, or neoplastic, either benign or malignant, the latter classification being unknown to Hippocratic physicians. The term is generally not used for lesions the Hippocratics had no way of visualizing or palpating. But it could be used when such things were postulated to occur, presumably from knowledge obtained from postmortem observation. Thus, a lung φῶμα might be diagnosed, but this was usually based on external evidence of internal disease, such as the tender swelling on the chest wall overlying an internal inflammatory lesion peripherally located. When the qualities of an abscess and inflammation could be visualized the term ἐρυσιπέλας would be preferred.

ΠΕΡΙ ΝΟΥΣΩΝ Α DISEASES I

The commentary that accompanies the following translation refers solely to *Diseases I*. It does not reflect a synopsis of the total content of the *Hippocratic Corpus*, its later commentaries and interpretations, including those of Galen, or an attempt to unify a Hippocratic “doctrine.” Thus, the internal logic assigned to any hypothesis or clinical judgment has been derived only from its clinical use in *Diseases I* as interpreted by the author, a clinician, and as guided by terminology derived from translations of Hippocratic works relevant primarily to the field of Internal Medicine as published in *The Natural State of Medical Practice: Hippocratic Evidence*, volume 2 of the present work.

The *Hippocratic Corpus* is now considered to include Greek medical works of many authors written over half a millennium, although most date from the 5th and 4th centuries BC. There will inevitably be, therefore, inconsistencies in translation and interpretation between the various components of the *Corpus*. But there is considerable consistency between the vocabulary of *Diseases I* and that of the works translated by the author for volume 2. For this reason, an amended Wordlist, now expanded to include terms from *Diseases I* and correction of some errors present in the earlier Wordlist, is found in the Appendix at the end of volume 2.

There are 34 Sections in *Diseases I*. For convenience the focus of each Section is provided at its beginning, and each Section’s paragraphs have been alphabetically labelled. The Greek text is that of Paul Potter in the Loeb Classical Library Series on *Hippocrates*, volume 5, as derived from that of Renate Wittern,¹⁴ with the addition of Section 2 and the first paragraph of Section 11 as copied from the 1538 edition of the collected works of Hippocrates.¹⁵ The reason for these inclusions, which are **bolded**, is to permit a side-by-side comparison by the reader of two printed versions of that Greek text, the oldest but one and one of the newest.

1. In this Section the author invokes physicians to be well-educated in their profession, to be familiar with the origin and causation of diseases, and to be quick to correct public and professional misconceptions about medicine and diseases.

a. ὃς ἂν περὶ ἰήσιος ἐθέλῃ ἐρωτᾶν τε ὀρθῶς
whoever should concerning treatment wish question correctly
καὶ ἐρωτώμενος ἀποκρίνεσθαι καὶ ἀντιλέγειν ὀρ-
and on being questioned to be distinguished and to contradict correctly
θῶς, ἐνθυμείσθαι χρὴ τάδε. πρῶτον μὲν, ἀφ’ ὧν
to be desired is necessary this. first then, from which

¹⁴ Wittern, Renate, *Die hippokratische Schrift De morbis I, Ausgabe, Übersetzung und Erläuterungen*, New York, 1974.

¹⁵ *Hippocratis Coi medici vetustissimi ... libri omnes*, Basel, 1538. This work was edited by Janus Cornarius (1500-1558), a scholar and physician whose editions in Greek and translations into Latin were much admired by Erasmus, as expressed in his note to Cornarius in 1529 (Letter 2204 of his collated letters).

αἱ νοῦσοι γίνονται τοῖσιν ἀνθρώποισι πᾶσαι· ἔπει-
the diseases all develop in men; thereupon/and,
τα δέ, ὅσα ἀνάγκας ἔχει τῶν νοσημάτων ὥστε
so that/just as necessary it is of diseases so that
ὅταν γένηται εἶναι ἢ μακρὰ ἢ βραχέα ἢ θανάσιμα
whenever it occurs to be whether prolonged or brief or lethal
ἢ μὴ θανάσιμα ἢ ἔμπηρόν τι τοῦ σώματος γενέ-
or not lethal or whether crippling something in the body is
σθαι ἢ μὴ ἔμπερον· καὶ ὅσα, ἐπὴν γένηται, ἐν-
to develop or not crippling, when it develops,
δοιαστά, εἴ κακὰ ἐπ' αὐτῶν ἀποβαίνει ἢ ἀγαθὰ·
uncertain, if bad upon them it descends or good;
καὶ ἄφ' ὁποῖων νοσημάτων ἐς ὁποῖα μεταπίπτει·
and freed up from one kind of disease into another kind it changes abruptly;
καὶ ὅσα ἐπιτυχίῃ ποιέουσιν οἱ ἰητροὶ θεραπεύοντες
and just as it happens to work the physicians treating
τοὺς ἀσθενέοντας καὶ ὅσα ἀγαθὰ ἢ κακὰ οἱ νο-
the enfeebled and just as good or bad the
σέοντες ἐν τῇσι νούσοισι πάσχουσι· καὶ ὅσα εἰκα-
diseased ones by the diseases are afflicted; and just as
σίῃ ἢ λέγεται ἢ ποιεῖται ὑπὸ τοῦ ἰητροῦ πρὸς τὸν
pictured/compared or is said or done by the physician in the presence of the
νοσέοντα, ἢ ὑπὸ τοῦ νοσέοντος πρὸς τὸν ἰητρὸν·
sick ones, or by those who are sick in the presence of the physician;
καὶ ὅσα ἀκριβῶς ποιέεται ἐν τῇ τεχνῇ καὶ λέγε-
and just as exactly it is done in the profession and is
ται, καὶ ἃ τε ὀρθὰ ἐν αὐτῇ καὶ ἃ μὴ ὀρθὰ· καὶ ὅ
said, and that which is accurate in it and which is not accurate; and which
τι αὐτῆς ἢ ἀρχῇ ἢ καὶ ἃ μὴ ὀρθὰ· καὶ ὅ
something of it or [its] origin which is not correct; and that which
ἀποδεδειγμένον τῶν τοιούτων· ὅ τε καὶ ὀρθῶς
has been demonstrated/proved of them; and which correctly
ἐστὶν ἐν αὐτῇ εἶναι ἢ μὴ εἶναι· καὶ τὰ σμικρὰ καὶ
it is in itself to be or not to be; and the tiny and
τὰ μεγάλα, καὶ τὰ πολλὰ καὶ τὰ ὀλίγα· καὶ ὅ τι
the great, and the many and the few; and which something
ἅπαν ἐστὶν ἐν αὐτῇ (ἐν καὶ πάντα), καὶ ὅ τι ἔν·
complete is in itself (or in all), and which something in [is];
καὶ τὰ ἀνυστὰ νοῆσαι τε καὶ εἰπεῖν καὶ ἰδεῖν καὶ
both the practical/feasible to be realized and to say and to see and
ποιῆσαι, καὶ τὰ μὴ ἀνυστὰ μήτε νοῆσαι μήτε
to do, and the not practical neither to be realized [implemented] nor
εἰπεῖν μήτε ἰδεῖν μήτε ποιῆσαι· καὶ ὅ τι εὐχειρὴ
to say nor to show nor to be done; and that something which is manageable
ἐν αὐτῇ, καὶ ὅ τι ἀχειρὴ· καὶ ὅ τι καιρός, καὶ ὅ
by oneself, and that thing which is unmanageable; and that which is timely, and that

τι ἀκαιρίη· καὶ τῶν τεχνέων τῶν ἄλλων ἥσιν τε
 thing which is untimely; and of all the professions
 ἔοικε καὶ ἥσιν οὐδὲν ἔοικε· καὶ τοῦ σώματος ὃ τι
 it resembles and in those which it does not resemble; and concerning the body, that which
 ἢ ψυχρὸν ἢ θερμὸν ἢ ισχυρὸν ἢ ἀσθενὲς ἢ πυκνὸν
 either cold or warm or potent or weak or frequent
 ἢ ἀραιὸν ἢ ὑγρὸν ἢ ξηρὸν· καὶ ὅσα τῶν πολλῶν
 or infrequent or moist or dry; and just as of many
 ὀλίγα γίνεται, ἢ ἐπὶ τὸ κάκιον, ἢ ἐπὶ τοῦ ἀμεινον·
 few it becomes, or besides the worst, or besides the best;
 καὶ ὃ τι καλῶς ἢ αἰσχυρῶς ἢ βραδέως ἢ ταχέως ἢ
 and that thing which is good, or shamefully or slowly or quickly or
 ὀρθῶς ἢ μὴ ὀρθῶς καὶ ὃ τι κακὸν ἐπὶ κακῷ γενό-
 correctly or not correctly and that badness which beside bad becomes
 μενον ἀγαθὸν ποιεῖ, καὶ ὃ τι κακὸν ἐπὶ κακῷ
 good is made, and that badness which besides being bad
 ἀνάγκη γενέσθαι.
 necessary becomes.

It is most desirable that one should be able to correctly question, characterize, or contradict information regarding medicine as follows. First, that from which all diseases arise in humans. Likewise, it is necessary [to know] when diseases occur, whether they will be prolonged or brief, lethal or nonlethal, crippling or noncrippling, or if there is uncertainty as to bad or good outcomes should they eventuate. Also, treating physicians should know what abrupt changes can be expected with certain diseases, and likewise to know what is likely to happen, good or bad, in treating those enfeebled by disease. And be aware of that which is said or done by the physician in the presence of patients, or, conversely, what is said by the sick in the presence of the physician; likewise what exactly is to be done, and what way is best to do it; and which features of its onset have been shown to be incorrect or correct; and which aspects are insignificant and which are important, and what is frequent and what is uncommon; and that feature which is unique to a disease or common to all diseases; and to say, show, or do that which is reasonable, and to not say, show, or do that which is not reasonable; and recognizing what can be managed by oneself and what is unmanageable; and that which is timely and which is untimely; and what appears to be done or not done by other professionals; and, concerning the body, that which is cold or warm, potent or weak, frequent or infrequent, or moist and dry; and likewise how much necessarily develops from a little, the best from the worse, or the worst from the best; and those things that are good from shameful, slow from quick, correct from incorrect, badness from good, goodness from bad.

b. ταῦτ' ἐνθυμηθέντα διαφυλάσσειν δεῖ ἐν τοῖσι
 this being recollected be fully mindful one must for these
 λόγοισιν· ὃ τι ἂν δέ τις τούτων ἀμαρτάνῃ ἢ λέ-
 reasons; whenever someone which if something of them be inaccurate whether
 γων ἢ ἐρωτῶν ἢ ὑποκρινόμενος, καὶ ἦν πολλὰ
 saying or questioning or explaining, and should many

ὄντα ὀλίγα φῆ εἶναι, ἢ μεγάλα ἐόντα σμικρά,
 being a few is said to be, or great being small,
 καὶ ἦν ἀδύνατα ἐόντα δυνατὰ φῆ εἶναι, ἢ ὅ τι ἂν
 of impossibilities being possibilities said to be, or if something
 ἄλλο ἀμαρτάνῃ λέγων, ταύτῃ φυλάσσοντα δεῖ
 else inaccurate saying, this being heeded one ought
 ἐπιτίθεσθαι ἐν τῇ ἀντιλογίῃ.
 to apply in the contradiction.

All this is to be remembered and the physician must therefore be fully mindful of the following: he should be prepared to respond with a contradiction to those matters that are inaccurate in pronouncements, questions, or explanations, or should they be exaggerated or minimized or should impossibilities be said to be possible, or if simply in error.

2. In this important section the origin of disease is outlined in which gall and mucus are critical elements in that they provide a common mechanism for the expression of many diseases of disparate origins.

a. αἱ μὲν οὖν νοῦσοι γίνονται ἡμῖν ἅπασαι,
 the then diseases develop in us all,
 τῶν μὲν ἐν τῷ σώματι ἐνεόντων, ἀπὸ τε χολῆς
 of the internal [parts] in the body, from both gall
 καὶ φλέγματος, τῶν δ' ἔξωθεν, ἀπὸ πόνων καὶ
 and mucus, and of the external, from [physical] abuse and
 τραυμάτων, καὶ ὑπὸ τοῦ θερμοῦ ὑπερθεμαίνοντος
 trauma, and because of the heat the being too hot
 καὶ τοῦ ψυχροῦ ὑπερψύχοντος.
 and because of the cold the being too cold.

All diseases that occur in us are: (1) internal afflictions of the body that arise from both gall and mucus, (2) those due to external injury [caused] by extreme use or trauma, and (3) those from being excessively hot or cold.

1538 Version (see frontispiece):

αἱ μὲν οὖν νοῦσοι γίνονται ἅπασαι,
 the then diseases develop all,
 τῶν μὲν ἐν τῷ σώματι ἐνεόντων, ἀπότε χολῆς
 of the internal [parts] in the body, from both gall
 καὶ φλέγματος, τῶν δὲ ἔξωθεν, ἀπὸ πόνων καὶ
 and mucus, and of the external, from [physical] abuse and
 τραυμάτων. ἀλλὰ καὶ τοῦ θερμοῦ καὶ ὑπερθεμαίνοντος
 trauma. otherwise and because of the heat the being too hot
 καὶ τοῦ ψυχροῦ καὶ ὑπερψύχοντος.
 and because of the cold the being too cold.

καὶ τοῦ ξήρου, καὶ ὑπερξηραίνοντος
and from dryness, and becoming dehydrated
καὶ τοῦ ὑγροῦ καὶ ὑπερυγραίνοντος.
and from wetness and becoming overhydrated.

Everyone develops disease: (1) internal afflictions of the body, from both gall and mucus, (2) those due to external injury that are caused by physical abuse or trauma, and (3) otherwise [those] from heat by becoming too hot, from the cold by becoming too cold, from dryness by becoming dehydrated, and from wetness by becoming overhydrated.¹⁶

b. καὶ ἡ μὲν χολὴ καὶ τὸ φλέγμα γινομένοισί τε
both on the one hand the gall and mucus on coming into being
συγγίνεται καὶ ἔνι αἰεὶ ἐν τῷ σώματι ἢ πλεονὴ ἢ
associate with and are present always in the body either more or
ἐλασσον· τὰς δὲ νούσους παρέχει, τὰς μὲν ἀπὸ σι-
less; that but disease on the other hand it enables, that from
τίων καὶ ποτῶν, τὰς δὲ ἀπὸ τοῦ θερμοῦ ὑπερθερ-
food and drink, that from heat becoming too
μαίνοντος καὶ ἀπὸ τοῦ ψυχροῦ ὑπερψύχοντος.
hot and from cold becoming too cool.

Both gall and mucus, on the one hand, on being generated, become associated with and permanently in the body to a greater or lesser degree. On the other hand, they enable disease that is derived from food and drink, from heat when they become too hot, and from cold when they become too cold.

1538 Version:

καὶ ἡ μὲν χολὴ καὶ τὸ φλέγμα, γινομενοίσι τε
both on the one hand the gall and mucus on coming into being
συγγίνεται, καὶ ἐστὶν ἐν τῷ σώματι, ἢ πλεον, ἢ
associate with, and are present in the the body, either more or
ἐλασσον. τὰς δὲ νούσους παρέχεται, τὰς μὲν ἀπὸ σι-
less. that on the other hand disease it enables, that from
τίων καὶ ποτῶν. τὰς δὲ, ἀπὸ τοῦ θερμοῦ ὑπερθερ-
food and drink. that and, from the heat becoming

¹⁶ This paragraph divides human health mishaps into three categories: internal, external, and homeostatic. Both the ancient and recent versions may seem in agreement, but the latter is more encompassing and the concept of homeostatic derangement is more clearly and separately (ἄλλᾳ) expressed. It is proposed that the heating, cooling, and hydration status refer not to atmospheric effects but specifically to gall and mucus, for heat activates them, cold inactivates them, dryness evaporates them, and hydration dissolves them. Galen, 500 years later, would sell the idea that hot, cold, dry, and wet represented physical properties of the humors rather than integral components of a kinetic system.

μαίνοντος. καὶ ἀπὸ τοῦ ψυχροῦ ὑπερψύχοντος.
too hot. and from the cold becoming too cold.

Both gall and mucus, on the one hand, on being generated, become associated and are in the body to a greater or lesser degree. On the other hand, they enable disease that is derived from food and drink, from heat when they become too hot, and from cold when they become too cold.¹⁷

3. This Section expands on Section (1) by listing specific diseases and injuries that have specific complications that inevitably occur, other diseases that inevitably lead to death if they are superimposed on a preexisting disorder, and others that can be lethal, nonlethal, crippling, chronic, or abruptly change.

a. ἀνάγκη δὲ τὰ τοιάδε ἔχει ὥστε γίνεσθαι, ὃ
inevitable that that which follows so that it will occur, that which
τι ἂν γίνηται· ἐν μὲν τοῖσι τρώμασι νεῦρα τὰ
occurs; in traumatic injury tendons the
παχέα τιτρωσκομένους χωλοῦσθαι καὶ τῶν μυῶν
thick being injured will be crippled and of muscles
τὰς κεφαλὰς, καὶ μάλιστα τῶν ἐν τοῖσι μηροῖσιν.
the origin, and especially of those in the thighs.
ἀποθνήσκειν δέ, ἣν τις ἐγκέφαλον τρωθῇ ἢ
to be lethal, however, should something the brain injure or
ῥαχίτην μυελὸν ἢ κοιλίην ἢ ἥπαρ ἢ φρένας ἢ
spinal cord or bowel or liver or diaphragm or
κύστιν ἢ φλέβα αἰμόρροον ἢ καρδίην· μὴ ἀπο-
bladder or vessels blood or heart; non-
θνήσκειν δὲ τιτρωσκόμενον ἐν οἷσι ταῦτα τῶν
lethal being injured in which this of
μελέων μὴ ἓνι ἢ τούτων προσωτάτω ἐστίν.
concern not one or of these furthest is.

Some things follow other things because it is inevitable that they should occur: in traumatic injury of the thick tendons or the origin/insertion of muscles, especially those of the thighs, [there] will be crippling. But to be lethal something must injure the brain, spinal cord, bowel, liver, diaphragm, bladder, blood vessels, or heart. Things nonlethal are injuries in which the preceding are not involved or are most distal.

¹⁷ This paragraph confirms the preceding footnote in that it is the gall and mucus that induce disease if they become too hot or too cold for there is no evidence here that “too hot” and “too cold” refer to ambient temperature. It also blames some kinds of internal disease on external sources (food, drink) and again indicates gall and mucus are involved in enabling diseases caused by them. Most importantly, *παρέχω* is properly translated as “I enable,” (and *παρέχεται*: “it personally enables”) making clear that gall and mucus are not diseases in themselves, but intermediaries by which disease becomes manifest. Lastly, the 1538 version does not indicate that gall and mucus are lifelong normal body constituents.

b. τῶν δὲ νοσημάτων τὰ τοιάδε ἔχει ἀνάγκας
 of and diseases that [people] have inevitable
 ὥστε ὑπ' αὐτῶν ἀπόλλυσθαι, ὅταν ἐπιγένηται·
 so that from them to die, whenever it be superimposed:
 φθίσις, ὕδρωψ ὑποσαρκίδιος, καὶ γυναῖκα ὅταν
 wasting disease, ascites with muscle atrophy, and women whenever
 ἔμβρυον ἔχουσιν περιπλευμονίῃ ἢ καύσος λάβῃ ἢ
 fetus having nonpurulent pneumonia or kausos fever can be seized by or
 πλευρίτις ἢ φρενίτις, ἢ ἐρυσίπελας ἐν τῇσιν
 with pleuritic chest pain or delirium, or abscess (*i.e.*, infection) in the
 ὕστέρῃσι γένηται.
 uterus occurs.

These are diseases that, if superimposed [on another disease process], almost always lead to death: wasting disease, ascites with muscle atrophy, and, in pregnant women, nonpyogenic pneumonia, kausos fever, chest wall disease, delirium, or uterine [infection].¹⁸

c. ἐνδοιαστὰ δὲ τὰ τοιάδε ἀπολλύναι τε καὶ μὴ·
 and these are those [diseases] that cause some to die and some not:
 περιπλευμονίῃ, καύσος, πλευρίτις, φρενίτις, κυ-
 nonpurulent lung disease,¹⁹ kausos fever, pleuritic chest pain, delirium,
 νάγχῃ, σταφυλή, σπληνίτις, νεφρίτις, ἥπατιτις,
 pharyngeal abscess, tonsillitis, spleen problem, kidney problem, liver problem,
 δυσεντερίῃ, γυναικὶ ῥόος αἱματώδους.
 dysentery, in women menometrorrhagia.

These are diseases from which some die and some do not: nonpurulent pneumonia, kausos fever, chest wall disease, delirium, pharyngeal abscess, tonsillitis, spleen problems, kidney problems, liver problems, dysentery, and, in women, menometrorrhagia.

d. τὰ δὲ τοιάδε οὐ θανάσιμα, ἢν μὴ τι αὐτοῖς
 those of these [diseases] non-lethal, unless something in them
 προσγένηται· κέδματα, μελαγχολίῃ, ποδάγρη,
 intervenes/supervenes: large inguinal lymph nodes, depression, gout,

¹⁸ The word ὑποσαρκίδιος is unlikely to mean “under the flesh (muscle)” for ὕδρωψ (ascites) is best translated as fluid “in the peritoneal cavity,” although at times anasarca and edema can be used. Diseases that cause ascites are commonly quite advanced (as seen in liver cirrhosis and in tuberculous peritonitis) and the patient is often weak and thin to the point of cachexia. Thus, ὕπο probably means a lessened amount or “small degree” rather than “under” or “by.”

¹⁹ It will be reiterated several times in this work that περιπλευμονία means “acute nonpurulent parenchymal lung disease,” but the more familiar and convenient “nonpurulent pneumonia” will be its translation when appropriate. Translation is awkward because the lung may be the source of symptoms such as cough and shortness of breath when the real problem can be heart disease, kidney failure, allergic asthma, mycoplasma pneumonia, and a myriad of other causes.

ἰσχίᾱς, τεινεσμός, τεταρταῖος, τριταῖος, στραγ-
 low back/hip disease, tenesmus, four-day fevers, three-day fevers,
 γουρίη, ὀφθαλμῖνη, ἀρθρίτις, λέπρη, λειχήν.
 strangury, conjunctival problems, joint problems, scaly/keratinizing skin problems,
 eczemas.

The following diseases are nonlethal as long as no complicating feature supervenes:
 inguinal lymphadenopathy, depression, gout, low back/hip problems, tenesmus, four-day
 fevers, three-day fevers, strangury, conjunctival disease, joint disease, scaly/keratinizing
 skin problems and eczemas.

e. ἔμπηροι δὲ ἀπὸ τῶνδε γίνονται· ἀπόπληκτοι
 crippling from these develop: post-head injury paralysis
 μὲν καὶ χεῖρας καὶ πόδας καὶ φωνῆς ἀκρατέες
 of hands, feet, and speech unable to control
 καὶ παραπλήγες ὑπὸ μελαίνης χολῆς, χῶλοι δὲ
 and unilateral paralysis from dark gall, lameness
 ὑπὸ ἰσχιᾱδων, ὅμματα δὲ καὶ ἀκοὴν (κατά-
 from low back/hip joint problems, and defective vision and hearing [damaged]
 πηροι) ὑπὸ φλέγματος καταστριζαντος.
 by mucus accumulation being leaned upon. [*i.e.*, pressure from local swelling]

Crippling develops from the following: (1) head injury, with inability to control hands,
 feet, and speech, or with unilateral paralysis due to dark bile, (2) lameness from low
 back/hip joint disease, and (3) defective vision and hearing due to pressure from a [local]
 collection of mucus.²⁰

f. μακρὰ δὲ τάδε ἀνάγκη εἶναι· φθόγην, δυσεντερί-
 prolonged these inevitably to be; wasting disease, dysentery,
 ἡν, ποδάγρην, κέδματα, φλέγμα λευκόν, ἰσχιᾱδα,
 gout, inguinal lymphadenopathy, anasarca, low back pain,
 στραγγουρίην, γεραιτέροισι δὲ νεφρίτιν, γυναικί
 strangury, in the aging kidney disease, in women
 δὲ ῥόον αἱματώδη, αἱμορροΐδας, σύριγγας. καῦσος
 menometrorrhagia, occult bleeding, fistulae. kausos fever,
 δέ, φρενίτις, περιπλευμονίη, κυνάγχη, σταφυλή,
 delirium, acute nonpurulent parenchymal lung disease, pharyngeal abscesses, tonsillitis,

²⁰ Note that strokes/unilateral paralysis are not associated with gall and/or mucus, markers of inflammation, but with “dark bile.” Head injury and paralysis is distinguished from “black bile” paralysis. The latter refers to cerebral infarction, with ischemic and necrotic tissue/blood the explanation for the “darkness” of the affected area of the brain, for infarcted areas tend to be of a darker color than surrounding tissue (e.g., pulmonary infarction, brain infarction, myocardial infarction, and digital or limb infarction), although the length of time following an infarction would be an important factor determining its color.

πλευρίτις ταχέως κρίνει.

pleuritic chest wall pain quickly resolves [for good or bad].

The following disorders are predictively of a chronic nature: wasting disease, dysentery, gout, inguinal lymph node enlargement, anasarca, low back pain, strangury, kidney problems in the elderly, menometrorrhagia in women, occult blood loss, fistulae. In contrast, the following tend to quickly [terminate], for better or worse: typhoidal fevers, delirium, nonpurulent pneumonia,²¹ pharyngeal abscess, tonsillitis and chest wall disease.²²

g. μεταπίπτει δὲ τάδε· ἐκ πλευρίτιδος ἐς καὶ-
change abruptly and these: from chest wall disease into kausos
σον, καὶ ἐκ φρενίτιδος ἐς περιπλευμονίην· ἐκ δὲ
fever, and from delirium into acute nonpurulent parenchymal lung disease; but from
περιπλευμονίης καὶσος οὐκ ἂν γένοιτο· τεινέσμος
a acute nonpurulent parenchymal lung disease kausos fever should not develop; tenesmus
ἐς δυσεντερίην, ἐκ δὲ δυσεντερίης λειεντερίη, ἐκ
into a dysentery, then from a dysentery into unformed stools, from
δὲ λειεντερίης ἐς ὕδρωπα, καὶ ἐκ λευκοῦ φλέγμα-
unformed stools into ascites, and from anasarca
τος ἐς ὕδρωπα, καὶ σπληνὸς οἰδήμα ἐς ὕδρωπα·
into ascites, and splenomegaly into ascites;
ἐκ περιπλευμονίης καὶ πλευρίτιδος ἐς ἔμπυον.
from nonpurulent pneumonia and pleuritic chest pain into a purulent pneumonia.

Sometimes there can be abrupt changes in clinical status such as the following: pleuritic chest wall disease that can quickly evolve into a kausos (typhoidal) fever, and a delirium can presage acute nonpurulent pneumonia, but the latter should not evolve into a kausos (typhoidal) fever [although the converse is not rare]; tenesmus can evolve into dysentery, dysentery can change into unformed stool, unformed stools into anasarca, [a patient with] an enlarged spleen can develop ascites, and nonpurulent pneumonia and pleuritic chest pain can develop into a purulent pneumonia.²³

²¹ Peripleumonia is translated as “nonpurulent pneumonia” here because of its inclusiveness, convenience, and brevity, although a more exact pathophysiological denomination is “acute nonpurulent parenchymal lung disease,” usually an acute process that comes to a conclusion, good or bad, in a matter of days or a few weeks. This description could have included viral catarrhs with cough, whooping cough, nonpurulent pneumonia, viral pneumonia, congestive heart failure, blood volume overload in renal failure, and the early stage of bacterial pneumonia, for it would have been difficult to differentiate among these causes early in their development and therefore their lethality would have greatly varied.

²² The inclusion of “gout” indicates that by “chronic” the Hippocratics included *recurrent* illness in which the patient was free of symptoms in between attacks.

²³ Diseases of an infectious nature fit best here. A century ago typhoidal pleurisy was a recognized disease state and not rare, and there is a suggestion of dysentery precipitating clinically apparent protein-energy malnutrition with chronic diarrhea containing undigested food, edema; but for information on nutrition suggesting adequacy of protein intake in a contemporary Greek colony see:

4. Here is another short list of complications and inevitabilities of disease and injury.

τάδε ἐπὶ κακοῖσιν ἀνάγκη κακὰ γίνεσθαι·
 these in those seriously ill unavoidably bad will become
 ῥίγος ἢν λάβῃ, πῦρ ἐπιλαβεῖν· καὶ νεῦρον ἢν
 rigor if seized by, fever then is superimposed; and a tendon/nerve if
 διακοπῇ μὴ ξυμφῶναι ἐπιφλεγμῆναί τε ἰσχυρῶς·
 transected not to reunite being made inflamed severe;
 καὶ ἢν ὁ ἐγκέφαλος σεισθῇ τε καὶ πονήσῃ πλη-
 and should the brain be concussed and [profoundly] is
 γέντος, ἄφωνον παραχρῆμα ἀνάγκη γενέσθαι,
 struck, inability to speak immediate necessarily will develop,
 καὶ μήτε ὁρῆν μήτε ἀκούειν· ἢν δὲ τρωθῇ, πυρε-
 and neither seeing or ability to hear; and should there be a wound, fever
 τόν τ' ἐπιγενέσθαι καὶ χολῆς ἔμετον, καὶ ἀπό-
 will be superimposed and greenish emesis, and a
 πληκτόν τι τοῦ σώματος γενέσθαι, καὶ ἀπολέ-
 paralysis some [part] of the body will have, and
 σθαι· ἐπιπλοῖον ἢν ἐκπέσῃ, ἀνάγκη τοῦτο ἀπο-
 ruined/impaired; should mesentery/meninges be exposed/protrude this necessarily
 σαπῆναι· κῆν αἷμα ἐκ τρώματος ἢ φλεβὸς ῥυῇ ἐς
 to be made necrotic; and if bleeding from trauma or a vessel flow into
 τὴν ἄνω κοιλίην, ἀνάγκη τοῦτο πύον γενέσθαι.
 into the chest cavity, necessarily this purulence will develop.

Patients who are already seriously ill will worsen if seized by rigor as fever is then superimposed; a transected tendon/nerve if made inflamed [swollen and irritated] will not unite;²⁴ should a brain be profoundly struck and concussed, there will inevitably be an immediate inability to speak or see or hear; if there is a wound (presumably meaning “penetrating” wound) to the brain with superimposed fever, greenish emesis, and focal paralysis, death is certain; exposed mesentery (meninges?) will always become necrotic;

Henneberg, R. J., and Henneberg, M, *The Diet of the Metapontine Population as Reconstructed from the Physical Remains*, in *Living Off the Chora: Diet and Nutrition at Metaponto*, A. Prieto and J. C. Carter, editors, Austin, 2003, pp. 29-36. Pneumonias often occur with typhoid, although most often as a secondary disease process. Some of the abrupt changes noted by Hippocratic physicians can seem illogical, but they may not be so. Consider the sequence of tenesmus, dysentery, unformed stool, and anasarca (including peripheral edema). Tuberculosis, especially gastrointestinal tuberculosis, and Familial Mediterranean Fever (FMF), especially if amyloidosis is a complication, commonly exhibit diarrhea and often malabsorption. Both renal and bowel involvement can lead to protein loss in the urine and/or bowel, and thereby anasarca or peripheral edema. Both diseases can be common in some populations, and if present in ancient Greece, including Ionia, could explain this sequence. There is commentary on FMF in *The Natural State of Medical Practice*, vol. 2, p. 82.

²⁴ The presence of ongoing infection profoundly inhibits the body's efforts at regeneration. Today tendons and nerves, if severed, can reunite if sutured, but it can take considerable time, and only if a any local infection has been controlled, as any patient whose elective surgery has been postponed for such a reason can vouch. It is noteworthy that this was realized by the Hippocratics.

if blood from trauma or a (ruptured?) blood vessel flows into the chest cavity (or cranial sinus cavities?), purulence will inevitably follow.²⁵

5. Here “critical” (life-threatening) moments are defined and examples given, with the caveat that at times a patient may survive a “critical” moment without the aid of a physician.

a. καιροὶ δέ, τὸ μὲν καθάπαξ εἰπεῖν, πολλοί
the critical moments, the “once and for all” moment to say, many
τ’ εἰσὶν ἐν τῇ τέχνῃ καὶ παντοῖοι, ὥσπερ καὶ τὰ
they are in the profession [of medicine] and in every way, just as and the
νοσήματα καὶ τὰ παθήματα καὶ τούτων αἱ θερα-
diseases and the signs/symptoms and of them the
πεῖλαι.
treatments.

Critical moments, which is to say the “once and for all” moments, are ubiquitous and diverse in the medical profession, just as are the diseases, their signs and symptoms, and their treatments.²⁶

b. εἰσὶ δὲ ὀξύτατοι μὲν, ὅσοισιν ἡ ἐκψύχουσι δεῖ
are the most urgent, in those who have lost consciousness one must
τι ὠφελῆσαι ἢ οὐρήσαι ἢ ἀποπατήσαι μὴ δυναμέ-
do something beneficial either to make urinate or make defecate those not
νοῖσιν ἢ πνιγομένοισιν ἢ γυναικὰς τικτούσαν ἢ
capable or those who are suffocating or women in childbirth or
τρωσκομένην ἀπαλλάττειν ἢ ὅσα τοιαῦτά ἐστιν.
following an injury to relieve or whatever like these it might be.
καὶ οὗτοι μὲν οἱ καιροὶ ὀξέες, καὶ οὐκ ἀρκέει ὀλί-
and these the [critical] moments [are] urgent, and not it is of use a
γὰρ ὕστερον· ἀπόλλυνται γὰρ οἱ πολλοὶ ὀλίγῳ
little later; for they die many a little
ὕστερον. ὁ μὲντοι καιρὸς ἐστίν, ἐπὴν πάθῃ τι
later. indeed the [critical] moment is, whenever be suffering severely something

²⁵ The dura mater, arachnoid and pia mater comprise the protective meningeal coverings of the brain. Could “epiploon” refer to meninges as well as mesentery? The pia mater is closely adherent to brain tissue, whereas the arachnoid mater is separated from it by the spinal fluid which bathes the brain. If so, and if its following clause refers to a skull fracture that extends into a cranial sinus cavity rather than the chest cavity, then all situations following the brain trauma described in this paragraph could be related to head injury. If the meningeal protections of the brain/spinal cord had been breached, lethal meningitis would surely follow.

²⁶ Note that καιρός, the “right” or “opportune” moment, is understood to be a “critical” moment and differing from “critical” time or “crisis” commonly used to translate κρίσις, a word usually translated as “resolution” by the author (see Wordlist).

τούτων ὧνθρωπος· ὃ τι ἂν τις πρὸ τοῦ τὴν ψυχὴν
 of them a person; that which someone something before the breath of life/soul
 μεθεῖναι ὠφελήσῃ, τοῦθ' ἅπαν ἐν καιρῷ ὠφέλη-
 to depart can assist, for this always in the critical moment
 σεν. ἔστι μὲν οὖν σχεδὸν τι οὗτος ὁ καιρὸς καὶ ἐν
 is beneficial. it is then at hand someone such the critical moment and in
 τοῖσιν ἄλλοισι νοσήμασιν· αἰεὶ γάρ, ὅταν τις ὠφε-
 the other diseases; for always, whenever anyone can
 λήσῃ, ἐν καιρῷ ὠφέλησεν.
 be beneficial, at the critical moment he will be beneficial.

The most urgent [medical situations] are those that require something effective for those about to expire, for those who have urinary or bowel obstruction, for those who are suffocating, women in childbirth, for those requiring resuscitation after trauma, and other like situations. And these are critical moments, as it is not enough be of assistance a little later, for many will die a little later. The critical moment is, therefore, whenever a person is suffering from the above, and that which is beneficial before the breath of life/soul departs is being beneficial at a critical moment. A critical moment is at hand in some other diseases, for whenever anyone can be useful he will always be of use at critical moments.

c. ὅσα δὲ τῶν νοσημάτων ἢ τραυμάτων μὴ ἐς
 just as/so that of diseases or trauma not is
 θάνατον φέρει, ἀλλὰ καίριά ἐστιν, ὀδύναι δ' ἐγγί-
 lethal he tolerates, but a critical moment it is, distresses
 νονται ἐν αὐτοῖσι, καὶ οἷά τέ ἐστιν, ἣν τις ὀρθῶς
 develop in them, and such as it is, should anyone correctly
 θεραπεύῃ, παύεσθαι, τούτοισι δὲ οὐκ ἀρκέουσι γι-
 be treated, to cease, in them but not they assist
 νόμεναι αἱ ὠφέλειαι ἀπὸ τοῦ ἰητροῦ, ὅταν γένων-
 to the coming the assistance from the physician, whenever they
 ται· καὶ γὰρ καὶ μὴ παρόντος τοῦ ἰητροῦ
 develop; for not being nearby the physician
 ἐπαύσαντο ἂν.
 would they have stopped.

Likewise, one can bear nonlethal diseases and trauma, but they have their critical moments, and if [distresses] accompany them, as happens, a distress will cease if someone treats it correctly. But even if they occur without the availability of a physician's assistance, they might have ceased without his presence.²⁷

d. ἕτερα δ' ἔστι νοσήματα, οἷσι καιρὸς ἐστι θε-
 another and is diseases in which the critical moment

²⁷ In other words, the physician is indispensable in situations likely to be lethal without help, whereas in nonlethal situations, even if greatly distressed, the patient will recover without help from a physician.

ραπεύεσθαι τὸ πρῶτ' ἢ τῆς ἡμέρης, διαφέρει δ' οὐδὲν
 to be treated early in the day, but it lasts not even
 ἢ πᾶν πρῶτ' ἢ ὀλίγω ὕστερον· ἕτερα δὲ νοσή-
 either very early or a little later; and other diseases
 ματὰ ἐστίν, οἷσι καιρὸς θεραπευθῆναι ἅπαξ τῆς
 are, in those the critical time to be treated once and for all
 ἡμέρης, ὁπνίκα δ' οὐδὲν διαφέρει· ἕτερα δὲ διὰ
 of the day, at what time or not is optimal; and another through
 τρίτης ἡμέρης ἢ τετάρτης· καὶ ἕτερά γε ἅπαξ
 the third day or the fourth; and another once and for all
 τοῦ μηνός· καὶ ἕτερα διὰ τριῶν μηνῶν, καὶ τοῦ
 of the month; and another at three months, and of the
 τρίτου ἢ ἱσταμένου ἢ φθίνοντος, οὐδὲν διαφέρει.
 third either remaining unchanged or declining, does not optimize.
 τοιοῦτοι οἱ καιροὶ εἰσιν ἐνίοισι, καὶ ἀκριβεῖν οὐκ
 such as these the critical times are in some, and specificity not
 ἔχουσιν ἄλλην ἢ ταύτην.
 they have others than those.

And there are other diseases in which the optimal time to be treated is early in the day and no earlier or later. There are other diseases where the optimal time to be treated can be any time of day; in others it can be every third or fourth day, or monthly or even every three months. But if at the end of the third [month?] the patient is no better or is worsening, this is not optimal. There are optimal times in some of these, but there are others that have no such specificity.

e. ἀκαιρία δ' ἐστὶ τὰ τοιάδε· ὅσα μὲν πρῶτ'
 but inopportune is as follows: whatsoever things early in the morning
 δεῖ θεραπεύεσθαι ἢν μεσαμβρίῃ θεραπεύηται,
 it is necessary to be treated should at midday he be treated,
 ἀκαίρως θεραπεύεται· ἀκαίρως δὲ ταύτῃ, ἐπεὶ
 inopportunately to be treated; and untimely in these, when
 ροπήν ἴσχει εἰς τὸ κάκιον διὰ τὴν οὐκ ἐν καιρῷ
 decline there is into badness because the not in good time
 θεραπεύηται· ὅσα δὲ τάχα, ἢν τε μεσαμβρίας ἢν
 treatment; whatever and speedily, should in midday or
 τ' ὀψὲ ἢν τε τῆς νυκτός θεραπεύηται, ἀκαίρως
 after a long time should at night be treated, suboptimally
 θεραπεύεται· καὶ ἢν τοῦ ἡρος δέῃ θεραπεύεσθαι,
 to be treated; and should by spring it be necessary to be treated,
 θεραπεύηται δὲ χειμῶνος, ἢ τοῦ μὲν χειμῶνος
 being treated but in the winter, or during the winter
 δέῃ, τοῦ δὲ θέρους θεραπεύηται· ἢ ὅ τι ἥδη δεῖ
 it be necessary, but in the summer to be treated; or that which it is necessary now
 θεραπεύεσθαι, τοῦτο ἀναβάλληται, ἢ ὅ τι ἀνα-
 to be treated, this is delayed, or that which something should be

βάλλεσθαι δεῖ, τοῦτ' ἤδη θεραπεύηται, τὰ τοιαῦ-
 put off it be necessary, this now to be treated, these
 τὰ ἀκαίρως θεραπεύεται.
 untimely are being treated.

The inopportune treatment times are as follows: when someone who should be treated early in the morning is treated at midday he has been suboptimally treated. It is inappropriate treatment should the patient deteriorate because of untimely treatment, [for example] if he should be treated at midday but treatment be delayed until nighttime, or if he is treated in the winter when treatment should have been given in the spring, or treatment meant for the winter is delayed until summer, or something requiring prompt treatment is delayed, or something best put off is hastily treated. All these things are examples of untimely treatment.

6. This Section discusses correct and incorrect advice and management of both medical and surgical problems. It also advises care in prescribing therapies in a way that suggests physicians were expected to be acquainted with techniques of compounding of medications.

a. ὀρθῶς δ' ἐν αὐτῇ καὶ οὐκ ὀρθῶς τὸ τοιάδε·
 correctly in itself or not correctly this the way:
 οὐκ ὀρθῶς μὲν, τὴν τε νοῦσον ἑτέρεν ἐοῦσαν ἑτέ-
 not correctly then, when the one disease being another
 ρην φάναι εἶναι, καὶ μεγάλην οὖσαν σμικρὴν φά-
 to declare to be, and a major one being minor
 ναι εἶναι, καὶ σμικρὴν ἐοῦσαν μεγάλην, καὶ περι-
 to declare to be, or a minor one being major, or
 εσόμενον μὴ φάναι περιέσεσθαι, καὶ μέλλοντα
 surviving is not declared to be a surviving, or about
 ἀπολεῖσθαι μὴ φάναι ἀπολεῖσθαι, καὶ ἔμπυον ἐόν-
 to be fatal to not declare to be fatal, or purulent pneumonia
 τα μὴ γινώσκειν, μηδὲ νοῦσου μεγάλης τρεφομέ-
 being not to know, nor of a major disease strengthening
 νης ἐν τῷ σώματι γινώσκειν, καὶ φαρμάκου δεό-
 in the body to know, , or medication being
 μενον, οὔποιου του δεῖ, μὴ γινώσκειν, καὶ τὰ δύνα-
 needed, whether it was necessary, not to know, or that which is possible
 τὰ μὴ ἐξιᾶσθαι, καὶ τὰ ἀδύνατα φάναι ἐξιῆσε-
 not to be completely cured, that which is impossible [to cure] to declare to be
 σθαι.
 cured.

This is advice on correct and incorrect action in nonsurgical illness: it is not correct to declare a disease to be one it is not, or to declare a major illness to be a minor one or a minor one as major, to not predict survivability or declare a likely fatal outcome to be unlikely, not to recognize a pneumonia or if a major disease is strengthening in the body,

not to know the proper medication needed, or to declare a curable disease as incurable or an incurable disease as curable.

b. ταῦτα μὲν οὖν ἐστὶ κατὰ γνώμην οὐκ ὀρθῶς,
these then are according to [our] knowledge not correctly
κατὰ δὲ χειρουργίην τάδε· πύον ἐν ἔλκει ἐνεδόν ἢ
concerning surgical matters; pus in a lesion inside or
ἐν φῦματι μὴ γινώσκειν, καὶ τὰ κατῆγματα καὶ
in an enlarging palpable swelling not to know, and the fractures and
τὰ ἐκπεπτωκότα μὴ γινώσκειν, καὶ μηλῶντα
the dislocations not to know, and probing
κατὰ κεφαλὴν μὴ γινώσκειν, εἰ τὸ ὀστέον κατέη-
concerning the head not to know if the bone is
γε, μηδ' ἐς κύστιν αὐλίσκον καθιέντα δύνασθαι
fractured, nor into the bladder an indwelling catheter to be able
καθιέναι, μηδὲ λίθου ἐνεόντος ἐν κύστι γινώσκειν,
to insert, nor of a stone being internal in the bladder to know,
μηδὲ πύον διασειόντα γινώσκειν, καὶ τάμνοντα
nor pus by shaking to know, and cutting
ἢ καίοντα ἐλλείπειν ἢ τοῦ βάρους ἢ μήκεος,
or cauterization to be insufficient either of depth or length,
ἢ καίειν τε καὶ τάμνειν ἃ οὐ χρή.
or to cauterize or to cut that which is not necessary.

These, then, are actions now considered incorrect in surgical management: to not recognize when there is pus in a wound or a palpable enlarging mass, inability to identify the presence of fractures and dislocations, inability to identify cranial fractures using a probe, incompetence in insertion of an indwelling urinary catheter, no expertise in shaking a patient to detect empyema of the chest, in making an inadequate incision or cauterization, and cutting or cauterizing that which is unnecessary.

c. καὶ ταῦτα μὲν οὐκ ὀρθῶς· ὀρθῶς δέ, τὰ τε
and these then not correctly; correctly but, those
νοσήματα γινώσκειν ἃ τέ ἐστὶ καὶ ἀφ' ὧν ἐστὶν,
diseases to know which is and that from which it comes,
καὶ τὰ μακρὰ αὐτῶν καὶ τὰ βραχέα, καὶ τὰ θανά-
and the protracted ones and the brief ones, and the lethal
σιμα καὶ τὰ μὴ θανάσιμα, καὶ τὰ μεταπίπτοντα
and the nonlethal, and the abruptly changing
καὶ τὰ αὐξανόμενα καὶ τὰ μαραινόμενα, καὶ τὰ
and the enlarging and the regressing, and the
μεγάλα καὶ τὰ μικρά, καὶ θεραπεύοντα τὰ μὲν
and the great and the small, and treating that
ἀνυστὰ ἐκθεραπεύειν, τὰ δὲ μὴ ἀνυστὰ εἰδέναι
practical to cure, and that not practical to ask

διότι οὐκ ἀνυστά, καὶ θεραπεύοντα τοὺς τὰ τοιαῦ-
 why not practical, and treating of those like them
 τα ἔχοντας ὠφελέειν ἀπὸ τῆς θεραπείης ἐς τὸ
 having to be helped from by treatment into the
 ἀνυστόν.
 realistic.

These, then, [were] the improper actions. The correct ones on the other hand are to recognize diseases for what they are and from whence they come, the protracted ones and the brief ones, the lethal and the nonlethal, those diseases that are abruptly changing or waxing or waning, the major and minor ones, treating those that are capable of cure and if incapable of cure to ask why, and for those like them being treated to be helped by treatment as long as it is realistic.

d. τὰ δὲ προσφερόμενα τοῖσι νοσέουσιν ὥδε χρὴ
 that and being prescribed in those illness such as are needed
 φυλάσσειν τὰ τε ὀρθῶς καὶ τὰ μὴ ὀρθῶς· ἣν τις ἅ
 to be watchful that which is [done] correctly and that not correctly; should someone who
 δεῖ ξηραίνειν ψγραίνει, ἢ ἅ δεῖ ὑγρραίνειν ξηραίνει,
 it is necessary to dry being moistened, or that is necessary to moisten being dried,
 ἢ παχύναι δέον μὴ προσφέρειν ἀφ' ὧν δεῖ παχύ-
 or to be well-formed being necessary not to prescribe that for which it is necessary
 νειν, ἢ ἅ δεῖ λεπτύνειν μὴ λεπτύνῃ, ἢ ψύχων μὴ
 to make well-formed, or that which it is necessary to dilute not be diluted, or being cooled
 ψύχῃ, ἢ θερμαίνων μὴ θερμαίνει, ἢ σήπων μὴ σή-
 not be cooled, or being hot not be heated, or if unwholesome
 πῃ, καὶ τὰ λοιπὰ κατὰ τὸν αὐτὸν λόγον τούτοις.
 to be not unwholesome, and the rest according to the circumstances of each patient.

It is necessary that one be watchful for correct and incorrect actions regarding that which is being prescribed for these illnesses/injuries; [these include] should something needing to be kept dry be moistened, or something to be moistened be dried, or that something (presumably stool) to be well-formed is not prescribed that which is necessary to make [it] well-formed, or that which should be dilute not be made dilute, or cooling [something] that should not be cooled, heating [something] that should not be heated, or [something] undergoing necrosis that should not necrose, and the rest according to the circumstances of each patient.

7. An extensive collection of clinical associations that suggest favorable or unfavorable outcomes are presented in this Section. The associations are often unexpected and, as their author points out, are often unpredictable.

a. τὰ δὲ τοιάδε ἀνθρώποισιν ἀπὸ τοῦ αὐτομά-
 and these that follow in humans by spontaneity
 του ἐν τῇσι νούσοισι γίνεται καὶ ἀγαθὰ καὶ κακά.
 in these diseases occurs either good or bad.

The following [features], good and bad, occur spontaneously in the course of illnesses in humans.

b. πυρέσσοντι μὲν καὶ χολῶντι σκεδασθεῖσα ἔξω
 being febrile and being irritated to be scattered/dispersing
 ἢ χολή, ἀγαθόν, ὑπὸ τὸ δέρμα κεχυμένη καὶ ἐσκε-
 the gall, good, under the skin having dissolved and dispersing
 δασμένη καὶ εὐπετεστέρα ἔχειν τε τῷ ἔχοντι καὶ
 and more favorable to be in those having and
 τῷ ἰωμένῳ ἰᾶσθαι· κεχυμένη δὲ καὶ ἐσκεδασμένη
 by being treated to be cured; having dissolved and dispersing
 πρὸς ἓν τι τοῦ σώματος προσπесоῦσα, κακόν.
 toward something in the body advancing against, bad.

In those with fever and gall, if gall is being freely dispersed externally [it] is favorable, and when profuse and dispersed under the skin it can be both more favorable in those having it and, when treated, to be cured. But it is bad if the gall, flowing forth and dispersing, is advancing [tunneling] toward something in the body.²⁸

c. κοιλίη ταραχθεῖσα ὑπὸ πλευρίτιδος ἔχομένῳ ἢ
 the bowel being disturbed by chest wall disease having or

περιπλευμονίης ἢ ἐμπύῳ ἔόντι, κακόν· πυρέσσον-
 nonpurulent pneumonia or purulent pneumonia having, bad: and being
 τι δὲ ἢ τρῶμα τετρωμένῳ ἀποξηρανθεῖσα, κακόν·
 febrile or traumatized, in being wounded to be dry, bad;
 ὑφ'ὕδρῳ καὶ σπληνώδει καὶ ὑπὸ λευκοῦ φλέγμα-
 in ascites and a large spleen or from anasarca
 τος ἔχομένῳ ταραχθεῖσα ἢ κοιλίη ἰσχυρῶς,
 having being disturbed the bowel severely,
 ἀγαθόν.
 good.

If there is disturbed bowel function from pleuritic chest wall disease, nonpurulent pneumonia, or a purulent pneumonia, that is bad. And on being injured if there is fever or a wound that remains dry, that is bad. But if bowel function is disordered in a patient with ascites and splenomegaly or anasarca, that is good.²⁹

²⁸ If the gall is dispersed externally, that presumably means it drains externally. If it is dispersed under the skin, presumably its appearance is that of jaundice, and its dispersion and excretion will be through sweat.

²⁹ If in this paragraph κοιλίη refers to the bowel (no κάτω, no ἄνω), all three statements can be viewed as correct in their essentials. Alternatively, the last statement seems unreasonable unless the point is to compare a group of chronic medical problems with two kinds of acute ones, the

d. ἐρυσίπελας ἥν ἔξω κατακεχυμένον ἔσω
 abscess should external be flowing forth internally
 τράπηται, κακόν· ἔσω δὲ κατακεχυμένον ἔξω
 is turned, bad; internal but be flowing forth externally
 τραπήναι, ἀγαθόν.
 to be turned, good.

Should a superficial abscess burrow internally, that is bad, but should a deep abscess drain externally, that is good.

e. διαρροίη δ' ἐχομένῳ ἰσχυρῇ ἄνω ἔμετος γενό-
 diarrhea having severe vomiting developing
 μενος, ἀγαθόν.
 good.

If a patient with severe diarrhea develops vomiting, that is good.³⁰

f. γυναικὶ αἷμα ἐμεουσι τὰ καταμήνια ῥαγῆσαι,
 in a woman blood be vomiting the menses suddenly flow,
 ἀγαθόν· ὑπὸ ῥόου δὲ πιεζομένη ἐς τὰς ῥίνας ἢ εἰς
 good; and concerning the flowing being pressed in the nostril or inside
 τὸ στόμα μεταπισεῖν τὸν ῥόον, ἀγαθόν· γυναικὶ
 the mouth to abruptly change [presumably "decrease"] the flow, good; in women
 ὑπὸ σπασμοῦ ἐχομένη ἐκ τόκου πυρετὸν ἐπιγενέ-
 from a convulsion having after delivery fever to develop
 σθαι, ἀγαθόν· καὶ τετάνου ἔχοντος καὶ σπασμοῦ
 good; and tetany having or a convulsion
 πῦρ ἐπιγενέσθαι, ἀγαθόν.
 fever be superimposed, good.

If a woman is vomiting blood and the menses suddenly flow, that is good; as for the flow, if being pressed on the nose or inside the mouth the flow decreases, that is also good; if a

consequences being a delayed death in the former but a speedy death in the other two. Put another way, here the practitioner is faced with a patient who has disturbed bowel function, and he wishes to help the patient by letting him know what outcome is to be expected. If the patient has ascites and splenomegaly or anasarca, the physician knows that diarrheas are rather common in advanced cirrhosis of the liver and often are not a threatening complication. But if the patient has pleuritic chest pain, pneumonia, empyema of the chest, or abdominal abscess, a disordered bowel is unexpected, and may be a serious and possibly terminal complication, especially if the chest problem happens to be tuberculosis.

³⁰ The presence of both vomiting and diarrhea will, most of the time, prove to be a self-limiting gastroenteritis, whereas severe diarrhea by itself may indicate a more dangerous bowel lesion, an invasive enterocolitis such as amebiasis, or other serious process.

woman develops fever from a convulsion occurring after delivery, that is good; and having tetany or a convulsion and then developing a fever, that is good.³¹

g. τὰ τοιαῦτα δι' οὐδεμίαν οὔτε ἀμαθίην οὔτε
these through not at all neither ignorance nor
σοφίην ἰητρῶν. γίνεται τε καὶ οὐ γίνεται, ἀλλ' ἀπὸ
wisdom of the physician occurs or does not occur, but from
τοῦ αὐτομάτου καὶ ἀπὸ ἐπιτυχίης, καὶ γενόμενά
spontaneity and from happenstance, and becomes
τε ὠφελέει ἢ βλάπτει καὶ οὐ γενόμενα ὠφελέει ἢ
it benefits or it harms and not occurring it benefits or
βλάπτει κατὰ τὸν αὐτὸν λόγον.
harms according to its own nature.

These events [*i.e.*, their concatenation] never occur because of wisdom or ignorance of the physician, but spontaneously and by chance, and when they develop they benefit or harm according to their nature.

8. Inevitably when treating a disease some correct actions of a physician will be followed by either desirable or undesirable chance events in apparently unrelated situations. When some inevitably unfavorable events occur or if the response is favorable but attended with discomfort the physician often receives blame from those who have limited knowledge of medicine. The same lack of knowledge can lead to unrealistic expectations.

a. ἐπιτυχίῃ δὲ τὰ τοιάδε οἱ ἰητροὶ ποιοῦσιν
by happenstance but such events the physicians produce

³¹ This paragraph's first clause has no clinical support. Furthermore, a woman vomiting a large enough volume of blood to require comment must have been quite an unusual event in a society where women rarely drank alcohol, and to have sufficient number of such patients so that even a loose association with menstruation and subsequent improvement could be made is inconceivable.

If epistaxis, whether anterior or posterior, is stopped by applying pressure and the swallowing of blood ceases, it means that if the vomiting of blood also ceases the cause of hematemesis was epistaxis, which would indeed have been good. The question here is, how did the physician apply pressure inside the mouth? Posterior packing that presses on a bleeding artery might have been attempted inside the mouth and well may have been effective, but its technique is not given. Sufficient pressure on the soft palate might temporarily slowed bleeding.

A convulsion with or after delivery could have been due to eclampsia, a disorder that, if untreated, can be fatal in up to a third of mothers who develop it and to a third of fetuses if it develops before delivery. If fever is also present it suggests the diagnosis is not eclampsia and that another cause of convulsions must be present that may not be as dangerous.

Tetanus generally does not cause fever, nor do seizures from structural lesions in the brain, so if fever there probably is another diagnosis; it may be that tetanic muscle spasms have led to aspiration of gastric contents into the lungs, thus causing a fever, but this is better than the disease "tetanus," which was usually lethal. And fever following a convulsion is also often due to aspiration and this is better than fever before a convulsion (suggesting meningitis) or no fever at all (suggesting seizures are from a structural lesion that might be incurable.)

ἐν τῇ θεραπείῃ ἀγαθὰ· ἄνω φάρμακον δόντες κα-
 by means of the treatment good; oral medicine giving they
 θαίρουσι καὶ ἄνω καὶ κάτω καλῶς· καὶ γυναικὶ
 clear out both orally or rectally thoroughly; and in a woman
 φάρμακον δόντες κάτω χολῆς ἢ φλέγματος, ἐπι-
 medicine giving vaginally for gall or mucus, the
 μύηια οὐ γινόμενα κατέρρηξαν· καὶ σπλῆνα ἔμ-
 menses not developing [begin] flowing; and splenic abscess
 πυον ἔχοντι κάτω φάρμακον δόντες ὥστε χολὴν
 having rectally medicine giving so that gall
 καὶ φλέγμα καθῆραι, πύον κάτω ἐκάθηραν ἐκ τοῦ
 and mucus is cleared out, pus rectally being cleared from the
 σπληνός καὶ ἀπῆλλαξαν τῆς ηῤύσου· καὶ λιθιῶντι
 spleen and getting rid of the disease; and in those with stones
 φάρμακον δόντες, τὴν λίθον ἐς τῶν οὐρητῆρα
 medicine giving, the stone into the ureters
 προέωσαν ὑπὸ βίης τοῦ φαρμάκου, ὥστε ἐξουρη-
 predicting according to the strength of the medicine, so that
 θῆναι· καὶ πύον ἔξοντι ἐν τῇ ἄνω κοιλίῃ ἐν φύ-
 it will be expelled in the urine; and pus having in the chest in
 ματι, οὐκ εἰδότες ὅτι ἔχει, δόντες ἄνω φάρμακον
 a swelling, not seeing what he has, giving oral medicine
 ὃ τι φλέγμα καθαίρει, ἐξ οὖν ἔμεσε τὸ πύον καὶ
 which some mucus clears out, from [it] then he vomits the pus and
 ἐγένετο ὑγιής· καὶ ἐκ φαρμάκου ὑπερκαθαίρό-
 becomes healthy; and from medicine being cleared out
 μενον ἄνω θεραπεύοντες, καταρραγείσης τῆς
 in those being treated orally, flow down from the
 κοιλίης ἀπὸ τοῦ αὐτομάτου, ὑγιέα ἐποίησαν τοῦ
 chest spontaneously, health being made by the
 ἐμέτου.
 vomiting.

And it can also be by happenstance that physicians produce good [results] in their treatments; giving medicine orally might thoroughly clear out [the patient] both orally and rectally; and giving a medication vaginally to a woman for gall or mucus-induced disease might reverse amenorrhea; and giving medicine rectally to clear out gall or swelling can, in a patient with a collection of pus associated with the spleen, release the pus associated with the spleen and get rid of the disease; and giving medicine to someone with [urinary] stones they [the stones] can, according to the strength of the medicine, proceed to be expelled in the urine; and in someone with a collection of pus in the chest unbeknownst to the physician, the giving of oral medicine to clear out fluid might be followed with vomiting of pus and return to health; and from the clearing out by oral medication, a catarrh may flow spontaneously from the chest, producing health by the vomiting.

b. κακά δὲ τάδε ἀπεργάζονται ἀπὸ ἀτυχίης·
 bad and the following are accomplished by happenstance;
 φάρμακον δόντες ἄνω χολῆς ἢ φλέγματος, φλέβα
 medicine giving orally for gall or swelling, vessels
 ἐν τοῖσι στήθεσιν ἔρρηξαν ὑπὸ τοῦ ἐμέτου, οὐδὲν
 in the chest having broken forth from the vomiting, nothing
 ἔχοντος πρόσθεν ἄλγημα ἐν τῷ στήθει φανερόν,
 having before pain in the chest appears,
 καὶ ἐγένετο νοῦσος· καὶ γυναικὶ ἐν γαστρὶ ἐχούσῃ
 and develops a disease; and in a woman pregnant should she
 ἄνω φάρμακον δόντες, κάτω ῥαγεῖσα ἡ κοιλίη ἐξ-
 oral medicine be given, explosive diarrhea the bowel
 ἔτρωσε τὸ ἔμβρυον· καὶ ἔμπυον θεραπεύοντι κοι-
 miscarries the fetus; and a collection of pus being treated the
 λίη ῥυεῖσα διαφθείρει· καὶ ὀφθαλμοὺς θεραπεύοντι
 bowel flowing he dies; and of the eye treating
 καὶ ὑπαλείψαντι ὀδύναι ἐνέπεσον ὀξύτεραι, καὶ ἦν
 and [salve] being thinly applied tenderness strikes more severe, and should
 οὕτω τύχη, ῥήγνυται τε ὁ ὀφθαλμὸς καὶ ἀμαυροῦ-
 this happen, it ruptures or the eye loses
 ται, καὶ αἰτιῶνται τὸν ἰητρὸν, ὅτι ὑπήλειψεν·
 vision, and they can blame the physician, because he rubbed it;
 καὶ λεχοῖ γαστροῦ ὀδύνης ἦν δῶ τι ὁ ἰητρὸς καὶ
 and to a woman during childbirth for abdominal tenderness should something give the
 physician and
 κακῶς ἔχη ἢ καὶ ἀπόληται, ὁ ἰητρὸς αἷτος.
 badly it becomes or the patient dies, the physician [gets] the blame.

The following are bad consequences [of therapy] that can occur by happenstance; medicine given orally for gall or mucus, because of the vomiting a copious flow from the chest [*i.e.*, from the bronchial tree] occurs, or, having no prior [chest] symptoms, pain in the chest appears and a disease develops; and should oral medicine be given to a pregnant woman and explosive diarrhea occur the fetus be miscarried; and when a collection of pus is being treated the patient can die from flowing of the bowel; and in treating the eye (a conjunctivitis) and applying an ointment tenderness [of the eye] becomes more severe, and should this happen the eye suddenly worsens and loses vision, they might blame the physician because he treated it; and should the physician give something to a woman at childbirth for abdominal tenderness and the problem worsens or [the patient] dies, the physician is blamed.³²

³² The last clause is a pregnant statement, for it may be specifically referring to tenderness, ὀδύνη, rather than to the cramping pain that normally accompanies delivery or to abdominal pain as a symptom expressed by the patient. This suggests that the physician has spotted, on physical examination of the abdomen, a complication at or near the time of delivery that necessitates treatment, for in general physicians are cautious about impeding a normal delivery by giving potent pain medications or anesthesia that might prevent normal uterine contractions or cause them to cease. Perhaps this is an overinterpretation by the author, but if it is not an overinterpretation it

c. σχεδὸν δέ, ὅσα ἀνάγκας ἔχει ὥστε γίνεσθαι ἐν
 for the most part, whatever necessarily it has so that to develop in
 τοῖσι νοσήμασι καὶ τρώμασι κακὰ ἐπὶ κακοῖσι,
 the diseases or trauma bad superimposed on bad,
 τὸν ἱητρὸν αἰτιῶνται τούτων γινομένων, καὶ τὴν
 the physician might be blamed for their occurrence, and the
 ἀνάγκην τὴν τὰ τοιαῦτα ἀναγκάζουσιν γίνεσθαι
 necessity the the same being inevitable to occur
 οὐ γινώσκουσιν. καὶ ἦν ἐπὶ πυρέσσοντα ἢ τρώμα
 they may not know. and should superimposed on the febrile or trauma
 ἔχοντα ἐσελθὼν καὶ προσενέγκας τὸ πρῶτον μὴ
 having going in and offering the first not
 ὠφελήσῃ, ἀλλὰ τῇ ὑστεραίῃ κάκιον ἔχῃ, τὸν
 be beneficial, but later bad it will be, the
 ἱητρὸν αἰτιῶνται· ἦν δ' ὠφελήσῃ, τοῦτο δὲ οὐχ
 physician might be blamed; should but it be beneficial not
 ὁμαλῶς ἐπαινέουσιν· χρεὼν γὰρ πεπονθέναι αὐτὸν
 evenly they praise; greater for to have been suffered it
 δοκέουσιν. τὰ δ' ἔλκεα φλεγμαίνειν καὶ ἐν τῇσι
 they seem. the wounds to irritate and in the
 νοῦσοισιν ἔστιν ἥσιν ὀδύνας γίνεσθαι, ταῦτα δὲ οὐ
 diseases it is to be tender to become, these not
 δοκέουσι χρεὼν εἶναι γίνεσθαι αὐτοῖσιν, οὐδὲ τὰ
 they believe necessary to be to develop in them, nor the
 τοιάδε ὥστε γίνεσθαι· νεῦρον ἢ διακοπῇ μὴ ξυμ-
 these so that will become; tendon/nerve should be transected not
 φῦναι μὴδὲ κύστιν μὴδ' ἔντερον, ἢ ἡ τῶν
 rejoin nor the bladder nor the small bowel, should it be of the
 λεπτῶν, μὴδὲ φλέβα αἰμόρροον μὴδὲ γνάθου τὸ
 smaller, nor vessels hemorrhage nor the mandible the
 λεπτὸν μὴδὲ τὸ ἐπὶ τοῦ αἰδοίου δέρμα.
 nor the skin over the genitals.

For the most part, those things that seem inevitably to develop in diseases and trauma that make bad things worse, the physician is blamed for their occurrence, for should the same things always occur, *i.e.*, are part of the usual course of those diseases, they [laymen] will not know the difference. And should [the physician's] first attempts treating fevers or trauma not be beneficial and later matters worsen, the physician is blamed; but should it be beneficial they [laymen] are inconsistent in their praise; for they seem to think they have suffered more than necessary. And for wounds to become irritated and diseases to be associated with tenderness, this they don't believe is necessary in their development, nor that they will become so; [they also think that] a tendon, bladder, or small bowel, if

would explain a course of action by the physician that, had there been a bad outcome, was less likely to have been the consequence of a poor clinical decision. It would change the writer's emphasis on what at first reading appears to be a mundane and unsatisfactory excuse for bad outcomes to a defensible statement relevant to clinical decisions.

transected, should rejoin, also bleeding vessels, a fractured mandibular ramus and skin over the genitals.

9. The writer points out that optimal times of treatment have not always been determined. In addition, it is not correct to say one thing and do another, or to advise action when there is insufficient knowledge.

ἀρχὴ δὲ ἰήσιος ἀποδεδειγμένη μὲν οὐκ ἔσ-
beginning but of healing being demonstrated is not,
τιν, ἥτις ὀρθῶς ἀρχὴ ἐστὶ πάσης τῆς τέχνης, οὐ-
whatsoever properly at first is of all the profession, not
δὲ δεύτερον οὐδὲν οὐδὲ μέσον οὐδὲ τελευτή· ἀλλὰ
second nor at the middle nor at the end; but
ἀρχόμεθα τε αὐτῆς ἄλλοτε λέγοντες ἄλλοτε ἐρ-
at the beginning of it at one time saying at another time
γάζομενοι, καὶ τελευτῶμεν ὡσαύτως· καὶ οὔτε
doing, and ending the same way; and not
λέγοντες ἀρχόμεθα ἐκ τῶν αὐτῶν λόγων, οὐδ' ἦν
those saying at the outset of their reason, nor should
περὶ τῶν αὐτῶν λέγωμεν, οὐδ' ἐς τοὺς αὐτοὺς
concerning of them should they say, nor in the same
τελευτῶμεν· καὶ ἐργαζόμενοι κατὰ τὸν αὐτὸν
should it finish; and being produced by their own
λόγον οὔτε ἀρχόμεθα ἐκ τῶν αὐτῶν ἔργων οὔτε
reason not being first from their doing nor
τελευτῶμεν ἐς ταυτά.
at the conclusion in this [way].

But the beginning of a treatment has not been demonstrated as to whether it be correctly given if done first, second, midway, or at the end. And to claim it is best done at such-and-such a time but doing it at another time and that it will end in this way or that way is not a product of reason. We should neither be saying the same about it nor concerned about it, either its beginning or its conclusion. It is not the beginning or the conclusion of the process, being instead just the consequence of their own logic.

10. Here the author contrasts truly good medical management with elegant but ornamental techniques.

a. εὐχειρίη δ' ἐστὶ τὰ τοιάδε· ὅταν τις τάμνη
good management therefore is as follows: whenever something be incised
ἢ καίη, μῆτε νεῦρον ταμεῖν μῆτε φλέβα· καὶ ἦν
or cauterized, neither tendon/nerve to cut nor a vessel; and should
ἔμπυον καίη, τυγχάνειν τοῦ πύου, καὶ τάμνοντα
a collection of pus be cauterized, to hit upon the pus, and incising

κατὰ τὸν αὐτὸν λόγον· καὶ τὰ κατήγματα συν-
 according to its nature; and the fractures being
 τιθέναι ὀρθῶς· καὶ ὅ τι ἂν τοῦ σώματος ἐκπέσῃ
 carried out correctly; and when somewhere in the body it protrudes
 ἐκ τῆς φύσιος, ὀρθῶς ἐς τὴν φύσιν τοῦτ' ἀπῶσαι·
 from its nature, correctly according to its nature making it depart;
 ἐμβάλλειν δὲ ἃ δεῖ ἰσχυρῶς, καὶ λαμβάνοντα
 to throw in and that which is necessary especially, and being seized
 πιέζειν, ἃ καὶ ὅσα ἀτρέμα λαβεῖν τε δεῖ, καὶ
 to press, that and whatever quietly to seize what is necessary, and
 λαβόντα μὴ πιέζειν, καὶ ἐπιδέοντα στρεβλὰ μὴ
 being seized not to press, and bandaging twisting not
 ποιεῖν ἐξ εὐθέων, μηδὲ πιέζειν ἃ μὴ δεῖ· καὶ
 be able efficiently, nor to press that which is unnecessary; and
 ψάλλοντα, ὅτου ἂν ψαύῃ, μὴ ὀδύνην παρέχειν ἐκ
 palpating that which should be palpated, not tenderness causing from
 περισσοῦ.
 excessive [palpation].

Good management is expressed as follows: whenever something requires incision or cauterization, to cut neither tendon nor blood vessel; and should a collection of pus be cauterized, to hit upon the pus, and to incise according to its nature (stage of maturation); to manage fractures correctly; that when [a closed or open fracture] protrudes unnaturally, to be able to correct [realign] it; to bring together that which is essential, and to compress what is held; and that which must be held quietly is not to be squeezed, and in bandaging to do so efficiently and without twisting the bandage, and to not compress that which is unnecessary; and in palpating that which is necessary to be palpated to do so with minimal discomfort.

b. ταῦτα μὲν ἐστὶν εὐχειρίῃ· τὸ δὲ τοῖσι δακτύ-
 these therefore are managed well; the but by the fingers
 λοισιν εὐσχημόνως λαμβάνειν ἢ καλῶς ἢ μὴ
 stylishly to grip whether very well or not
 καλῶς ἢ μακροῖς ἢ βραχέσιν, ἢ καλῶς ἐπιδεῖν καὶ
 very well or over a long time or briefly, or easily to bandage and
 ἐπιδέσιος παντοίας, οὐ πρὸς τῆς τέχνης κρίνεται
 bandaging all [kinds of], not before the technique to judge
 εὐχειρίης πέρι, ἀλλὰ χωρίς.
 good management concerning, but separate.

This then is good management; but to stylishly grip with the fingers, whether more or less pleasing or whether protracted or brief, and to stylishly tie all kinds of bandages, good management of technique does not include these and is not to be judged by these, but separately.

11. This paragraph opens a remarkable monologue, as all Sections that follow are either about presumed chest diseases or are relevant to them. Those diseases include upper respiratory tract disorders, pneumonias, lung abscesses, empyemas of chest and abdomen, pleural effusions, and hemothorax, stressing the role of “gall,” “mucus,” and somatic characteristics of patients in determining clinical significance. The monologue implies an overwhelming importance of chest disease and diseases that manifest themselves in some way in the chest on morbidity and mortality at the time of its writing.

ὅσον ἔμπυοι γίνονται τὸν πλεύμονα ἢ
 inasmuch as internal collections of pus develop the lung or
 τὴν ἄνω ἢ τὴν κάτω κοιλίην, ἢ φῦματα ἴσχουσιν
 the chest or abdominal cavities, or palpable/enlarging swellings they have
 εἴτ’ ἐν τῇ ἄνω κοιλίῃ εἴτ’ ἐν τῇ κάτω ἢ ἐν τῷ
 wherever in the chest cavity or in the abdominal cavity or in the
 πλεύμονι, ἢ ἔλκεα εἴσω, ἢ αἷμα ἐμέουσιν ἢ
 lungs, or lesions internal, or blood they vomit or
 πτύουσιν, ἢ ἀλγημά τι ἔχουσιν εἴτ’ ἐν τοῖσι
 spit up, or pains some they have whether in their
 στῆθεσιν εἴτ’ ἐν τοῖσιν ὀπισθεν ἐν τῷ νώτῳ,
 chests or posteriorly in the back,
 πάντα ταῦτα ἴσχουσε, τῶν μὲν ἐν τῷ σώματι
 all these they have, of which in the body
 ἐνέοντων, ἀπὸ χολῆς καὶ φλέγματος, τῶν δ’
 being internal, from gall and mucus, and of the
 ἔξωθεν, ἀπὸ τοῦ ἡέρος ἐπιμιγνυμένου τῷ
 external, from the air being admixed [with gall/mucus?] by means of the
 συμφύτῳ θερμῷ, ἀτὰρ καὶ ἀπὸ πόνων καὶ
 fusing heat, but also from undue exertion and
 τραυμάτων.
 traumas.

Inasmuch as collections of pus involve the lungs or the chest or abdominal cavities, or there are enlarging masses somewhere in the lungs or in the chest or abdominal cavities, or [other] internal lesions, or there is vomiting or coughing up of blood, or whether there are pains in the chest or posteriorly in the back, all of these, the internal [diseases] of the body, stem from gall and mucus, or, if external, occur from its [gall/mucus?] admixture with air by innate heat, or are from physical abuse or trauma.³³

³³ There is little difference in wording between early and late printings of this paragraph, and no obvious difference in meaning. It is a general statement on the mechanism that produces purulence. Its unusual feature is the implication that external lesions can become purulent when air mingles with them at body temperature. If this is correct, presumably the author is posing an analogy with internal purulence whereby gall/mucus first become necrotic and then purulent over time. Could he be implying that the internal transformation of gall/mucus to purulence also requires the presence of air? If so, the air (πνεύμα, pneuma) would have been brought to the involved site by the blood. The fact that “air” goes unmentioned in the remainder of *Diseases I* argues against this interpretation.

1538 Version

ὅπόσοι ἔμπτυοι γίνονται τὸν πλεύμονα, ἢ
 as many as purulent pneumonias develop the lungs, or
 τὴν ἄνω ἢ τὴν κάτω κοιλίην, ἢ φῦματα ἴσχουσιν,
 whether the chest or abdominal cavities, or palpable swellings they have,
 εἴτε ἐν τῇ ἄνω κοιλίῃ, εἴτε ἐν τῇ κάτω, ἢ ἐν τῷ
 whether in the chest or in the abdomen or in the
 πλεύμονι, ἢ ἔλκεα ἐνωθεν (ἐνδοθεν-from within), ἢ αἷμα ἐμέουσιν ἢ
 lungs, or lesions from within, or blood they vomit or
 πτύουσιν, ἀλγημά τι ἔχουσιν, ἢ ἐν τοῖσι
 expectorate, [or] pain some they have, whether in the
 στήθεσιν ἢ ἐν τῷ νώτῳ,
 chest or in the back,
 ταῦτα πάντα ἴσχουσε. τῶν μὲν ἐν τῷ σώματι
 all these they have. therefore the in the body
 ἐνεόντων, ἀπὸ χολῆς καὶ φλέγματος. τῶν δὲ
 interior, from gall and mucus. but the
 ἑξωθεν, ἀπὸ τοῦ ἡερος ἐπιμιγνυμένου τῷ
 external, from the air being admixed [with gall/mucus?] by
 συμφύτῳ θερμῷ καὶ ἀπὸ πόνων καὶ
 fusing heat and from undue exertion and
 τραυμάτων.
 trauma.

Inasmuch as collections of pus involve the lungs or the chest or abdominal cavities, or there are palpable masses in the lungs or in the chest or abdominal cavities, or [other] internal lesions, or there is vomiting or coughing up blood, or whether there are pains in the chest or in the back, all of these, being internal, stem from gall and mucus, or, if external [on the body surface and open to the air], occur from the admixture of air [with gall/mucus] by means of fusing heat, or are from physical abuse and trauma.

12. This is about περιπλευμονία (acute nonpyogenic parenchymal lung disease, herein called “nonpurulent pneumonia”) and an overview of its complication, ἐμπυός (acute pyogenic parenchymal lung disease, herein called “purulent pneumonia”).

καὶ ὅσοι μὲν τὸν πλεύμονα ἔμπτυοι γίνον-
 and as many as the lungs purulent pneumonia
 ται, ἀπὸ τῶνδε γίνονται· ἢν περιπλευμονίῃ λη-
 develop, but from what they develop; should by nonpurulent pneumonia
 φθεῖς μὴ καθαρῇ ἐν τῇσι κυρίησιν ἡμέρησιν,
 being seized it not clear out by the proper day,
 ἀλλ’ ὑπολειφθῇ ἐν τῷ πλεύμονι πύον τε καὶ
 but in being left behind in the lungs pus and

φλέγμα, ἔμπυος γίνεται· καὶ ἤν μὲν αὐτίκα θε-
 mucus, purulent pneumonia causes; and should promptly
 ραπευθῇ, διαφεύγει ὥς τὰ πολλά· ἤν δ' ἀμεληθῇ,
 it be treated, escape most; but should it be neglected,
 διαφθείρεται, διαφθείρεται δὲ ὧδε· τοῦ φλέγμα-
 it can kill, and it kills thus; of the mucus
 τος ἐν τῷ πλεύμονι ἐνισταμένου τε καὶ σηπομέ-
 in the lungs becoming congealed and
 νου ἐλκοῦται τε ὁ πλεύμων καὶ διάπυος γίνεται,
 necrotic it damages/ulcerates the lungs and suppuration occurs,
 καὶ οὐτ' ἔτι ἔσω ἔλκει ἐς ἑωυτὸν ὃ τι καὶ ἄξιον
 and no longer inside it attracts into itself that which and worthy
 λόγου τῆς τροφῆς, οὐτ' ἔτι ἀποκαθαίρεται ἀπ'
 of a word of nutrition, no longer it is cleared out from
 αὐτοῦ ἄνω οὐδέν. ἀλλὰ πνίγεται τε καὶ δυσπνοεῖ
 itself upwardly nothing, but he chokes/suffocates and he is
 αἰεὶ ἐπὶ μᾶλλον, καὶ ῥέγκει ἀναπνέων, καὶ ἀνα-
 always short of breath progressively, and he has stertorous inspiration, and
 πνεῖ αὐτόθεν ἄνωθεν ἐκ τῶν στηθέων· τέλος
 he inspires upper from the chest; at the end
 δὲ ἀποφράσσεται ὑπὸ τοῦ πτύσματος καὶ ἀπο-
 and it is closed off by the sputum (unexpectored mucus) and
 θνήσκει.
 he dies.

As many as develop pneumonia, how does it happen? If nonpurulent pneumonia occurs and has not cleared out by the expected day but pus and mucus remain behind in the lungs, the pus accumulates; if the patient is promptly treated he usually escapes; but should it be neglected it can be lethal, and it kills thus; the mucus in the lungs congeals and necroses, thereby injuring the lungs and causing [more] suppuration, and no longer does it [the lungs] extract into itself that which is worthy of the term nutrition, and no longer is it [the lungs] cleared out by coughing. Instead, the patient chokes/suffocates and he is evermore dyspneic, exhibits stertor on inspiration, and breathes in from the upper chest; terminally [the airway] is closed off by all the mucus and he dies.³⁴

³⁴ This patient's acute nonpyogenic parenchymal lung disease, here called "nonpurulent pneumonia," might have been a bad cold with cough, congestive heart failure, or viral pneumonia, all of which would tend to have a prominent dry hacking cough, but it evolved into pyogenic pneumonia. Note that necrosis of congealed mucus is injurious to the lungs and leads to more pus. All that is missing is a germ theory as the source of the initial respiratory problem, but see (11) above. Here the examiner must have used immediate auscultation and when he applied his ear to the chest he heard air movement only in upper chest. And the congealed mucus he mentions suggests insight on gross anatomic changes that occur in lung tissue that has become pneumonic. Postmortem examination of the lungs would have revealed heavy, dense, uncollapsed, fluid-filled, and perhaps bloody lung segments, their appearance often likened to "hepatization" (the gross appearance of pneumonic congestion can bear some resemblance with the cut appearance of a lobe of the liver).

13. The Hippocratics considered that not all pneumonias began as a nonpyogenic pulmonary disease such as nonpurulent pneumonia. The following is about a purulent pneumonia and its development from a respiratory catarrh.

γίνεται δ' ἔμπυος καὶ ἦν ἀπὸ τῆς κεφα-
occurs purulent pneumonia and should from the head
λῆς φλέγμα οἱ καταρρυῇ ἐς τον πλεύμονα. καὶ
mucus flow down into the lungs. and
τὸ μὲν πρῶτον ὡς τὰ πολλὰ λανθάνει καταρρέον,
at first for the most part it escapes notice flowing down,
καὶ βῆχά τε παρέχει λεπτήν καὶ τὸ σίελον πικρό-
and cough it brings slight and the saliva acidic
τερον ὀλίγῳ τοῦ ἐωθότος καὶ ἄλλοτε θέρμην
a bit from the accustomed....and sometimes the heat
λεπτήν· ὅταν δὲ ὁ χρόνος προίη, τρηχύνεται τε
a bit; but whenever the time goes by, it becomes rougher
ὁ πλεύμων καὶ ἐλκοῦται ἔσωθεν ὑπὸ τοῦ φλέγ-
the lungs and is damaged internally from the
ματος ἐνισταμένου καὶ ἐνσηπομένου, καὶ βάρος τε
mucus becoming congealed and necrotic, and heaviness
παρέχει ἐν τοῖσι στήθεσι καὶ ὀδύνην ὀξέην καὶ
brings in the chest and tenderness severe both
ἔμπροσθεν καὶ ὀπισθεν, θέρμαι τε ὀξύτεραι ἐμπί-
anteriorly and posteriorly, heat and severe abruptly
πτουσιν ἐς τὸ σῶμα· καὶ ὁ πλεύμων ὑπὸ τῆς θερ-
appears in the body; and the lungs because of the
μασίης ἄγει ἐς ἑωυτὸν ἐκ παντὸς τοῦ σώματος
local heat leads into itself from the entire body
φλέγμα, καὶ μάλιστα ἐκ τῆς κεφαλῆς· ἡ δὲ κε-
mucus, and especially from the head; thus the
φαλή θερμαινομένη ἐκ τοῦ σώματος· καὶ τοῦτο
head is being heated from the body; and this
σηπόμενον πτύει ὑπόπαχυν· ὅσῳ δ' ἂν ὁ χρόνος
being necrosed he expectorates a bit thicker; and in whom the time
προίη, εἰλικρινὲς πύον πτύει, καὶ οἱ πυρετοὶ ὀξύ-
earlier pure pus he expectorates, and the fevers more
τεροὶ γίνονται, καὶ ἡ βῆξ πυκνή τε καὶ ἰσχυρή,
severe, become, and the cough frequent and severe,
καὶ ἡ ἀσιτίη διακναίει· καὶ ἡ κοιλίη ἡ κάτω τα-
and the anorexia wears away; and the abdomen lower
ράσσεται, ταρασσεται δὲ ὑπὸ τοῦ φλέγματος· τὸ
is disordered, but is disordered because of mucus; the
δὲ φλέγμα ἐκ τῆς κεφαλῆς καταβαίνει. οὗτος,
mucus from the head descends. thus,
ὅταν ἐς τοῦτο ἀφίκηται, ἀπόλλυται· ἀπόλλυται
whenever into this it is extended, he dies; he dies

δὲ, καθάπερ ἐν τοῖσι πρόσθεν εἴρηται, διαπύου
 and just as previously it was said, suppuration
 τοῦ πλεύμονος γενομένου ἢ τῆς γαστρὸς ῥυείσης
 of the lung developing or of the bowels flowing
 κάτω.
 below.

Should mucus flow from the head into the lungs a purulent pneumonia can develop. At first it for the most part escapes notice while flowing down, and then a slight cough comes along and the saliva/mucus tastes a bit acidic and sometimes there is a bit of heat; then, as time goes forward, the lungs become abraded and are internally damaged from the mucus as it congeals and necroses, and heaviness and extreme tenderness emerge in the anterior or posterior chest, and severe heat abruptly appears in the body; the lung, because of the heat, attracts mucus into itself from the entire body, especially from the head; thus the head is being heated by the body; and as this [the lung] becomes necrotic the expectoration is thicker; going forward in time the patient will expectorate pure pus, the fever increases, the cough becomes more frequent and severe, anorexia leads to cachexia, and the bowel becomes disordered because of the mucus which descends from the head. When it has spread thus, the patient dies. And he dies, just as previously stated, from [mucus from the head] bringing suppuration to the lungs and looseness to the bowels.³⁵

14. Pneumonia continued: this includes a complication caused by vascular erosion and manifested as hemoptysis. Features of its description strongly suggest that pulmonary tuberculosis was not able to be differentiated from the usual bacterial pneumonia, perhaps because the chronic nature of the former was not always apparent to the physician if patients had no repeat visit. Thus, the descriptions of active tuberculosis were included under the rubric of pneumonia. This would explain some events that were very atypical for the usual bacteria (purulent) pneumonia.

a. γίνεται δὲ καὶ ἀπὸ τῶνδε ἔμπυος ὁ πλεύ-
 it develops thus and from the purulent pneumonia the
 μων· ὅταν τι τῶν ἐν αὐτῷ φλεβίων ῥαγῇ, ῥήγνυ-
 lungs; whenever some of the blood vessels burst, it
 ται δὲ ὑπὸ πόνων, καὶ ὅταν ῥαγῇ, αἰμορροεῖ τὸ
 it flows from weakness [of the vessel wall], and whenever it bursts, bleeds the
 φλέβιον· καὶ ἢν μὲν παχύτερον ᾖ, μᾶλλον, ἢν δὲ
 vessel; and should it thicker [arterial?] be, rather, should but
 λεπτότερον, ἥσσον· καὶ τὸ μὲν παραυτίκα τοῦ
 [it be] thinner [venous?], less; and immediately of the

³⁵ Community-acquired pneumonia is caused by inhaled or upper airway organisms (viruses or bacteria) becoming established deep into lung parenchyma, which is normally sterile. This triggers inflammation as the body fights the infection, and fluid exudes into alveolae and bronchioles. In this paragraph the problem is upper airway mucus draining into the lungs causing pneumonia. But normally the “post-nasal drip” is swallowed, not aspirated into the lungs, so causal attribution to upper airway “phlegm” is not entirely accurate.

αἵματος πτύει· τὸ δέ, ἢν μὴ στεγνῶθῃ ἢ φλέψ,
 the blood he expectorates [*i.e.*, acute hemoptysis]; and should not be sealed off the vessel,
 χεῖται τε εἰς τὸν πλεῦμονα καὶ σήπεται ἐν αὐτῷ,
 it [the blood] is received into the lung and becomes necrotic in it,
 καὶ ὅταν σαπῇ, πύον πτύει, προιόντος δὲ τοῦ
 and whenever it be necrotic, he expectorates pus, and going forward
 χρόνου ἄλλοτε πύον εἰλικρινές, ἄλλοτε πύον
 at one time pus pure, at another time the pus with some
 ὕφαιμον, ἄλλοτε αἷμα. καὶ ἢν μᾶλλον πληρωθῇ
 admixed blood, at another time [just] blood. and if more than full
 τὸ φλέβιον, ἀπεμεί τὸ πλήρωμα ἀφ' ἐωυτοῦ ἀλὲς
 the blood vessel, he vomits up the excess from himself an accumulation
 τοῦ αἵματος, τὸ δὲ πύον πτύεται παχὺ ὑπὸ τοῦ
 of blood, and the pus he expectorates thick because of the
 προσγινόμενου καὶ ἐσηπομένου φλέγματος.
 foregoing and necrotizing mucus.

And this is how the lungs react to the preceding purulent pneumonia: whenever a part of the blood vessel is eroded, the erosion causes weakness [of the vessel wall], and so whenever it (the pus) erodes a blood vessel, the vessel wall weakens and the vessel bleeds. Should the vessel have a thick wall [*i.e.*, an artery] it bleeds more, whereas a thin-walled vessel [*i.e.*, a vein] bleeds less. [Upon eroding the vessel wall] the patient immediately expectorates blood [*i.e.*, acute hemoptysis]; and if the vessel does not seal itself the blood collects in the lung and becomes necrotic and [as a consequence] the patient expectorates pus. Over time the expectorate can be pure pus, at another time here can be both pus and blood, or just blood. If a blood vessel is very full/distended [because of excess blood], the patient will vomit up the excess mass of blood from himself. This causes the expectorated pus and necrotic mucus to be thick.³⁶

b. οἷτος ἢν καταληφθῇ ἀρχομένου τοῦ νοσήμα-
 thus should it be checked the beginning of the
 τος πρὶν ἢ τὴν φλέβα αἱμορροεῖν ἢ χαλᾶν ἰσχυ-
 disease before the vessel to bleed or neglecting

³⁶ This paragraph primarily discusses hemoptysis as a complication of pneumonia, noting its origin from eroded blood vessels, which is correct. It is the pus that causes the erosion of the vessels. But massive hemoptysis is rare in pneumonia and in lung abscess. The latter especially tends to be a more local and walled-off process. But there are frequent causes of hemoptysis: tuberculosis, including tuberculous bronchiectasis, and other types of bronchiectasis. In discussing hemoptysis as a manifestation of pneumonia it is likely that the Hippocratics have inadvertently included pulmonary tuberculosis, a more prolonged illness and one that often progresses to cachexia, which is not the case with the usual patient with an acute pneumonia, whether purulent or nonpurulent.

Thick and thin-walled would seem an appropriate translation for comparing arteries and veins, but in the pulmonary vasculature the pulmonary artery, being under low pressure, is thin-walled compared to arteries elsewhere in the body of like size, so perhaps “size” rather than “thickness” is the better translation. The largest, and also the shortest, would be the pulmonary artery. Finally, here it is blood rather than mucus that becomes necrotic and turns to pus, and gall goes unmentioned.

ρῶς, καὶ πρὶν ἢ λεπτυνθῆναί τε καὶ κλινοπετῇ
 seriously, or until he becomes cachectic and bedridden
 γενέσθαι καὶ τὴν κεφαλὴν ἄρξασθαι φθίνειν καὶ
 becomes and the head first to begin to waste away and
 τὸ ἄλλο σῶμα τήκεσθαι, ἐξάντης γίνεται. ἤν δ'
 the rest of the body to weaken, an improvement (a rising up) occurs. but should
 ἀμεληθῇ καὶ ταῦτα καταλάβῃ, ὥστε παθεῖν ἢ
 be neglected and this become established, so that to suffer if
 πάντα ἢ τὰ πλεῖστα, ἀπόλλυται· ἀπόλλυται δὲ
 all or most will die; and will die
 οὗτος ἢ ὑπὸ τῶν αὐτῶν ἃ εἶρηκα ἐν τῇ πρόσθεν,
 those if from these which have been seen at the onset,
 ἢ ὑπὸ ἐμέτου αἵματος πολλοῦ καὶ πολλάκις
 or from those vomiting much blood or frequently vomiting.
 ἐμευμένου.

This, therefore, should be confronted rather than neglected at the beginning of the disease before there is bleeding from blood vessels and before the patient becomes thin and bedridden, before the head displays temporal wasting and the rest of the body becomes cachectic, improvement occurs. But should the changes be neglected and the [disease] become established, then most patients will die, especially those in whom it [the “bleeding from blood vessels” as expressed as hemoptysis] is seen early in the course of the disease or from [those] vomiting much blood or are frequently vomiting.³⁷

c. ἤν δὲ τὸ φλέβιον παντάπασιν μὲν μὴ διαρρα-
 but should the vessel entirely not cut
 γῇ, σπαδῶν δ' ἐν αὐτῷ ἐγγένηται, γίνεται δὲ μά-
 through, but deteriorating in itself [“by the pus”?] develops, occurs most
 λιστα οἶον κιρσός, ὃ παραυτίκα ἐν ὅταν γένηται
 like a hematoma, which promptly wherever it may occur
 ὀδύνην τε παρέχει λεπτὴν καὶ βῆχα ξηρὴν. ἤν
 tenderness it brings slight and a dry cough. but
 δὲ χρονίση τε καὶ ἀμεληθῇ, διαδιδοῖ αἷμα, τὸ μὲν
 should over time it be neglected, can spread blood, at
 πρῶτον ὀλίγον καὶ ὑπομέλαν, ἔπειτα δὲ ἐπὶ
 first a little and a bit dark, thereafter but
 πλέον τε καὶ εἰλικρινέστερον, καὶ πάσχει τε
 more and pure, and it afflicts
 ὅσαπερ ἐν τῇ πρόσθεν εἴρηται.
 just as in the earlier discussion.

³⁷ Here the bleeding from eroded blood vessels is identified as the cause of a more chronic and debilitating illness, suggesting that intermixed with the usual pneumonias were patients with tuberculosis (as mentioned in previous footnote), or perhaps mitral stenosis, bronchiectasis of various etiologies, and perhaps even congestive heart failure, all of which can at times exhibit hemoptysis. On a single visit a Hippocratic physician would often have had difficulty differentiating community-acquired pneumonia from them.

Should a blood vessel not be transected [through and through] [by the pus?] but merely torn, usually a hematoma promptly develops which is slightly tender and [causes] a dry cough. Should this be neglected the blood can extend further, at first just a small amount and dark but later more and [redder], and it afflicts the patient as described earlier.³⁸

d. ξυμφέρει δὲ τοῖσι τοιούτοισιν, ἣν κατ' ἀρχὰς
it is beneficial in them who have this, should from the beginning
λάβῃς ὥστε θεραπεύειν, φλέβες ἐξιέμεναι ἐκ τῶν
[they] be attacked so that to treat, of the vessel to be taken out from the
χείρῶν καὶ δίαιτα, ὥφ' ἧς ἔσται ὡς ξηρότατός τε
arms and the diet, so that they would be the most dehydrated
καὶ ἀναιμότατος.
and least blood.

It is beneficial in those with this [problem], should it strike, to treat from the beginning [by] (1) removing [blood] from the vessels of the arms, and (2) diet, so that they will be the most dehydrated and with the least blood (most anemic).³⁹

e. τὸν αὐτὸν δὲ τρόπον τοῦτο καὶ τὰ ἐν τῷ
the same nature this and that in the
πλευρῷ φλέβια πάσχει, ὅσα ἔσω ἀκρόπλοά ἐστιν·
chest wall [blood] vessels it afflicts, so that internally floating on top it is;
ὅταν οὖν πονήσῃ, κίρσοειδέα τε γίνεται καὶ με-
whenever then it distresses, something like a hematoma develops and
τέωρα ἔνδον· καὶ ἣν μὲν ἀμεληθῇ, τὰδε πάσχει·
lifts up internally; and should then it be neglected, this [way] it afflicts;
ἐκρήγνυται, καὶ πτύουσί τε ἀπὸ σφῶν αἷμα, καὶ
it breaks forth externally, and they cough up from them blood, and
ἐνίοτε καὶ ἐμέουσι, καὶ ἔμπυοι γίνονται καὶ ὡς τὰ
sometimes they vomit, and a collection of pus (lung abscess) develops and just as
πολλὰ δε' οὖν ἐφθάρησαν· ἣν δὲ θεραπευθῶσιν ἀρ-
generally then they die; but should they be treated
χομένου τοῦ νοσήματος, πάλιν κατὰ χώραν προσ-
beginning of the illness, again depending on the place it
πίπτει τε πρὸς τὸ πλευρὸν τὰ φλέβια καὶ γίνε-
falls forward toward the chest wall the [blood] vessel and
ται ταπεινά.
occurs a subsidence.

³⁸ A true lung hematoma usually follows chest trauma (lung laceration, not a lung contusion) rather than a pneumonia, but it can be site of abscess formation. Nevertheless, to modern understanding lung hematoma is not an appropriate term, and perhaps this is why οἶον is used here.

³⁹ In other words, in the pneumonic phase look out for evidence that vascular erosion is occurring, for a lung abscess may subsequently develop. Try to head it off by phlebotomy. This preventive approach makes no sense to moderns, but who has tried it?

It is of a nature similar to this that blood vessels afflict the chest wall, so that internally it occurs in the top of the lung [apical]; and when it causes symptoms something like a hematoma develops and internally distends. Should it then be neglected, here is what happens: it ruptures and the patient coughs up blood, sometimes vomiting it [blood], or an accumulation of pus develops and then this kills the patient. But should the patient be treated early in the illness, according to the place the blood vessels collapse against the chest wall, a receding can occur.⁴⁰

f. καὶ ὁ μὲν πλεύμων ἀπὸ τούτων ἔμπυος γίνε-
and the lungs from them purulent pneumonia
ται, καὶ τὰ ἀπ' αὐτοῦ πάσχουσί τε τοιαῦτα καὶ
develops, and that from there they suffer like the foregoing and
τελευτῶσιν οὕτως.
they can terminate thusly [as follows].

Thus, from vascular erosion the lungs accumulate pus, and from the latter patients are sick and, like the foregoing, can die as follows:

15. Here the problem is complications of purulent pneumonia, the chest empyema and a broncho-pleural fistula. ἄνω κοιλία must be stated along with ἔμπυος in order to translate the latter as “chest empyema.”

a. τὴν δ' ἄνω κοιλίην ἔμπυοι γίνονται
the chest cavity collections of pus develop
πολλαχῶς· καὶ γὰρ ὅταν φλέγμα ῥυῇ ἐκ τῆς
frequently; and whenever mucus flows from the
κεφαλῆς ἀλὲς ἐς τὴν ἄνω κοιλίην, σήπεται τε
head as a mass in the chest, is made necrotic
καὶ γίνεται πύον· σήπεται δ' ἐπὶ τῶν φρενῶν
and develops pus; it is necrosed toward the diaphragms
κεχυμένον· σήπεται δ' ἐν ἡμέρησι μάλιστα δυοῖν
flowing forth; and it becomes necrotic during days especially
καὶ εἴκοσι. τοῦτ' οὖν διασείεταί καὶ ἐγκλυδάζεται
twelve to twenty. This then being shaken about and swelling like a wave

⁴⁰ “Top of the lung” is consistent with the common apical presentation of pulmonary tuberculosis, although it can occur with aspiration pneumonia and its complication, an upper lobe abscess. Otherwise, most lung abscesses are in the lower lobes. Thus, this phase of pneumonia probably included patients who had pulmonary tuberculosis but had not yet begun to physically deteriorate to the point of cachexia. It is likely that physical examination (immediate auscultation, with the ear pressed to the chest wall) was performed and/or postmortem observation of an upper chest lesion was identified, for either would have been necessary for the physician to locate the disease process to the upper lobes. Given the nonspecific examination findings in most tuberculous patients and the apparent certainty of apical disease in this description, postmortem examination of some tuberculous patients was probably performed. Apical tubercular lesions are common and for the most part represent “reactivation” tuberculosis a few years after the primary infection has occurred.

τὸ πύον πρὸς τὰ πλευρὰ προσπίπτον· οὗτος ἦν
 the pus against the chest wall falls; this if
 καυθῇ ἢ τμηθῇ, πρὶν ἢ χρονίσει τὸ πύον, ὑγιής
 if it be cauterized or cut, before the pus becomes chronic, good health
 γίνεται ὡς τὰ πολλά.
 occurs usually.

Chest cavity collections of pus (empyemas) develop frequently, for whenever mucus flows in a mass from the head into the chest it [mucus] becomes necrotic and, developing into pus, it flows forth toward the diaphragms. It tends to become necrotic during days 12 to 20. Shaking these patients so that any fluid present flows like a wave causes the pus to fall against the chest wall. If this be cauterized or incised before the pus becomes chronic, good health often occurs.⁴¹

b. γίνονται δὲ τὴν ἄνω κοιλίην ἔμπτυοι καὶ ἐκ
 they develop the chest cavity empyemas and from
 πλευριτίδος, ὅταν ἰσχυρὴ γένηται καὶ ἐν τῇσι
 chest wall disease whenever it becomes severe and by the
 κυρίῃσιν ἡμέρησι μήτε σαπῇ μήτε πτυσθῇ, ἀλλ’
 expected day neither necroses nor is coughed up, but
 ἐλκωθῇ τὸ πλευρὸν ὑπὸ τοῦ προσπεπτωκότος
 is eroded the chest wall by the further maturation
 φλέγματός τε καὶ χολῆς. καὶ ὅταν ἔλκος γένη-
 mucus and gall. and whenever an erosion
 ται, ἀναδίδεται ἀπότε αὐτοῦ ἑωυτοῦ πύον, καὶ
 occurs, it gives off at any time its own pus, and
 ἐκ τῶν πλησίον χωρίων ὑπὸ θερμασίης ἄγει ἐφ’
 from the nearby places by heat guided to
 ἑωυτὸ φλέγμα· καὶ τοῦτο ὅταν σαπῇ, πτύεται
 itself mucus; and this whenever becomes necrotic, he coughs up
 πύον. ἐνίοτε δὲ καὶ ἐκ τῶν φλεβίων διαδιδοῖ ἐς
 pus. sometimes and from the vessels it can spread into
 τὸ ἔλκος αἷμα, καὶ γίνεται σηπόμενον πύον· ου-
 the wound blood, and it occurs being necrotic pus;

⁴¹ Here an empyema is described, coming, like pneumonia, from head mucus, not from a focus of bleeding caused by erosion of a blood vessel. Both blood and mucus, concentrated locally, undergo necrosis and then become purulent, the ἔμπυος. An empyema indeed tends to accompany pneumonia, and a small sterile pleural effusion is often concurrent with today’s pneumonias. Shaking a patient with a suspected empyema (or other type of pleural effusion) was performed to elicit a succession splash, a sound heard when a hollow viscus or cavity containing fluid and air is shaken while the examiner listens with his ear or stethoscope over the suspect area. Usually this section is translated as an enema, and perhaps that is correct. But more likely it is that the writer is describing the consequence of shaking, with the pleural fluid colliding against the chest wall (ἐγκλυδάζομαι) and, at least in the physician’s mind, making any purulence more accessible to drainage. If there were a lavage performed through an incision into the empyema, it would have been so stated.

τος ἦν μὲν παραχρῆμα ὑποληφθῆ, ὑγιὲς γίνεται
 this should immediately be left behind, healthy [patient] becomes
 ὡς τὰ πολλὰ· ἦν δ' ἀμεληθῆ, διαφθείρεται.
 for the most part; but should it be neglected, he can die.

Empyemas (collections of pus occur in the chest cavity) result from chest wall disease whenever it becomes severe and when putrid matter is not coughed up in timely fashion. There is erosion into the chest wall by the mucus as it becomes purulent and by gall. Whenever such an erosive lesion develops, pus can be released from it at any time, and by [its] heat it guides mucus from nearby locations toward itself. Because of this, when it [mucus] becomes putrid the patient coughs up pus. Sometimes blood from vessels can spread into the lesion, pus coming from [necrotic blood]. Should this promptly be removed the patient generally recovers, but should it be neglected, he can die.⁴²

c. γίνονται δ' ἔμπυοι καὶ ἦν φλέγμα ἐκ τῆς
 they develop [purulent] pneumonias and should mucus from the
 κεφαλῆς ῥυὲν πρὸς τὸ πλευρὸν προσπαγῇ καὶ
 head be flowing toward the chest wall [pleura] also may be affixed and
 σαπῇ· τό τε πλευρὸν ὡς τὰ πολλὰ καίεται,
 may necrose; the chest wall generally is [locally] hot,
 καὶ πάσχει ὅσαπερ ἐκ πλευρίτιδος, ὅταν ἔμπυος
 and it affects [it] much the same as from chest wall disease whenever purulent pneumonia
 γένηται.
 develops.

Empyemas [can also] develop should mucus flow from the head toward the chest wall and become necrotic; the chest wall is usually hot [in the region of the empyema], and whenever an empyema strikes it is much the same as chest wall disease.⁴³

d. γίνονται δὲ καὶ ὅταν ὑπὸ ταλαιπωρίας ἢ ἐκ
 they develop and whenever from hard work or from

⁴² Here the empyema is postulated to develop from “chest wall disease” as the primary lesion. The postulation is not correct, but, as stated above, pneumonia is often associated from its onset with a sterile pleural effusion that, if it becomes infected, is termed an empyema. Pleuritic pain is chest wall pain that increases on inspiration. There are many causes of pleuritic chest pain, including pulmonary infarction, ruptured pleural blebs, and certain viral infections that are not pneumonic. A pneumonia will cause pleuritic pain if the pneumonic process extends to the periphery of the lung and inflames the pleura that lines the chest wall. That is what probably happened here, and the paragraph is describing an empyema developing from a pneumonia that eroded through the [visceral] pleural lining of the lungs into the chest cavity; it is accurate. Clubbing of the fingernails is not described, and clubbing is a characteristic of a lung abscess but not an empyema. Gall is mentioned here, but its source is not stated. Presumably it is attracted by heat, just like mucus. It is stated that heat guides additional mucus to the site of the lesion, thus potentially making it worse. The Hippocratics may have thought heating made mucus more fluid, thus facilitating its flow in direction of the heat. With many viscous liquids such is the case.

⁴³ Here the writer describes an empyema caused by the flow of mucus down from the head, but it flows to the chest wall, not the diaphragms. Note that ἔμπυος must mean “empyema” in this context even though ἀνώ is not included.

γυμνασίδης ἢ ἄλλως πως ῥαγῇ ἢ ἔμπροσθεν ἢ
 exercise or other how it can burst forth either in front or
 ὀπισθεν, ῥαγῇ δὲ ὥστε μὴ παραυτίκα πτύσαι
 posteriorly, and it can burst so the not immediately to cough up
 αἷμα, ἀλλ' ἐν τῇ σαρκὶ σπαδὼν γένηται, καὶ ἡ
 blood, but in the muscle deterioration occurs, and the
 σὰρξ σπασθεῖσα εἰρύση ἱκμάδα ὀλίγην καὶ γένη-
 muscle being deteriorated it draws in a little moisture and it becomes
 ται ὑποπέλιος. καὶ παραυτίκα μὲν μὴ αἰσθάνη-
 a bit dark. and promptly then without not perceiving
 ται παθὼν ὑπὸ ῥώμης καὶ εὐεξίης, ἣν δὲ καὶ
 symptoms because of strength and good state of health, but should
 αἰσθῆται, μηδὲν πρᾶγμα ἡγήσεται· οὗτος ὅταν
 it be perceived, no concern will come together; this whenever
 καταλάβῃ ὥστ' αὐτόν ὑπὸ πυρετῶν ληφθέντα
 it seized so that it because by fevers being seized
 λεπυνθῆναι ἢ ποσίων ἢ λαγνείης ἢ ἄλλου του, ἡ
 being thin or drinking or venery or other [things] the
 σὰρξ ἡ τετρωμένη ὑποξηραίνεται τε καὶ ὑποθερ-
 tissues the injured being somewhat dehydrated and
 μαίνεται, καὶ ἔλκει ἱκμάδα ἐς ἑωυτὴν ἀπὸ τῶν
 heated, and it draws fluids into itself from the
 πλησίον καὶ φλεβῶν καὶ σαρκῶν· ὅταν δ' εἰρύση,
 surrounding area both from the blood vessels and in the tissues; but whenever it draws in
 οἰδίσκεται τε καὶ φλεγμαίνει, καὶ ὀδύνην παρέχει
 it becomes swollen and it irritates, and tenderness it brings
 λεπτήν καὶ βῆξα ἀραιήν τε καὶ ξηρήν τὸ πρῶτον,
 slight and cough occasional and dry at first,
 ἔπειτα ἐπὶ μᾶλλον ἔλκει τε ἐς ἑωυτὴν, καὶ ὀδύ-
 and then especially it draws inside itself, and
 νην παρέχει ἰσχυροτέραν καὶ βῆχα πυκνοτέραν·
 tenderness it renders more severe and cough more frequent;
 καὶ πτύει τὸ μὲν πρῶτον ὑπόπυον, ἐνίστε δὲ καὶ
 and the patient expectorates at first a bit of pus, and then
 ὑποπέλιον καὶ ὑφαιμον· ὅσῳ δ' ἂν ὁ χρόνος προίη,
 a little dusky and with a little blood; and in those as time proceeds,
 ἔλκει τε μᾶλλον ἐς ἑωυτὴν καὶ σάπει· καὶ αὐτῆς
 it draws more into itself and necroses; and of this
 τῆς σαρκός, ὅσον πελιδνὸν ἐγένετο τὴν ἀρχήν,
 tissue, whenever it becomes dusky at first
 τοῦτο πᾶν ἔλκος γίνεται, καὶ ὀδύνην παρ-
 this completely damaged becomes, and tenderness
 ἔχει ἰσχυρὴν καὶ πυρετὸν καὶ βῆχα πολλήν τε
 it has severe and fever and cough deep
 καὶ πυκνήν, καὶ τὸ πτύσμα εἰλικρινὲς πτύει
 and frequent, and the pure excrete being examined he coughs up

πύον. ἤν δὲ χρονίση τὸ πύον ἐν τῇ κοιλίῃ, δια-
 pus. should but over time the pus in the chest cavity, being
 θερμαίνεται αὐτοῦ τὸ σῶμα πᾶν, μάλιστα δὲ τὰ
 heated by it the body entire, especially the
 ἐγγυτάτω· θερμαινομένου δὲ τοῦ σώματος ἐκτῆ-
 closest; being heated and the body it
 κεται τὸ ὑγρόν, καὶ τὸ μὲν ἀπὸ τῶν ἄνω ἐς τὴν
 dissipates the moisture, and the from above into the
 ἄνω κοιλίην μάλιστα συρρεῖ καὶ γίνεται πύον
 chest cavity especially it flows in a stream and becomes pus
 πρὸς τῷ ἐνέοντι, τὸ δὲ καὶ ἐς τὴν κάτω κοιλίην
 toward the internal, and in the abdominal cavity
 ῥεῖ, καὶ ἐνίοτε ταράσσεται ἡ κοιλίη ὑπ' αὐτοῦ, καὶ
 it flows, and sometimes is disordered the bowel from it, and
 δι' οὖν ἔφθειρε τὸν ἄνθρωπον. τὰ γὰρ εἰσιόντα
 through then he dies the man. for the admitting
 τῶν σιτίων διαχωρεῖ ἄσηπτα, καὶ τροφή ἀπ'
 of foods passing through [undigested], and nourishment from
 αὐτῶν οὐ γίνεται τῷ σώματι· καὶ ἡ τοῦ πτύσμα-
 them does not occur in the body; and the from the expectorations
 τος ἄνω καθαρσις οὐχ ὁμαλῶς γίνεται, ἅτε δια-
 superiorly cleaning out not balanced becomes, for throughout
 τεθερμασμένης τῆς κοιλίης καὶ ἀγούσης πάντα
 the heating of the cavities and being led out everything
 κάτω ἐφ' ἑωυτὴν· καὶ ὑπὸ μὲν τοῦ πτύσματος
 below from itself; and because of the expectoration
 πνίγεται τε καὶ ῥέγκει οὐ καθαιρόμενος, ὑπὸ δὲ
 it chokes/suffocates and [the patient] has stertorous breathing [airways] not being cleared,
 τῆς γαστρὸς ρεούσης ἐξασθενέει, καὶ ὥς τὰ πολ-
 and from the abdomen flowing [the patient] is utterly weak, and as usually
 λὰ διαφθίρεται.
 happens he dies.

Whenever they [empyemas] develop, somehow, whether from physical misuse or exertion or from some other cause, they can burst forth anteriorly or posteriorly, and should it burst [the patient] may not immediately cough up blood, but breakdown occurs in the muscle, and the muscle, being weakened, attracts mucus and becomes dark [like a bruise]. The patient perceives nothing at this point because of strength and self-control, but should it be perceived he will be led to have no concern because fevers are being neglected whenever they affect him should he be thin or [preoccupied] by alcohol or indulging in venery or other things. The injured tissues are somewhat dehydrated and heated, and they draw into themselves fluids from blood vessels and the surrounding tissues. But as they amass [fluids, i.e., mucus and gall] the area becomes swollen and irritated, and there is slight tenderness and an occasional dry cough at first. The next development is internal injury with severe tenderness and frequent cough. The patient expectorates a bit of pus at first, and then [the sputum] is a little dusky and has a bit of blood. As time proceeds, the injury leads to tissue necrosis, at which time the tissue

becomes dusky, is exquisitely tender and there is fever and an unrelenting deep cough. On examination the sputum will reveal pus. Should the pus remain in the chest cavity a long time the entire body will be heated, especially the surrounding tissue. The body, on being heated, will dissipate any moisture. [To recapitulate,] the flow down from the head enters the chest and evolves into internalized pus, although it also can enter the abdominal cavity [by swallowing] and cause a disordered bowel that can be deadly, for the ingested food can pass through undigested, leading to malnutrition. Thus, there is unequal clearing out of [pus] from the chest, a heating of the chest and abdominal cavities, and a promoting of the passage from the body of [intestinal contents]. The degree of expectoration can choke the patient, there will be stertorous breathing for the [airways] are not being cleared, and with the addition of diarrhea the patient weakens and often dies.⁴⁴

e. μάλιστα δ' ἐν τῇσι τοιαύτησι τῶν νούσων τὸ
 especially and in the like these the diseases the
 ῥεῦμα τοῦτο ἢ κεφαλὴ παρέχει, ἅτε γὰρ κοίλη
 drainage this the head it supplies, because cavitory
 ἐοῦσα καὶ ἄνω ἐπικειμένη· ὅταν διαθερμανθῇ ὑπὸ
 being and hanging over superiorly; whenever heat spreads from
 τῆς κοιλίης, ἔλκει ἐς ἐωυτὴν ἐκ τοῦ σώματος τὸ
 a cavity, it extracts into itself from the body the
 λεπτότατον τοῦ φλέγματος· ὅταν δ' ἀλίσθη ἐν
 thinnest of mucus; but whenever it is caught in
 αὐτῇ, ἀποδιδόι πάλιν ἄλές τε καὶ παχύ, καὶ
 it, it can return again in a mass and thick, and
 ὥσπερ εἴρηται, τὸ μὲν αὐτοῦ ἐς τὴν ἄνω κοιλίην
 just as discussed, the same into the chest cavity
 καταρρεῖ, τὸ δ' ἐς τὴν κάτω· ὅταν οὖν ἄρξηται ἢ
 flows down, and into the abdomen; whenever then begins
 τε κεφαλὴ ῥεῖν καὶ τὸ ἄλλο σῶμα τήκεσθαι, οὐκ-
 the head to flow and the other [parts] body are weakened,

⁴⁴ This long paragraph describes the mechanism of progression of an empyema to its rupture into a bronchus, the evidence for this being the late development of copious purulent sputum. In this context the “extreme fatigue or exercising” probably refers to the final event leading to rupture rather than an originating event. The developing empyema attracts tissue fluid because of its heat (calor). The result is edema (swelling) and tenderness (dolor). Although the process cannot be visualized and the presence of redness (rubor) unconfirmed, the Hippocratics have provided a description of an internal inflammatory process that resembles that of a superficial one. Of note, the passage from the body is said to be “promoted,” and this suggests the swallowed drainage from the “head” is irritating to the bowel, thus promoting its own rapid excretion. Prior to effective anti-amebic therapy, amebiasis often cause inflammatory diarrhea, liver abscess, erosion into the chest cavity with formation of an empyema, and erosion of the empyema into a bronchus to form a bronchopulmonary fistula, as described here. This was a chronic, debilitating, and often lethal infection and could explain cases such as are described in this paragraph except that the sputum would likely be the characteristic anchovy-paste in color and texture, a feature the Hippocratics probably would have described.

ἐτι ὁμαλῶς οὐδὲ καυθέντες περιγίνονται· κρατέει
 not yet equally nor being cauterized they recover; it functions
 γὰρ πρὸς μὲν τὸ πύον τὰ ἐπιρρέοντα κακὰ ἢ τὰ
 for toward the pus the flowing to bad or the
 ἀπορρέοντα, αἱ δὲ σάρκες τηκόμεναι μᾶλλον ὑπὸ
 flowing from, the tissues become wasted more from
 τῶν κακῶν ἢ τρεφόμεναι ὑπὸ τῶν ἐσιόντων.
 the badness than being nourished by ingested foods.

Notably in diseases such as these there is drainage from the head, for the head lies superiorly and contains cavitary sinuses. Whenever heat spreads from the cavity [presumably a sinus cavity] it extracts into itself the thin mucus from the body, but when it has been confined into a cavitary mass it can return again as a thick bolus. As has been discussed, this mass can flow down into the chest cavity (via the trachea) and into the abdomen (via swallowing). Thus, when the head starts to drain the rest of the body is weakened, but not homogeneously, so they are unable to recover [even if] being cauterized [*i.e.*, management of a local collection of pus does not always help systemic disease]. The effect of the to-and-fro drainage by the pus is deleterious, with tissues becoming wasted more from the severity of the illness than [from] that ingested in the diet [*i.e.*, an inadequate diet caused by anorexia].⁴⁵

16. The variation by patients in response to the preceding diseases is discussed, and inexactitude thereby limits prognostication. (And see preceding footnote for relevant commentary.)

α. οὗτοι ὅσοι τοιοῦτότροπα νοσήματα ἴσχουσε
 those in whom those of this nature diseases they have
 καὶ ἀπὸ τούτων, ἔνιοι μὲν δι' ὀλίγου ἀπόλλυνται,
 and from them, sometimes in a short time they die,
 ἔνιοι δὲ πολὺν χρόνον ἔλκουσιν. διαφέρει γὰρ
 sometimes but a long time they drag it out. the [disease] persists for whether
 σῶμα σώματος καὶ πάθημα παθήματος καὶ
 body of the body, symptom of the symptoms, and

⁴⁵ As stated at the beginning of Section 15, empyema is its topic. Even though it can be a complication of pneumonia, the Hippocratics also recognized that it sometimes seemed to develop without evidence of prior cough/purulence, and so they concluded that head mucus drainage itself could produce empyema, whereas other empyemas were attributed to “chest wall disease.” But there were some patients that had neither initial purulence, mucus drainage, and occasionally not even pleuritic chest pain, the empyema appearing seemingly *de novo*. One common clinical presentation of tuberculosis is pleural effusion, in modern times comprising about 4% of tuberculosis cases and one of the most common extrapulmonary sites of involvement, although symptoms are highly variable. Just as apical tuberculosis was probably unknowingly included in their ἔμπυος (purulent pneumonia) category of disease, for it would have explained hemoptysis, cachexia, and terminal diarrhea in some of their patients, so was tuberculous effusion probably and unknowingly included in their ἔμπυος ἀνώ (chest empyema) category. In both categories the presence of tuberculosis would have contributed to great uncertainty in prognosis by Hippocratic physicians, as described in the following Section.

ὥρη ὥρης, ἐν ᾗ ἂν νοσέωσι· καὶ οἱ μὲν ταλαιπω-
 season of the seasons, in which a patient might be sick; and some of those
 ρότεροί εἰσιν ἐν τῇσι νόσοισιν, οἱ δὲ παντάπασι
 more enduring are in the diseases, others but entirely
 ταλαιπωρέειν ἀδύνατοι.
 to tolerate powerless.

Those having these diseases and those of a similar nature can sometimes die in a short time, but occasionally some survive a long time, although they [the diseases] persist in anybody, for any symptom, and in any season during which the patient might become sick. There are those [patients] most able to tolerate these diseases, but there are also those completely powerless to tolerate [them].

b. οὐκ οὐκ ἐστὶ τὸ ἀκριβὲς εἰδέναι καὶ τυχεῖν
 not therefore it is exactness to be seen and to happen
 εἴπαντα τοῦ χρόνου, ἐν ὅποσῳ ἀπόλλυται, οὔτ' εἰ
 all of the time, in which some die, whether if
 πολλόν, οὔτ' εἰ ὀλίγον· οὐδὲ γὰρ οὗτος ὁ χρόνος
 long, or if soon; neither for this the time
 ἀκριβῆς, ὃν ἔνιοι λέγουσιν, ὡς τὰ πολλά, οὐδὲ
 exact, which sometimes they say, in general, but not
 αὐτὸ τοῦτο ἐκποιεῖ· διαφέρει γὰρ καὶ ἔτος ἔτεος
 itself it does; this is consistent both for age regardless of age,
 καὶ ὥρη ὥρης. ἀλλ' ἢν τις ἐθέλῃ περὶ αὐτῶν
 and season regardless of season. but should which it someone desire concerning them
 ὀρθῶς γινώσκειν καὶ λέγειν, γινώσεται οὕτω πᾶσαν
 correctly to know and to say, it will be known thus every
 ὥρην καὶ ἀπολλυμένους καὶ περιγινομένους καὶ
 season and dying and surviving and
 πάσχοντας ἃ ἂν πάσχωσιν.
 being afflicted by that which may afflict.

Therefore exactitude is not to be seen or to happen consistently as to when some die, whether sooner or later; nor is the time exact which the patient reports (generally the case). This is consistent and it applies to both age and season. Should one wish to know and report concerning them, this will be correctly knowable [for] any season, whether dying, surviving, or ill from the affliction.⁴⁶

⁴⁶ This lack of exactitude is an accurate clinical appraisal that overrides, and beclouds, any theory. In this particular case the inclusion of some patients with pulmonary tuberculosis as cases of purulent pneumonia (ἐμπυοί) would surely interfere with determining exactitude in outcome. But consider this: could the author, in the last sentence, be advising his readers to report their outcomes with this type of disease so that predictions will be more exact? Admittedly unlikely, but, if so, this is a most remarkable request.

17. This is about abdominal abscesses.

a. τὴν δὲ κάτω κοιλίην ἔμπτυοι γίνονται
 [in] the abdomen [*i.e.*, abdominal cavity] collections of pus occur
 μάλιστα μὲν, ὅταν φλέγμα ἢ χολή συστήῃ ἀλῆς
 especially, whenever mucus or gall thickens in a mass
 μεσηγυ τῆς τε σαρκὸς καὶ τοῦ δέρματος· γίνονται
 between the tissues (muscle) and the skin; it occurs
 δὲ καὶ ἀπὸ σπασμῶν· καὶ ὅταν φλέβιον σπασθῇ
 from sprains/tears; and whenever small blood vessel being pulled
 ῥαγῇ, τὸ αἷμα ἐκχυθῇ σήπεται τε καὶ ἐκπυεῖ· ἢν
 breaks, the blood pours forth it becomes necrotic and it suppurates; should
 δὲ ἡ σὰρξ σπασθῇ ἢ φλασθῇ, ἔλκει ἐκ τῶν παρ'
 the tissue be drawn apart or rent, it draws from the nearby
 ἑωυτῇ φλεβίων αἷμα, καὶ τοῦτο σήπεται τε καὶ
 blood vessels blood, and this necroses and
 ἐκπυεῖ.
 it suppurates.

Abdominal abscesses are prone to occur in the abdomen whenever mucus and/or gall thicken in a mass between the deeper tissues and the skin. They occur from tears in tissues. Whenever small blood vessels break when pulled, the blood that pours forth becomes necrotic and suppurates; [likewise,] should the tissues be drawn apart or rent they attract blood from nearby blood vessels, and this [also] becomes necrotic and suppurates.

b. τοῦτοις ἢν μὲν ἔξω ἀποσημῆνη καὶ τὸ πύον
 in them should externally having been revealed and the pus
 ἐξέλθῃ, ὑγιᾶς γίνονται· ἢν δ' ἐκραγῇ ἔσω αὐτό-
 exits, healthy they become; but should it drain internally
 ματον, ἀπόλλυνται.
 spontaneously, they die.

In those in whom pus has been exposed and it exit externally, health returns; but should it spontaneously drain internally they can die.

c. κεκυμένον δὲ πύον ἐν τῇ κάτω κοιλίῃ, ὥσπερ
 being fluctuant and pus in the abdomen, just as
 ἐν τῇ ἄνω εἴρηται ἐγγίνεσθαι, οὐκ ἂν δύναιτο ἐγ-
 in the chest it has been discussed to develop, it may not be possible
 γενέσθαι, ἀλλ' ὥσπερ εἴρηται, ἐν χιτῶσι τε καὶ
 to take place, but just as discussed, in a membrane or
 ἐν φύμασιν ἐγγίνεται. καὶ ἢν μὲν ἔσω ἀποσημῆ-
 in an palpable mass it develops. and should internally it be revealed,

νη, δυσπετέες γινῶναι· οὐδὲ γὰρ διασείσαντά ἐστι
 [it can be] most difficult to know; not by and being shaken it is
 γινῶναι. γινώσκεται δὲ μάλιστα τῇ ὀδυνῇ, ἐνθα
 to be known. it will be known but especially by the tenderness, in this case
 ἂν ἡ· καὶ ἥν καταπλάσης γῇ κεραμίτιδι ἢ ἄλλῳ
 if there be [tenderness]; and should [it] be poulticed with clay mud or other
 τῷ τοιούτῳ, ἀποξηραίνει δι' ὀλίγου.
 like this, it dries out quickly.

As discussed regarding the chest, a fluctuant collection of pus can occur in the abdomen. If it does not take place as discussed [above], it may be enclosed within a membrane or [appear] as a [solid] mass. It can be almost impossible to identify even with shaking [of the patient]. Primarily it will be identifiable as [local] tenderness, assuming there is tenderness, and should it be poulticed with muddy clay or something similar it [the poultice] will quickly dry.⁴⁷

18. In three paragraphs, this is a sequence about lung abscess: its origin, its clinical presentation, and its spontaneous drainage, external and internal.

a. ἐρυσίπελας δ' ἐν τῷ πλεύμονι γίνεται,
 an abscess in the lungs occurs,
 ὅταν ὑπερξηρανθῇ ὁ πλεύμων· ὑπερξηραίνεται δὲ
 whenever be too dehydrated the lungs; it is too dehydrated
 καὶ ὑπὸ καύματος καὶ ὑπὸ πυρετῶν καὶ ὑπὸ
 both from local heat or from fever or from
 ταλαιπωρίας καὶ ἀκρασίης· καὶ ὅταν ὑπερξηρανθῇ,
 extreme fatigue or loss of control (paralyses of various types); and whenever it be too
 dehydrated
 ἔλκει τὸ αἷμα ἐφ' ἑωυτόν, μάλιστα μὲν καὶ πλεῖ-
 draws the blood upon [into] itself, especially the excess
 στον ἐκ τῶν μεγάλων φλεβῶν· αὐταὶ γὰρ αὐτῷ
 [of blood] in the great vessels; these for to itself
 ἐγγυτάτω εἰσὶ καὶ ἐπίκεινται ἐπ' αὐτῷ· ἔλκει δὲ
 closest to be and they are pressed against them; it extracts
 καὶ ἐκ τῶν ἄλλων τῶν πλησίον· ἔλκει δὲ τὸ
 and from the others nearby; it extracts
 λεπτότατον.
 thinnest.

A lung abscess occurs whenever the lungs become too dehydrated. They become too dehydrated from local heating, fever, extreme fatigue, and loss of control [including

⁴⁷ This and the preceding two paragraphs describe a sequence: first, a subcutaneous abscess in the abdominal region; second, the subcutaneous abscess will drain either externally or internally; third, a clinical description of an intraabdominal abscess is given. The author also is describing the origin of intraabdominal abscesses, namely internal burrowing from more superficial foci of purulence. This rarely occurs.

paralysis or dystonia affecting swallowing, breathing, or positioning]. Whenever it is too dehydrated it attracts blood into itself, especially the excess blood of the great vessels, for these are closest and are pressed against it. It also extracts from other nearby [vessels] the least viscous part [*i.e.*, a transudate].⁴⁸

b. ὅταν δ' εἰρύση, πυρετός ἀπ' αὐτοῦ γίνεται
 whenever it draws in, fever from it occurs
 ὀξύς καὶ βήξ ξηρὴ καὶ πληθώρη ἐν τοῖσι στήθεσι
 severe and cough dry and it is full in the chest
 καὶ ὀδύνη ὀξέη ἔμπροσθεν τε καὶ ὀπισθεν, μάλι-
 and tenderness extreme in the front and the back, especially
 στα δὲ κατὰ τὴν ῥάχιν, ἅτε τῶν φλεβῶν τῶν
 but concerning the spine, because by the vessels the
 μεγάλων διαθερμαινομένων· καὶ ἐμέουσιν ἄλλοτε
 great being heated; and they vomit at one time
 ὕφαιμον, ἄλλοτε πελιδνόν· ἐμέουσι δὲ καὶ
 blood clots, at another time [dark material]; and they vomit
 φλέγμα καὶ χολήν· καὶ ἐκψύχουσι πυκινά, ἐκψύ-
 mucus and bile; and they become lose consciousness all the time, they
 χουσι δὲ διὰ τοῦ αἵματος τὴν μετάστασιν ἐξαπί-
 faint from of the blood the removal suddenly
 νης γινομένην· καὶ μάλιστα διασημαίνει τοῦτο,
 occurring; and especially it points out this
 ὅταν ἐπὶ τοῦ πλεύμονος ἐπιγένηται ἐρυσίπελας
 whenever on the lung supervenes abscess
 καὶ τοῦ πυρετοῦ ἡ συνεχὴς λήψις.
 and of fever it may be continuous attack.

And when it has retracted (*i.e.*, formed an abscess), high fever and dry cough develop and there is fullness in the chest and exquisite tenderness in the front and the back, especially near the spine because of the heat extending from the great vessels. The patient then may vomit a lot of blood clots at one time, and at another time dark material,⁴⁹ and vomit mucus and gall. They are frequently light-headed, with the occurrence of fainting caused by removal of [loss of] blood. This especially indicates that a lung abscess has supervened; it is likely to have a continuous fever.

⁴⁸ Lung abscess is therefore caused by local dehydration from the heating that accompanied a pneumonia, *i.e.*, the Hippocratics considered lung abscess to be a secondary event, a complication of local heating often occurring in debilitated patients, not a consequence of drainage from the head. Today lung abscesses are usually caused by aspiration of oral contents, and they often contain anaerobic bacteria found in the mouth, so the Hippocratics were not far from the truth of the matter. The lung abscess then increases vascular congestion and causes local edema. Importantly, aspiration as a cause of pneumonia or lung abscess is facilitated by extreme inebriation, extensive stroke, coma, loss of the gag reflex, and numerous other causes.

⁴⁹ The “dark material” is likely to be old blood that has turned dark from digesting enzymes. Note that the blood, mucus, etc., were vomited, not expectorated, and therefore probably represented swallowed blood, a gastrointestinal complication such as a stress ulcer, or even an unrelated problem. It is not likely to have come from the lung abscess.

c. τούτῳ ἦν μὲν δύο ἢ τριῶν ἢ τεσσέρων τὸ
 in this [case] should two or three or four at
 πλεῖστον ἡμερέων διαχυθῇ καὶ μεταστῇ τὸ ἐνδον
 most days it be dispersed and removed from inside
 ἔξω, ὑγιῆς ὡς τὰ πολλά· ἦν δὲ μὴ διαχυ-
 externally, healthiness usually occurs; but should it not
 θῇ καὶ μεταστῇ, ἐνσῆπεται τε καὶ ἔμπυος γίνεταί
 be dispersed and removed, it necroses and a collection of pus develops
 καὶ ἀπόλλυται· ἀπόλλυται δὲ δι' ὀλίγου, ἅτε τοῦ
 and the patient dies; and he dies in a short time, because of
 πλεύμονος διαπύου ἐόντος ὅλου καὶ σαπροῦ· ἢ δ'
 lung purulence being throughout and necrosis; or should
 ἔξω κατακεχυμένον ἔσω τράπηται καὶ λάβῃ τοῦ
 externally flowing forth internally is turning and attacks the
 πλεύμονος, τοῦτον οὐδεμία ἐλπίς περιγενέσθαι.
 lung, this not one expect to survive.
 ὅταν γὰρ προαπεξηρασμένος ὁ πλεύμων εἰρύσῃ ἐς
 whenever for dehydrating beforehand the lung it draws into
 ἑωυτόν, οὐκ ἂν ἔτι μετασταίῃ, ἀλλὰ παραχρῆμα
 itself, not yet it be removed, but promptly
 ὑπὸ τοῦ καύματος καὶ τῆς ξηρασίης οὔτε δέχεται
 from the heat and the dehydration neither it accepts
 οὐδὲν οὔτε ἂν ἀναδιδοῖ οὐδὲν, ἀλλὰ δι' οὐν
 none nor brings up none, but throughout the
 ἔφθειρεν.
 it damages.

In this situation should it [this lesion] be dispersed externally over two, three, or four days, healing usually occurs. But should it not be dispersed and removed it becomes necrotic, a collection of pus develops and the patient dies. Furthermore, death comes quickly because there is pus throughout the lung [probably meaning multiple small abscesses]. And should external drainage be turned internally and attack the lung, this patient is not expected to survive, for whenever the previously dehydrated lung attracts [fluid] into itself, should it be unable to disperse it because of the heat and dehydration, it neither accepts nor brings up [via expectoration] anything; because of this [persistent focus of disease] it causes harm.⁵⁰

⁵⁰ In other words, a lung abscess, if it drains via eroding into the bronchi and the pus is expectorated, cure can occur over a few days. But if it is not expectorated, it will extend throughout the lung with lethal results, sometimes eroding into the pleural space and forming an empyema. The description of its extension throughout the lung could have been a guess by the Hippocratics, but it is unlikely that they would have made such a statement without some evidence that it occurs, suggesting a postmortem examination revealed multiple abscesses throughout the lungs, which is the usual case.

19. This is also about lung abscess that ruptures, its origin from mucus/gall, its rupture into the bronchi and subsequent healing or worsening, its enlargement and the rupture into the pleural cavity with temporary easing, and the patient's cachectic demise.

a. φῦμα δὲ γίνεται ἐν τῷ πλεύμονι ὥδε·
 a suspected mass occurs in the lungs thus;
 ὅταν φλέγμα ἢ χολὴ ξυστραφῇ, σήπεται, καὶ
 whenever mucus or bile congeals into a mass, it becomes necrotic, and
 ἕως μὲν ἂν ἔτι ὠμότερον ἦ, ὀδύνην τε παρέχει
 so long as less ripe it be, tenderness that it brings
 λεπτὴν καὶ βῆχα ξηρὴν· ὅταν δὲ πεπαίνεται,
 slight and cough dry; but whenever it becomes mature,
 ὀδύνη τε γίνεται καὶ πρόσθεν καὶ ὀπίσθεν ὀξέη,
 tenderness occurs and anteriorly and posteriorly it is severe,
 καὶ θέρμαι λαμβάνουσι καὶ βῆξ ἰσχυρή.
 and heats grip[the patient] and cough severe.

A lung [abscess] mass occurs as follows: whenever mucus or gall clump together, they become necrotic. While in its early stages there is slight tenderness and a dry cough, but as it grows and matures, exquisite tenderness develops anteriorly and posteriorly in the chest and heating and severe cough grip the patient.

b. καὶ ἢν μὲν ὅτι τάχιστα πεπανθῇ καὶ ῥαγῇ καὶ
 and should because most quickly it ripens and bursts and
 ἄνω τράπηται τὸ πύον καὶ ἀναπτυσθῇ πᾶν καὶ ἡ
 upward it is turning the pus and is expectorated all and the
 κοιλίη, ἐν ᾗ τὸ πύον ἐνῇ, προσπέσῃ τε καὶ ἀνα-
 cavity, in which the pus was in, falls in and dries
 ξηρανθῇ, ὕγιής γίνεται παντελῶς.
 up, healthiness occurs completely.

And should the mass break because it matures most quickly and the pus flows superiorly, it is completely expectorated and the [abscess] cavity which contained the pus collapses and dries up [so that] healing occurs completely.

c. ἢν δὲ ῥαγῇ μὲν τάχιστα καὶ πεπανθῇ καὶ
 should but it burst quickly and be mature and
 ἀνακαθαίρεται, ἀποξηρανθῆναι δὲ παντάπασιν μὴ
 be cleared out, but dried out completely not
 δύνηται, ἀλλ' αὐτὸ ἀφ' ἑωυτοῦ τὸ φῦμα ἀναδιδῶ
 possible, but the same from itself the palpable mass give off
 τὸ πύον, καὶ ἀπὸ τῆς κεφαλῆς τε καὶ τοῦ ἄλλου
 pus, and from the head and the rest of
 σώματος φλέγμα καταρρέον ἐς τὸ φῦμα σήπεται
 the body mucus flow down into the palpable mass necroses (putrifies?)

τε καὶ πύον γίνηται καὶ πτύηται, δι' οὖν ἐφθάρη·
 and pus it develop and it can be expectorated, throughout it is destructive;
 διαφθείρεται δὲ ὑπὸ τῆς γαστρὸς ῥυείσης ἢ ἀφ'
 he is utterly destroyed and from the flowing from the abdomen or from that
 ὥσπερ τὸ πρόσθεν εἴρηται· λεσχηνευομένου δὲ
 just as previously discussed; conversing and
 αὐτοῦ καὶ φρονέοντος πάντα χρήματα ὁμαλῶς
 with him and being understood completely things balanced
 καὶ ἐν τῷ πρὶν χρόνῳ, ἀποξηραίνεται τε καὶ ἀπο-
 and in previous time, it is drying up and being blown off,
 φύχεται, καὶ ξυμμύει τὰ φλέβια τὰ ἐν τῷ σώματι
 and close down the vessels in the body
 πάντα, ἅτε τοῦ αἵματος ἐξ αὐτῶν ἐκκεκαυμένου
 entirely, because of the blood from them being heated
 ὑπὸ πυρετῶν, ἐνίοτε δὲ ὑπὸ χρόνου τε πλήθους
 by the fevers, sometimes and from a long time
 καὶ μεγέθους τῆς νόσου καὶ τῶν ἐνεόντων κακῶν
 or seriousness of the disease or of the internal maliciousness
 καὶ τῶν προσεπιγινομένων.
 or of that supervening even more.

But should it mature and break even sooner and then be cleared out but not fully dried out [emptied], the [abscess] mass releases pus. From the head and the rest of the body mucus flows down into the mass and becomes necrotic. This develops into pus and it can be expectorated, although it is injurious wherever it is to be found. The patient is lost from the drainage or release from the abdomen [via the bowel], just as previously discussed. If in conversation the patient is completely understood and balanced in memory [the mass] is drying up and evaporating. But should the blood vessels in the body close completely because their blood is being heated by the fevers, sometimes [this problem] can persist a long time, become more serious and internally destructive, and intensify the problem.

d. ἥν δὲ μὴ δύνηται πολλοῦ χρόνου ῥαγῆναι,
 but should it not be possible for a long time to burst,
 μήτε ἐκ τοῦ αὐτομάτου μήτε ὑπὸ φαρμάκων,
 neither by itself spontaneously nor from medicine,
 τήκεται ὁ ἀσθενέων ὑπὸ τε ὀδυνῶν ἰσχυρῶν καὶ
 atrophies the weak one from the tenderness severe and
 ἀσιτίης καὶ βηχὸς καὶ πυρετῶν καὶ ὥς τὰ πολλὰ
 anorexia and cough and fevers and usually
 διαφθείρεται.
 the patient dies.

But if the mass is unable to rupture for a long time, either from its nature or from medicine, the weakened patient becomes cachectic from the severe tenderness, anorexia, cough, and fevers and usually dies.

e. ἤν δ' ἤδη λελεπτυσμένῳ καὶ κλινοπετεῖ
 and should already have been thinned and bedridden
 ἐόντι ῥαγῇ τὸ πύον, οὐδ' οὕτω μάλα ἀναφέρουσιν,
 they be can flow the pus, not this badness they recover
 ἀλλὰ διαφθεύρονται τρόπῳ τῷ αὐτῷ.
 but they die in the same manner.

And should the patient already be cachectic and bedridden, the pus might break out [and drain] but he may not recover from the illness, dying in the same manner.

f. ἤν δὲ ῥαγῇ μὲν ὅτι τάχιστα καὶ πεπανθῇ,
 but should it flow because quickly it matures,
 πεπανθὲν δὲ ἐκχυθῇ ἐπὶ τὰς φρένας τὸ πολλὸν
 the matured [pus] flows on the diaphragm much
 αὐτοῦ, τὸ παραυτίκα μὲν δοκέει ῥάων εἶναι.
 of it, it immediately he thinks easing to be;
 προιόντος δὲ τοῦ χρόνου, ἤν μὲν ἀναπτύσῃ πᾶν
 going forward and in time, should then be coughed up everything
 καὶ ἡ κοιλίη, ἐν ᾗ τὸ πύον ἐνῇ, προσπέσῃ τε καὶ
 and the [abscess] cavity, in which the pus entered, falls in and
 ἀναξηρανθῇ, ὑγιὲς γίνεταί· ἤν δὲ ὁ τε χρόνος
 dries up, healthiness occurs; but should the time
 πλείων γένηται, καὶ αὐτὸς ἀσθενέστερος, καὶ
 greater become, and the patient weaker, and
 ἀναπτύσαι μὴ δύνηται, ἀλλὰ καυθῇ ἢ τμηθῇ, καὶ
 to cough up not able, or [on the other hand] should he be cauterized or incised, and
 τὸ πύον ἐξέλθῃ, παραυτίκα μὲν καὶ οὕτω δοκέει
 the pus escapes, immediately this he believes
 δὴ τι ῥάων εἶναι, προιόντος δὲ τοῦ χρόνου δια-
 things more easy to be, but going forward in time he is
 φθίρεται ὑπὸ τῶν αὐτῶν, ὅφ' ὥνπερ καὶ ἐν τῇ
 overcome by the same, as it has been previously
 πρώτῃ εἴρηται.
 discussed.

Should the mass rupture because it matures quickly and much of the mature [pus] flow onto the diaphragm, the patient immediately thinks the illness to be easing. And, going forward in time, should everything be coughed up and the [abscess] cavity which held the pus collapses and dries up, healing occurs. But should it take longer and the patient become weaker and unable to expectorate, even if he is cauterized or incised and he thinks matters are easing with the escape of the pus, as time passes he is overcome by the same [difficulties] as have been previously discussed.⁵¹

⁵¹ The ineffectiveness of cautery or incision in advanced cachexia and the likely presence of tuberculosis in some of the patients is described here. And flowing onto the diaphragm was probably considered by the Hippocratics to indicate the mechanism of expectoration, rather than the coordinated contraction of chest wall and abdominal muscles that produce cough.

20. This is solely about pleural effusions other than empyemas that accompany pneumonia inasmuch as pleuritic pain rather than cough and expectoration are part of the clinical picture and external injury is their origin.

a. ἐν δὲ τῷ πλευρῷ γίνεται μὲν φῦματα
 on the inside of the chest wall occur presumed (palpable) swellings
 καὶ ἀπὸ φλέγματος καὶ ἀπὸ χολῆς κατὰ τὸν αὐ-
 both from mucus and from gall by the
 τὸν λόγον τοῖσιν ἐν τῷ πλεῦμονι· γίνεται δὲ καὶ
 same reason by them in the lungs; but it [swelling] can develop
 ἀπὸ πόνων, ὅταν τι τῶν φλεβίων σπασθὲν ῥαγῇ,
 from overuse, whenever something of the blood vessels being stretched ruptures,
 ἢ σπασθῇ μὲν, ῥαγῇ δὲ μὴ παντελῶς, ἀλλὰ σπα-
 or being stretched, it ruptures not completely, but a weakening
 δὼν ἐν αὐτῷ γένηται ἢ μὲν οὖν ῥαγῇ παραυτί-
 in it occurs should then it rupture suddenly,
 κα, τὸ αἷμα ἐκχυθὲν ἐκ τοῦ φλεβίου σήπεται τε
 the blood pouring forth from the vessel necroses
 καὶ ἐκπύει· ἢ δὲ σπιδῶν ἐν τῷ φλεβίῳ γένη-
 and drains; but should deterioration in the vessel occur,
 ται, τοῦτο δὲ κατ' ἀρχὰς μὲν ὀδύνας παρέχει καὶ
 this from the beginning tenderness has it presents and
 σφύζει, προϊόντος δὲ τοῦ χρόνου διαδιδοῖ ἢ φλεψ
 throbs, and going forward in time may respond the vessel
 τοῦ αἵματος ἐς τὴν σάρκα, καὶ τοῦτο σηπόμενον
 with blood in the tissue, and this becoming necrotic
 ἐν τῇ σαρκὶ πύον γίνεται.
 in the tissues pus becomes.

In the chest wall [presumed] palpable swellings can develop from either mucus or gall, just as it does in the lungs. Another cause, however, is an extreme stress, and whenever blood vessels are under tension and rupture or they stretch to the point of almost rupturing so that a weakening in it occurs that can rupture suddenly, the blood can pour forth from the vessel, undergo necrosis, and drain. But should deterioration in the vessel occur (*i.e.*, is not physically distorted or torn), tenderness and throbbing are present from the beginning, and as time passes the vessel may respond with bleeding into the tissue. This, when it becomes necrotic in the tissues, subsequently becomes pus.⁵²

⁵² This paragraph begins with an independent clause referring back to a chest wall disease πλευριτις and its evolution to empyema, but the remainder of the paragraph primarily concerns traumatic bleeding into the pleural cavity causing a hemothorax that may or may not become purulent. A hemothorax usually follows trauma to the chest. The writer is stating that if drainage of a focal collection of blood in the chest doesn't occur (*i.e.*, is not coughed up) it becomes pus. He is attempting to explain the origin of empyemas seemingly not due to πλευριτις.

b. κατὰ τὸν αὐτὸν δὲ λόγον καὶ ἡ σὰρξ, ἥ μὲν
 and by the nature of it the tissue, should
 μᾶλλον πονήσῃ, πλέον ἔλκει τοῦ αἵματος ἐς
 more be overstrained, it draws more of the blood into
 ἐωυτὴν ἐκ τῶν ἐγγυτατῶ φλεβῶν, καὶ παραχρῆμα
 itself from the nearby blood vessels, and promptly
 ἐκπυέει· ἥν δ' ἥσσον πονήσῃ, σχολαίτερον καὶ
 it suppurates; but should it be less strained, more slowly both
 ἔλκει καὶ ἐκπυέει.
 it extracts and suppurates.

As expected, should a tissue be more overburdened, it draws more blood into itself from the nearby blood vessels and promptly it suppurates. But should it be less burdened, it more slowly (almost ceases?) extracts and suppurates.⁵³

c. ἐνίοισι δ' ὅταν ἀσθενέα γένηται τὰ σπάσματα
 sometimes whenever weakness occurs the tears
 ἢ ἐν τῇ σαρκὶ ἢ ἐν τῇσι φλεψίν, οὐκ ἐκπυίσκεται,
 either in the tissues or in the blood vessels, it does not suppurate,
 ἀλλὰ γίνεται ἀλγήματα πολυχρόνια, ἃ καὶ
 but occur pains long history and which
 καλέουσι ῥήγματα.
 they call sudden worsenings.

But sometimes, when tears occur from weakness in the tissues or in the blood vessels, they may not suppurate. Instead, the patient has a long history of [recurring] pain, which they call “lancinating.”⁵⁴

d. καὶ ὅσα μὲν ἐν τῇ σαρκὶ γίνεται, ὥδε γίνεται·
 and whenever in the tissues it develops, this is how it occurs;
 ὅταν ἡ σὰρξ πονήσῃ τι ἢ σπασθεῖσα ἢ πληγείσα
 whenever the tissue be overstrained either being wrrenched or being struck
 ἢ ἄλλο τι παθοῦσα, γίνεται, ὥσπερ εἴρηται, πελι-
 or some other suffering, it occurs, as stated before, dusky,
 δονή, πελιδονή δὲ οὐκ εἰλικρινεῖ αἷματι, ἀλλὰ
 but dusky not pure blood, but

⁵³ The significance of this notable statement is that the writer knows that pleural effusions sometimes clear spontaneously, and he assumes that clearance is a function of quantity of local bleeding. Thus, the lesser “burden” in some patients explains the better outcome.

⁵⁴ Although the author’s description is limited, the pain must have been sharp pleuritic pain occurring with each breath. This is common with hemothorax or any chest trauma. Could something like Cocksackie virus pleurodynia also have been a problem? But this lasts only a week. More likely the pleuritic pain mentioned here was secondary to an area of local pleural inflammation and adhesions subsequent to trauma.

λεπτῷ τε καὶ ὕδαρεϊ καὶ τούτῳ ὀλίγῳ· ὅταν δ'
 thin and watery and a little of it; whenever
 ὑπερξηρανθῇ μᾶλλον τοῦ εἰωθότος, διαθερμαίνει-
 it dries up especially in the usual way, it is heated from that around
 ταί τε καὶ ὀδύνην παρέχει, καὶ ἄγει ἐς ἑωυτὴν
 and brings tenderness, and it leads into itself
 ἀπὸ τῶν πλησίον καὶ φλεβῶν καὶ σαρκῶν τὸ
 from the nearby and from blood vessels and tissues the
 ὑγρόν· καὶ ὅταν ὑπερυγρανθῇ καὶ τοῦτο αὐτὸ τὸ
 moisture; and whenever it be overhydrated and this itself the
 ὑγρόν διαθερμανθῇ ὑπ' αὐτῆς τῆς σαρκός,
 moisture being heated by the tissue of it
 σκίδνεται ἀνὰ τὸ σῶμα πᾶν, οἷόν περ εἰρύσθῃ,
 is dispersed all over the body, so that very much it attracts,
 καὶ μᾶλλον δὴ τι σκίδνεται ἐς τὰς φλέβας ἢ ἐς
 and more some is dispersed into the blood vessels or into
 τὰς σάρκας· ἔλκουσι γὰρ αἱ φλέβες μᾶλλον τῶν
 the tissues; extract for the vessels more than the
 σαρκῶν, ἔλκουσι δὲ καὶ αἱ σάρκες.
 tissues, but do extract the tissues.

Whenever it develops in the tissues, this is how it occurs. It happens when tissues have been stressed, either from being wrenched or struck or suffering some other [disruption]. It develops, as stated before, as a bruise, but not the kind of bruise [from extravasated blood], but thin and watery and only a little of it [blood without the redness, *i.e.*, plasma]. Then, when it is drying up in the usual way, by being heated from that around it, there is some tenderness. It [also] attracts mucus from the surrounding area and from blood vessels. Should it become overfilled, the heated mucus is dispersed throughout the body, where much is drawn, being dispersed into blood vessels or tissues. For the vessels extract more than the tissues, but the tissues do extract [some].⁵⁵

e. ὅταν δ' ἐς πολλὸν ὑγρόν, τὸ ἐν τῷ σώματι,
 whenever into much moisture, that in the body
 ὀλίγον τὸ ἀπὸ τῆς σαρκὸς ἔλθῃ, ἄδηλόν τε γίνε-
 a little that from the tissues returns, inapparent it

⁵⁵ The tissue injury described here has produced a thin, watery, fluid, a nonbloody or minimally bloody pleural effusion. When blood is drawn from a vein and collected in a container it clots within minutes. Over the next few hours the clot retracts, leaving a denser, heavier clot now surrounded by a translucent liquid, the blood serum. This, a simple observation, was probably known to the Hippocratics, and so they assumed the “minimally bloody fluid in the chest was left over from internal hemorrhage. The writer states it usually clears spontaneously by evaporation or else is dispersed throughout the body, even though it attracts mucus into the site, for mucus is also so dispersed. The notable feature of this passage is how such a diagnosis and description could have been obtained. It would seem to necessitate a thoracentesis with removal of some of the fluid for visual inspection, *i.e.*, a diagnostic thoracentesis. If so, this is remarkable.

ται καὶ ἀνώδυνον, καὶ ἀντὶ νενοσηκότος γίνεται
occurs and painless, and before having been ill he becomes
ὑγιὲς τῷ χρόνῳ.
healthy in time.

Should a little bit of mucus return from the tissues and join the large amount of fluid in the body [e.g., in the blood vessels], it becomes inapparent and nontender, and, even though previously ill, in time [the patient] becomes healthy.⁵⁶

f. ἤν δὲ διαθερμανθῇ τε μᾶλλον ἢ σὰρξ καὶ εἰρού-
but should it be heated more the tissues and it
ση πλεῖον τὸ ὑγρὸν, ὀδύνην παρέχει, καὶ ὅπη ἂν
draws in more the mucus, tenderness it supplies, and wherever
τοῦ σώματος ἀπ' αὐτῆς ὀρμήσῃ καὶ κατασπινύσῃ,
of the body by itself it provokes and compresses,
ὀδύνην παρέχει ὀξέην· καὶ δοκέουσιν ἔνιοι ἑωυ-
tenderness it supplies severe, and they [patients] appear sometimes in
τοῖσι τὸ ῥῆγμα μεθεστάναι· τὸ δ' οὐκ ἀνυστόν·
themselves the sudden worsening to be removed; this not realistic;
ἔλκος γὰρ μεταστῆναι οὐκ ἀνυστόν· ἐγγυτατῶ
the wound for to be removed not realistic; nearest
δ' ἔλκεός ἐστιν ὅσα τοιαῦτα· ἀλλὰ τὸ ἀπὸ τῆς
the wound is this way; but that of the
σαρκὸς ὑγρὸν αἰσσει διὰ τῶν φλεβίων· ὅταν δὲ
tissue fluid to quickly move through the vessels; whenever but
διαθερμανθῇ τε καὶ παχυνθῇ καὶ γένηται πλεόν,
it is heated and be thickened and becomes more,
ὀδύνην παρέχει, ἔστ' ἂν ὁμοίῳ γένηται τῷ ἄλλῳ
tenderness it brings, it can the same way become by means of other
ὑγρῷ καὶ λεπτότερον καὶ ψυχρότερον.
fluid both thinner and cooler.

But should the tissues be more heated and thereby attract more mucus, there is tenderness, and wherever [it occurs] in the body it by itself irritates and compresses. There is exquisite tenderness, and [patients] sometimes believe the cause [focus of inflammation] of the worsening to be changing. This is not practical, for it is unrealistic to change [the cause of] an injury, and these changes are nearest the injurious process [the swelling and tenderness]. Nevertheless, mucus pulses rapidly through the blood vessels. Wherever it

⁵⁶ This brief passage continues from the previous. The author writes that if the quantity of fluid is small it can be reabsorbed, and when diluted in the blood is insufficient to produce symptoms. In fact, pleural effusions accompanying pneumonia are common (20%-50%), and, being small and sterile or almost so, most reabsorb without difficulty. As with the previous paragraph, there must have been the documented experience with patients who had a benign recovery from clinically detectable effusions for the author to have described its mechanism. It also hints at a feedback mechanism the body uses to control some physiological processes, as discussed on p. 330.

is hotter, thicker, and increased in volume there is tenderness, and it is this way unless it becomes as other fluids, less viscous and cooler.⁵⁷

g. ὅσα δ' ἐν τοῖσι φλεβίοισι γίνεται, αὐτὸ μὲν τὸ
as many as in the blood vessels it develops, themselves the
φλέβιον, ὅσον ἔσπασται, κατὰ χώραν μένει· ὅταν
vessels, as long as they are stretched, according to the place it remains; whenever
δὲ σπασθῇ, σπᾶται δ' ὑπὸ τόνου καὶ βίης, καὶ
but it be stretched, it is stretched from tensions and force, and
ὅταν σπασθῇ, γίνεται οἷον κιρσός· καὶ διαθερμαί-
whenever it be stretched, it develops like a bruise; and it becomes
νεταί τε καὶ ἔλκει ἐς ἑωυτὸ νοτίδα ὑγρήν· ἡ δὲ
heated and it extracts into itself dampness soggy; but the
νοτίς ἐστὶν ἀπὸ χολῆς καὶ φλέγματος· καὶ ὅταν
dampness is from gall and mucus; and whenever
μιχθῇ τό τε αἷμα καὶ το ἀπὸ τῆς σαρκὸς ὑγρόν,
it be mixed the blood and the from the tissues fluid,
παχύνεται τε τὸ αἷμα πολλαπλασίως αὐτὸ ἑωυ-
it is thickened the blood many times more itself
τοῦ ταύτη, ἥ ἂν ἡ φλεψ τυγχάνῃ ἐσπασμένη, καὶ
by this, which the vessel should happen being stretched, and
νοσωδέστερον γίνεται καὶ στασιμώτερόν τε καὶ
more diseased becomes and more fixed and
πλέον· καὶ ὅταν πλέον γένηται, μετ' οὖν ἔσται τὸ
more than; and whenever more it becomes, with then it is the
πλήρωμα, ἡ ἂν τύχη, καὶ ὀδύνην παρέχει ὀξέην
excess, if it be happens, and tenderness it provides exquisite
ὥστ' ἐνίοισι δοκέειν τὸ ῥῆγμα ἑωυτοῖσι μεθεστώ-
so that sometimes to appear the abrupt worsening in itself to be
ναι. καὶ ἥν τύχη ὥστ' ἐς τὸν ὦμον μεταστῆναι
removed. and should it happen that in the shoulder it moves
βάρος τε τῇ χειρὶ παρέχει καὶ νάρκην καὶ νω-
heaviness in the arm it brings and sleepiness and
θρίην· καὶ ἥν μὲν ἐς τὴν φλέβα σκεδασθῇ, ἡ ἐς
torpor; and should in the vessels it disperse, or in

⁵⁷ This is a description of a focus of inflammation, its extraction of fluid from blood vessels (capillaries) that have increased permeability, tenderness associated with products of inflammation, and pain produced by tissue fluid (mucus)-induced swelling. The locus is still the pleural cavity. The problem with the author's logic is that the effects of an inflammatory process have been mistaken for its cause. Note that here heating causes an influx of more mucus rather than its evaporation, so both must have been thought to be operative by heating, and if more mucus accumulated than could be evaporated the local problem worsened. Finally, there is the implication that rapid pulsatile flow through blood vessels can clear out the "mucus" from the diseased site so that it becomes more dilute and cooler.

τὸν ὠμὸν τε καὶ ἐς τὸν νῶτον τείνει, παύεται ἡ
 the shoulder and in the spine it stretches, it ceases the
 ὀδύνη παραχρῆμα ὡς τὰ πολλά.
 tenderness abruptly usually.

In as many blood vessels as it develops, the vessels themselves, when they are wrenched/sprained, remain in place. And when they are wrenched, some are torn by tension or force. And as long as it is sprained/torn, this is like a bruise and becomes heated, thereby attracting moisture. And that moisture is composed of gall and mucus. Whenever mucus is mixed with blood, the blood becomes much thicker. If the blood vessels happen to be strained, they become more damaged, fixed in place, and larger, and when they become larger it is because of excess [content]. When this happens there is exquisite tenderness, so that sometimes it seems to be an abrupt change for the worse. And should it happen that it [tenderness] changes into the shoulder there is heaviness in the arm plus numbness and immobility. But should the excess then be dispersed by the vessels, whether it is in the shoulder or stretches into the spine, it usually promptly ceases.⁵⁸

h. γίνεται δὲ τὰ σπάσματα καὶ ἀπὸ πόνων καὶ
 occur the sprains/tears from overuse and
 πτωμάτων καὶ πληγῆς, καὶ ἢ τις ἄχθος μέζον
 falls and being struck, or if something of greater burden
 αἴρεται, καὶ ἀπὸ δρόμων καὶ πάλης καὶ τῶν τοι-
 be seized, or from a race or a contest and of this
 ούτων πάντων.
 type all.

Sprains occur from excessive use, falls, being struck, excessively heavy burdens, races, contests, and anything of this kind.

21. This Section involves penetrating chest wounds that may or may not become infected, and chest wounds that cause internal bleeding. The latter can be either blunt or penetrating and can result in blood in the pleural cavity, a hemothorax. Left alone, septic change is a well-known complication of hemothorax, and so the idea that blood could undergo necrosis and then turn to pus has some clinical, if not bacteriological, support.

⁵⁸ This is a postulated mechanism of disease based on direct observation of external injury, with the implication being that a similar mechanism is operative in nonvisualized diseases processes, which is roughly true as far as it goes. Note the congealing (clotting) effect of interstitial fluid (the actual procoagulant commonly known today as “tissue factor,” a substance that is used in some coagulation test and termed “mucus” herein) on blood! Also note that “moisture” here specifically includes both χολή and φλέγμα, and their concentrations can be lowered after being dispersed by the blood.

a. ὅσοι δ' ἀπὸ τραυμάτων ἔμπτυσι γίνονται,
 those from trauma collections of pus develop,
 ἥν ὑπὸ δόρατος ἢ ἐγχειριδίου ἢ τοξεύματος ἔσω-
 should from a spear or knife or arrow internally
 τέρω τραυθῶσιν, ἕως μὲν ἂν ἔχη ἔξω τὸ ἔλκος
 be wounded, as far as it be external the wound
 ἀναπνοὴν ἀνὰ τὸ ἀρχαῖον τραῦμα, ταύτῃ τε τὸ
 breathes in through the initial injury, for in this way the
 ψυχρὸν ἐπάγεται ἐφ' ἑωυτό, καὶ τὸ θερμὸν ἀφ'
 coolness is captured within itself, and the warmth leaves
 ἑωυτοῦ ταύτῃ ἀφίησι, καὶ ἀποκαθαίρεται ταύτῃ
 by itself in this way to be discharged, and is cleaned out by this
 τὸ πύον καὶ ἥν δὴ τι ἄλλο. καὶ ἥν μὲν ὑγιανθῇ
 the pus and should [there be] something else. and should it improve
 τό τ' ἔνδον καὶ τὸ ἔξω ὁμοῦ, ὑγιῆς γίνεται παν-
 the inside and the outside the same, healthiness occurs
 τελῶς· ἢ δὲ τὸ μὲν ἔξω ὑγιανθῇ, τὸ δ' ἔσω μὴ
 completely; but if the external heal, and the internal not
 ὑγιανθῇ, ἔμπυος γίνεται· καὶ ἥν ὑγιανθῇ μὲν
 heal, a collection of pus develops; and should it heal
 ὁμοῦ τὸ ἔνδον καὶ το ἔξω, ἢ δὲ οὐλὴ ἔσω ἀσθενῆς
 the same the internal and the external, but the external scar weak
 τε γένηται καὶ τρηχέα καὶ πελιδνῇ, ἀνελκοῦται
 become and roughened and dusky, it draws back (opens up)
 ἐνίοτε, καὶ ἔμπυος γίνεται· ἀνελκοῦται δὲ καὶ ἥν
 sometimes, and a collection of pus occurs; and it draws back should
 πονήσῃ τι πλεόν, καὶ ἥν λεπτυνθῇ, καὶ ἥν
 [the patient] be exhausted more, or if he be thin, or should
 φλέγμα ἢ χολὴ πρὸς τῇ οὐλῇ προσπαγῇ, καὶ ἥν
 mucus or gall by the scar be trapped, or should
 νοῦσῳ ἐτέρῃ ληφθεὶς λεπτυνθῇ.
 by disease another be caught as he grows thinner.

Collections of pus occur from traumatic wounds such as those caused by a spear, knife, or arrow unless the initial injury is open to the air, for by this means the wound acquires cooling and permits discharge of heat and [any] purulence and other matter [*e.g.*, foreign material] is cleaned out. Should external and internal healing occur at the same [time], complete healing occurs. But should internal healing be delayed, a collection of pus can develop. Likewise, should external and internal healing take place [simultaneously] but the external scar be atrophic, rough, and dusky (like a scab?), the [wound] can open up and then a collection of pus can occur. And it can open up should the patient be more fatigued, thinner, if mucus or gall be trapped under the scar, or if [the patient] is cachectic from being attacked by some other disease.

b. ὅταν δὲ γένηται ἔλκος, ἥν τε οὕτως ἥν τε
 whenever a lesion develops, should in this manner should

προσυμφυῆ τὸ ἔξω τοῦ ἔσω, ὁδυνὴν τε παρέχει
 unite the external than the internal, tenderness it brings
 ὀξέην καὶ βήχα καὶ πυρετόν· καὶ τήν τε ψύξιν
 severe and cough and fever; and the coolness
 ἐπάγεται αὐτὸ ἑωυτῷ τὸ ἔλκος διὰ τὸ πλεόν τε
 is acquired to itself the wound through the more
 καὶ θερμότερον εἶναι, καὶ αὐτὸ ἀφ' ἑωυτοῦ ἀπο-
 and the warmer to be, and it from itself exhales
 πνεῖ τὸ θερμόν· καὶ τὸ πύον ἀποκαθαίρεται διὰ
 the heat; and the pus is cleaned out over
 πλείονος καὶ προσανήτόν τε καὶ σχολαίτερον
 more [time?] both emitting and more leisurely
 ὑγιαίνεται πολλῶ, ἐνίοτε δ' οὐδ' ὑγιάζεται· ἡ
 is relieved greatly, but sometimes is not relieved; the
 γὰρ σὰρξ ἡ τοῦ ἔλκος ὑπὸ τοῦ καύματος τοῦ ἐν
 for tissue the of the wound from the heat of in
 τῷ σώματι ἐψεται τε καὶ ὑπερυγραινεται, ὥστε
 the body is refined [heated/boiled] and is overhydrated, so that
 μὴ δύνασθαι μῆτε ξηρανθῆναι μῆτε σαρκοφυῆσαι
 it is not able neither to get dry nor regrow tissue
 μῆτε ὑγιασθῆναι, ἀλλ' ὅταν χρόνος προίη, τελευ-
 nor become healed, but whenever time passes, in the
 τᾷ πάσχων ταυτά, ᾧ καὶ ἐν τῇ πρόσθεν εἴρηται.
 end being effected this, that which has been previously described.

When a wound such as this occurs, should the external part seal over more than [sooner than] the internal portions, there is severe tenderness, cough, and fever. The wound acquires coolness the warmer it is, for it radiates heat from itself. Pus is cleaned out over time, progressively and more leisurely, [and the patient] is relieved greatly, but sometimes the patient does not heal. This is because the tissue of the wound is heated [processed?] by body heat and is overhydrated, so it cannot dry out, regrow [normal] tissue, or heal. Instead, as time passes the consequences of this conclude as has been previously described.

c. ἥν δὲ τύχη ὥστε τρωθῆναί τι τῶν φλεβίων
 should it happen that to be injured one of the vessels
 τῶν παχυτέρων καὶ εἴσω ῥυῆ τὸ αἷμα καὶ ἐν-
 the thickest and into flows blood and becomes
 σαπῆ, ἔμπος γίνεται· καὶ ἥν μὲν τοῦτο τὸ πύον
 necrotic, a collection of pus develops; and should this pus
 πτυσθῇ πᾶν, καὶ ἡ φλὲς ἡ τετρωμένη στεγνώθῃ,
 be coughed up completely, and the vessel injured be sealed,
 καὶ τὸ ἔλκος ὑγιασθῇ καὶ τὸ ἔσω καὶ τὸ ἔξω,
 and the wound be healed both internally and externally,
 ὑγιῆς γίνεται παντελῶς· ἥν δὲ μὴ δύνηται μῆτε
 healthy he becomes completely; but should not be possible nor

τὸ ἔλκος συμφυῆναι μήτε ἢ φλὲψ στεγνωθῆναι,
 the wound to unite nor the vessel to be sealed,
 ἀλλ' ἄλλοτε καὶ ἄλλοτε ἀναδιδῶ αἷμα, καὶ ἢ
 but at one time or another be given up blood, and should
 παραυτίκα ἐμῆται ἢ πτύηται, ἢ καὶ σήπηται καὶ
 suddenly be vomited or coughed up, and should it necrose and
 πύον πτύηται, διαφθείρεται ὡς τὰ πολλά, ἢ
 pus be coughed up, he deteriorates usually, or
 παραυτίκα ἐμέων αἷμα, ἢ ὕστερῳ χρόνῳ ὕφ' ὧν
 suddenly vomiting blood, or at a later time from those being
 καὶ ἐν τῇ πρόσθεν εἴρηται διαφθειρόμενος.
 and as previously stated deteriorating.

Should it happen that one of the large blood vessels be injured (severed) and bleed internally and the blood become necrotic, a collection of pus develops. Should this be completely coughed up, the severed vessel be sealed off, and the wound be healed both internally and externally, the patient is completely healed. But should it be impossible for the wound to close or for the vessel to be sealed but at one time or another emit blood to be suddenly vomited or coughed up, or to necrose and pus be coughed up, the patient is usually lost, or deteriorates from suddenly vomiting blood or from those [other] things having been previously discussed.

d. πολλάκις δὲ ὅσοι τι τῶν ἔσω φλεβίων τιτρώ-
 frequently however some of the internal small blood vessels be
 σκονται ἢ ὑπὸ τραμάτων ἢ πόνων ἢ κατὰ
 injured or from trauma or overuse or from
 γυμνασίην ἢ ὑπ' ἄλλου του, ὅταν συμφυῇ καὶ δοκῇ
 exercise or from some other [cause], whenever it unites and appear
 ὑγιὲς εἶναι τὸ φλεβίον, ἀναρρήγνυται ὕστερον
 healed to be the vessel, it breaks open at a later
 χρόνῳ· ἀναρρήγνυται δ' ὑπὸ τῶν αὐτῶν ὕφ' ὧν-
 time; it breaks open from those things previously done
 περ καὶ πρόσθεν· ὅταν δ' ἀναρραγῇ, αἱμορροέει,
 whenever before; and when it breaks open, it bleeds,
 καὶ παραυτίκα ἀπόλλυνται ἐμέοντες αἷμα πολλόν
 and suddenly they die vomiting blood much
 τε καὶ πολλάκις, ἢ ἄλλοτε μὲν καὶ ἄλλοτε αἷμα
 and frequently, or at one time or another blood
 ἐμέουσι πρόσφατον, πύον δὲ πτύοντες ἀνὰ πᾶσαν
 they vomit anew, but pus they expectorate up every
 ἡμέρην πολλόν τε καὶ παχύ, δι' οὐν ἐφθάρησαν
 day much and thick, through which they die
 τρόπῳ τοιούτῳ ἢ παραπελησίῳ, ὡς καὶ ἐν τῇσιν
 in this manner or resembling, as previously
 ἀλλήσιν εἴρηται.
 discussed.

Frequently small internal blood vessels are injured by trauma, undue stress, exercise, or some other cause. Then, although it seals over and the blood vessel seems to be healed, at a later date it breaks open from those things that occurred previously. When this happens it bleeds and frequently the patient can die vomiting much blood. Or at another time they may vomit some blood anew, but they expectorate much thick pus every day, through which mechanism or a similar one they can die, as previously discussed.⁵⁹

22. The following long Section comments on age-related pulmonary change. This is of interest in that it is difficult for modern science to associate age-related change with propensity for disease, at least using an epidemiological approach. There is, nevertheless, an age-related decline in lung density, perhaps consistent with modern measurements of a 30% decline between ages 20-90 years (approximately), and consistent with Hippocratic observations in an age of nonsmokers. Yet modern measurements of other parameters are difficult to assess in terms of respiratory decline, including the quantitation of emphysema, a decrease in cilia in the elderly, and less cough. This Section is an opportunity to assess the physiology described in Hippocratic works in light of modern knowledge.⁶⁰

a. τοῖσι δὲ ταῦτα νοσήματα ἴσχουσε καὶ
 as these such diseases they have and
 ὅσα τοιαῦτα διαφέρει εἰς τὸ εὐπετεστέρως τε
 others like them it differs among the easily
 ἀπαλλάσσειν καὶ δυσπετεστέρως ἀνὴρ τε γυναι-
 to relieve or difficultly for a man than a
 κός, καὶ νεώτερος γεραιτέρου, καὶ γυνὴ νεωτέρη
 woman, and of a younger man than older man, and a younger woman
 καὶ παλαιότερη, καὶ πρὸς τούτοισιν ἡ ὥρη τοῦ
 than older woman, and concerning them the season of
 ἔτεος, ἐν ᾗ ἂν νοσέωσι, καὶ ἣν ἐξ ἑτέρης νόσου
 year, in which they might be sick, or should from another disease
 νοσέωσιν ἣν τε μὴ ἐξ ἑτέρης. διαφέρει δὲ καὶ
 they might be sick or not from another. and it differs
 πάθημα παθήματος μέζον ὃν τε καὶ ἔλασσον
 suffering from greater suffering which or less
 καὶ χρῶς χρωτὸς καὶ θεραπείῃ θεραπείης.
 and color/body from [another] color/body and a medical treatment from [another]
 medical treatment.

⁵⁹ A point at issue here is the vomiting of blood, mentioned in paragraphs “c” and “d,” when the initial injury was a chest wound. It is not rare for a patient to vomit large quantities of blood initially swallowed during a massive posterior nosebleed, but to vomit such a large amount of blood from a chest lesion first requires the blood to be brought up from the lungs via the trachea into the pharynx and then swallowed. The associated coughing, shortness of breath, and near asphyxia would not go unnoticed by the physician or the family. It is not mentioned here. The vomiting of blood may have been due to a “stress ulcer,” a bleeding diathesis, a terminal event, or another disease entirely, but it is most unlikely to have been from the lung itself.

⁶⁰ The numbers quoted here are from: Harding, R. and Pinkerton, K. E. (editors), *Lung: Development, Aging, and the Environment*, London, 2015, 2nd edition.

And in those that have such diseases and others like them [that have been so far discussed in this work], to alleviate them they differ as to ease or difficulty between a man and a woman, a younger man and an older man, and a younger woman and an older woman. Also of concern is the season of the year in which they might be sick and whether or not they are sick with another disease. Furthermore, suffering can differ, [meaning] greater or less suffering, for one body differs from another body and one medical treatment differs from another medical treatment.

b. τούτων δ' οὕτω διαφερόντων ἀνάγκη διαφέ-
among those having differences from it is necessary to
ρειν καὶ τὸν χρόνον, καὶ τοῖσι μὲν πλέω γίνεσθαι,
differentiate according to time, and in those much to occur,
τοῖσι δ' ἐλάσσω, καὶ ἀπόλλυσθαι ἢ μή, καὶ τοῖσι
and in those less, and to be killed or not, and in those
μὲν παραμόνιμά τ' εἶναι καὶ μέζω, τοῖσι δ' ἐλάσ-
having endurance to be and a lot, or in those with less
σω τε καὶ ὀλιγοχρόνια, τοῖσι δὲ παραμένειν ἐς τὸ
and for a short time, in those to persist into
γῆρας τὰ νοσήματα καὶ συναποθνήσκειν, τοὺς δ'
old age diseases and die with them, and of those
ἀπόλλυσθαι δι' ὀλίγου ὑπ' αὐτῶν.
to die in a short time from them.

Among the differences people have it is necessary to differentiate according to duration [of disease progression], whether it is prolonged or brief, lethal or not lethal, and whether a patient's stamina is durable and long-lasting or less durable and short-lived, whether their diseases persist into old age and they die with them or they die from them in the near term.⁶¹

c. καὶ ὅσοι μὲν νεώτεροι πάσχουσι τι τούτων,
and those who are young they are affected some of them
ὅσα εἴρηται ἀπὸ πόνων παθήματα γίνεσθαι, πά-
so it is said from overuse symptoms develop, they
σχουσε πλέω τε καὶ ἰσχυρότερα καὶ ἀλγέουσι μάλ-
are affected much and more severe and they feel pain
λον τῶν ἄλλων, καὶ παραυτίκα ἔνδηλα αὐτοῖσιν,
more than others, and promptly it is obvious in them,
ὥστε ἢ πτύσαι αἷμα ἢ ἐμέσαι, τὰ δὲ καὶ γινόμενα
so that blood to be coughed up or vomited, and that occurrence

⁶¹ An insightful point made in this short paragraph is the observation that some chronic diseases that are seemingly serious and lethal in some may not be life-shortening in others, just as today it is known that most men with prostate carcinoma die *with* the disease, not *from* it. (The American Cancer Society asserts, in 2016, the five and ten-year survival rate for cancer of the prostate to be virtually 100% and 98%, respectively.)

λανθάνει αὐτοὺς ὑπὸ εὐεξίης τοῦ σώματος.

it escapes notice by them because of the good state of health of the body.

And it is said the younger men are affected more by symptoms from extreme physical abuse (use) and feel pain more than others, also that momentary coughing up or vomiting blood occurs, although it escapes their notice because of the [otherwise] good control of the body.⁶²

d. οἱ δὲ γεραίτεροι πάσχουσι μὲν ὀλιγάκις, καὶ
the elderly are afflicted less frequently, and
ὅταν πάθωσιν, ἀσθενέα πάσχουσιν ἅτε ἀσθενέστε-
whenever they are symptomatic, mild weakness they suffer seeing that
ροι ἐόντες, καὶ ἐπαίουσι μᾶλλον καὶ ἐπιμέλονται
weaker being, and they have more experience and cautious
μᾶλλον τῶν παθημάτων.
more of the symptoms.

The elderly, on the other hand, are afflicted less frequently, and being weaker they suffer less, although they have more experience and are more careful about what bothers them.

e. γίνεται οὖν τὴν ἀρχὴν τὸ παράπαν ἥσσον τῷ
it begins then the onset on the average milder in the
γεραιτέρῳ ἢ τῷ νεωτέρῳ· καὶ ὅταν γένηται, τῷ
elderly than in the younger; and whenever it be developed, in the
μὲν γεραιτέρῳ ἀσθενέστερα γίνεται, τῷ δὲ νεωτέρῳ
more strong.

The onset of disease, on the average, occurs more gradually in the elderly than in the younger; and once developed it is milder in the elderly and harsher in the younger.

f. καὶ τῷ μὲν νεωτέρῳ, ἅτε τοῦ σώματος τόνον
and in the young, seeing that of the body [muscle] tone
τε ἔχοντος καὶ ξηρασίην καὶ τὴν σάρκα πυκινὴν
having and dry/taught and the tissue solid
τε καὶ ἰσχυροτέραν καὶ πρὸς τοῖσιν ὀστέοισι
and stronger and concerning the bones

προσκαθημένην καὶ περὶ αὐτὴν τοῦ δέρματος
setting down before and around them of the skin

⁶² Brief flecks of blood in phlegm are common with benign coughs and in young people this is usually not a significant health problem. Small amounts of blood in vomitus are also often from benign causes. Before the days of sophisticated diagnostic testing these events would have passed with little notice if there were no associated symptoms.

περιτεταμένου, όταν τι πονήσῃ πλέον τοῦ εἰωθό-
 being taut, whenever something be physically demanding very of in the
 τος, μᾶλλον καὶ ἐξαίφνης, σπασμοί τε γίνονται
 usual way, more and immediately, cramps develop
 ἰσχυροὶ καὶ ῥήγματα πολλά τε καὶ παντοῖα τῶν
 severe and burstings many and all kinds of
 φλεβῶν καὶ τῶν σαρκῶν· καὶ τούτων τὰ μὲν
 vessels and of tissues; and of them some
 παραυτίκα ἐνδηλα γίνεται, τὰ δ' ὕστερον χρόνῳ
 immediately obvious occurs, but others the later in time
 ἀναφαίνεται.
 it comes to light.

And in the young, seeing that the muscle tone of the body is taut, solid, and strong, firmly attached to the bones and enclosed by taut skin, whenever something physically more demanding than usual is unexpectedly required, muscle cramps develop, tissues are sprained, and blood vessel ruptures occur, some immediately apparent, some appearing at a later time.

g. τοῖσι δὲ γεραιτέροισι τόνος τ' ἰσχυρὸς οὐκ ἔνι,
 in the elderly muscle tone strong not present,
 καὶ αἱ σάρκες περὶ τὰ ὀστέα περιρρέουσι, καὶ τὸ
 and the tissues around the bones flow around, and the
 δέρμα περὶ τὰς σάρκας, καὶ αὐτὴ ἡ σὰρξ ἀραιή
 skin covering the tissue, and itself the tissue thinner
 τε καὶ ἀσθενής· καὶ οὔτε τι ἂν πάθῃ τοιοῦτον
 and weaker; and not even should some distress them
 ὁμοίως ὥς καὶ ὁ νεώτερος, καὶ ἢν τι πάθῃ, πάσχει
 in the same way as the younger, but should something cause distress, the affliction
 ἀσθενέα τε καὶ παραυτίκα ἐνδηλα.
 [causes] weakness and is immediately apparent.

In contrast, in the elderly good muscle tone is not present, the tissues wrap loosely around the bones, the skin loosely covers the tissues, and the tissue itself is thinner and weaker. Should some affliction strike them the same as the younger it might not even cause distress, but should it cause distress the weakness it afflicts is immediately apparent.

h. τοσοῦτῳ μὲν ἐν τῇ ἀρχῇ τῶν παθημάτων
 in these then at the beginning of the symptoms
 δυσχερέστερον ἀπαλλασσοῦσιν οἱ νεώτεροι τῶν
 more difficulty are relieved the younger than the
 γεραιτέρων.
 elderly.

In these [situations] then, the younger are relieved with greater difficulty at the onset of symptoms than are the elderly.

i. ὅταν δ' ἡ νοῦσος ἐμφανῆς γένηται, καὶ ἡ
whenever the disease to appear in begins, and should
πύον ἢ αἷμα πτύσωσιν ἢ ἀμφοτέρω, ὅσοι μὲν νεώ-
pus or blood be expectorated or both, in the younger
τεροί εἰσιν, ἅτε τοῦ σώματος εὐτόνου τε ἐόντος
it is, seeing that of the body good muscle tone there being
καὶ πυκινοῦ, οὐ δύνανται ἀποκαθαίρεσθαι ὁμαλῶς
and solid, it is not possible to be cleared equally
ἀπὸ τῶν ἐλκῶν τῶν ἐν τῇ ἄνω κοιλίῃ τὸ πύον.
from the lesions in the chest cavity the pus.
ὅ τε γὰρ πλεύμων οὐ κάρτα ἔλκει ἐς τὰς
that for the lungs not badly it attracts into the
ἀρτηρίας πυκνότερος ἐὼν, αἳ τε ἀρτηρίαι λεπταὶ
bronchi more concentrated being, but the bronchi small
εἶναι καὶ στεναὶ οὐκ ἐνδέχονται τὸ πύον, εἰ μὴ
to be and narrow not possible to give up the pus, except for
ὀλίγον τε καὶ ὀλιγάκις, ὥστε ἀνάγκη τὸ πύον ἐν
a little and infrequent, so that necessarily the pus in
τῷ θώρακί τε καὶ ἐπὶ τῶν ἐλκῶν ἀθροίζεσθαι τε
the chest and on the wounds to be collected
καὶ παχύνεσθαι.
to become thickened.

And whenever it seems the disease is starting and either pus or blood or both are being expectorated, it is in the younger men that the good tone and solid muscle makes it impossible for the pus to be cleared satisfactorily from the chest cavity. For the lungs are not badly damaged because the blood vessels/bronchi are more numerous, but [because] the small and narrow bronchi cannot give up the pus except for an occasional small amount so that the pus inevitably collects and thickens in the chest and on lesions.

j. τῷ δ' ἀφηλικεστέρω ὅ τε πλεύμων ἀραιότερος
but in the older the lungs [are] less dense
καὶ κοιλότερος, καὶ αἱ ἀρτηρίαι εὐρύτεραι, ὥστε
and more hollow, and the bronchi wider, so that
μὴ ἐγχερόναι τὸ πύον ἐν τῇ κοιλίῃ καὶ ἐπὶ
not to delay the pus in the chest cavity and on
τῶν ἐλκῶν, καὶ ὅτι ἂν ἐπιγένηται, τοῦτο πᾶν
the lesions, and when it occurs, these completely
ἀνάγκη ἀνασπᾶσθαι ἄνω ὑπὸ τοῦ πλεύμονος ἐς
compulsory to be dragged up from the lungs into
τὰς ἀρτηρίας καὶ παραχρῆμα ἐκπύεσθαι.
the bronchi and promptly expectorated.

But in the elderly the lungs are emptier and less dense and the bronchi are wider so as not to impede pus [coming up] from the chest cavity and [its] lesions; when it [the disease] occurs this pus will always be brought up from the lungs, into the bronchi, and promptly expectorated.

k. τῷ μὲν οὖν νεωτέρῳ, ἅτε τῶν παθημάτων
 in the then younger, since of the signs and symptoms
 ἰσχυροτέρων ἐόντων καὶ τῆς καθάρσιος οὐ γινομέ-
 severer being and of the cleansing not occurring
 νης κατὰ λόγον τοῦ πτύσματος, οἷ τε πυρετοὶ
 as expected by expectoration, the fevers
 ὀξύτεροι καὶ πυκνότεροι γίνονται, καὶ ὀδύνη ἐμ-
 more severe and more frequent become, and tendernesses
 πίπτουσιν ὀξέαι αὐτοῦ τε τοῦ παθήματος καὶ τοῦ
 burst in severe of them of the symptoms and of
 ἄλλου σώματος, ἅτε τῶν φλεβίων ἐντόνων τε
 of entire body, since of the blood vessels being stretched
 ὄντων καὶ ἐναίμων· ὅταν δὲ ταῦτα διαθερμανθῇ
 being in them blood; but whenever this is heated throughout.
 ἐφ' ἑωυτῶν, ὀδύνη διαίσσουσιν ἄλλοτε ἄλλῃ τοῦ
 to itself, tendernesses/fatigues rush through, in one direction then another, of the
 σώματος, καὶ οὗτοι μὲν διαφθείρονται ὡς τὰ
 body, and these [patients] are harmed as is
 πολλὰ δὲ ὀλίγου.
 usually in a short time.

Then in the younger, because [their] symptoms are more severe as the expected cleansing [of the lungs] by expectoration has not occurred, fevers are more severe and frequent, and extreme fatigue [malaise?] attends their disorder and affects the entire body. This is because blood vessels are being stretched and having blood in them, for whenever these are heated up above usual, distress [malaise?] in one place or another spreads throughout the body, and these patients are usually harmed in short order.⁶³

l. τοῖσι δὲ γεραιτέροιςιν, ἅτε τῶν παθημάτων
 but in the elderly, since of the signs and symptom
 ἀσθενεστέρων ἐόντων καὶ τοῦ πτύσματος ἀπ'
 milder having and by expectoration from
 αὐτῶν καθαιρομένου, οἷ τε πυρετοὶ λεπτότεροι καὶ
 them having cleansed, the fevers less severe and
 ὀλιγάκις γίνονται, καὶ ὀδύνη ἔνεισι μὲν, ἔνεισι δὲ
 less frequently occurring, and tenderness/distress set in motion internally, but internally

⁶³ Could this (fever, general malaise) be interpreted as a symptom complex now attributed to “tissue necrosis factor” which is released in inflammation and systemically distributed via the blood circulation, symptoms being malaise, anorexia, and fever.

λεπταί· καὶ παντάπασι μὲν τῶν παθημάτων τῶν
 mild; and everything of the symptoms of
 τοιούτων οὐκ ἀπαλλάσσονται οὐδ' οἱ γεραίτεροι,
 them not they are easing up nor the elderly,
 ἀλλ' ἔχοντες αὐτὰ καταφθίρονται πολὺν χρόνον,
 but having themselves been brought to ruin over a long period,
 καὶ ἄλλοτε πύον πτύουσιν, ἄλλοτε δ' αἷμα
 and at one time they expectorate pus, at another time blood
 ἄλλοτε δ' οὐδέτερον, τέλος δὲ συναποθνήσκει
 and at another time neither, at the end he dies
 αὐτοῖσιν· ἀποθνήσκουσι δὲ μάλιστα οὕτως, ὅταν
 by means of them; they die especially thus, whenever
 τι αὐτοὺς νόσημα τούτων, ᾧ ἂν ἔχωσι, παρα-
 some the same disease of them, in which it may be,
 πλῆσιον καταλάβῃ, ὥστ' ἔχειν καὶ τοῦτο, καὶ ὃ
 resembling lay hold of, so that to have both this, and that which
 ἂν ἔχωσι νόσημα ἰσχυρότερον γίνεται καὶ ὥς τὰ
 it might be, disease severer occurs and as usually
 πολλὰ δι' οὖν ἔφθιρε. ταῦτα δ' ἐστὶ τὰ μάλιστα
 happens through [this] he dies. these [patients] are especially
 ἐξεργαζόμενα τῶν νοσημάτων πλευριτίς τε καὶ
 terminated by the diseases chest wall disease and
 περιπλευμονίη.
 nonpurulent pneumonia .

But in the elderly, as they have milder expressions of afflictions and [the lungs] having been cleansed by expectoration, the fevers are less severe and less frequent, and malaise, although having been set in motion internally, is less. Nevertheless, overall the elderly are not relieved of affliction, but instead by having these are themselves brought to deteriorate over a long period, at one time expectorating pus, at another time blood, and at other times nothing until they finally die because of them. And they die as follows: whenever they happen to be gripped in like manner by some other mild disease, a severer illness results and this usually causes death. This *coup de grace* is particularly dominant in diseases with chest wall pain and with acute nonpurulent pneumonia.⁶⁴

23. This is an explanation for production of fever (a body temperature above normal).

⁶⁴ In the elderly who come down with a disease that is not severe they might well survive it except that they may develop a secondary infection, one that may cause pleuritic chest pain or a lung problem, and the two illnesses together cause death (reminiscent of the old axiom that pneumonia is “the old man’s friend.”) And that pleuritic chest pain or lung problem, for example, could be a pulmonary embolus/infarction or congestive heart failure rather than pulmonary infection. Note that “nonpurulent pneumonia” is the translation of the last line of the interlinear text, but this is frequently the early manifestation of a pneumonia that might become purulent (an ἔμπυος) within a week or so.

πυρετός δ' ἀπὸ τῶνδε γίνεται· ὅταν χολή
 fever from this arises: when gall
 ἢ φλέγμα θερμανθῇ, θερμαίνεται πᾶν τὸ ἄλλο
 or mucus/plasma is heated, is heated all of the
 σῶμα ἀπὸ τούτων, καὶ καλέεται πυρετός τοῦτο·
 body by them, and is called fever this;
 θερμαίνεται δὲ ἢ τε χολή καὶ τὸ φλέγμα ἔσωθεν
 are heated and both the gall and the mucus/plasma internally
 μὲν ἀπὸ σιτίων καὶ ποτῶν, ἀφ' ὧν περ καὶ τρέφε-
 from food and drink, from which and it [the fever] is sustained
 ται καὶ αὖξεται, ἔξωθεν δ' ἀπὸ πόνων καὶ τραυμά-
 and intensified, externally or from exertion or
 των, καὶ ὑπὸ τε τοῦ θερμοῦ ὑπερθερμαίνοντος καὶ
 trauma, and because the heat [external sources] becoming overheated and
 τοῦ ψυχροῦ ὑπερψύχοντος· θερμαίνεται δὲ καὶ
 [from] the cold becoming excessively cold; it [the body] is heated and
 ἀπὸ ὀψιός καὶ ἀκοῆς, ἐλάχιστα δ' ἀπὸ τούτων.
 from visual and auditory [sources], but the least of them.

Fever arises as follows: when gall and/or mucus are heated, they in turn heat the entire body, and this is called “fever.” Both gall and mucus are heated internally by food and drink, through which this [heating] is sustained and augmented. External sources of heating included severe exertion and trauma, hot or cold sources, and, least important, visual and auditory input.⁶⁵

24. Here the source and mechanism of rigors is explained.

a. τὸ δὲ ῥίγος ἐν τῇσι νούσοισι γίνεται μὲν
 rigors in diseases develop
 καὶ ἀπὸ τῶν ἔξωθεν ἀνέμων καὶ ὕδατος καὶ
 both from the external winds or water or
 αἰθρίης καὶ ἐτέρων τοιούτων, γίνεται δὲ καὶ ἀπὸ
 or clear weather and others like them, and yet it occurs from
 τῶν ἐσιόντων σιτίων καὶ ποτῶν· μάλιστα δὲ καὶ
 those eating and drinking; especially however

⁶⁵ The energy for fever, therefore, is produced by the body's metabolism of food and is not an intrinsic feature of gall or mucus nor their mixture or admixture. Indeed, as the following Sections indicate, gall and mucus are physically “cool,” both “cooler” than blood. But, as the author of *Diseases I* understood it, they trigger fever, although the control mechanism is not stated but must have been thought to be centrally located. They get to where they are heated by being carried in the blood. The blood is passively warmed in a central location by the heat of the body's metabolism, the source of the energy for heating the entire body. So something normally in the blood does not cause the fever; the cause lies with a central mechanism that detects something abnormal in the blood, namely gall and/or mucus, for normally no gall or mucus is present in the blood. The one inconsistency in this paragraph is that heating of bile can be caused by cold when it (the bile?) becomes too cold. It would be more logical if the central heating mechanism were triggered by cold, thus allowing central heating of the bile as would otherwise happen. Perhaps that is what is meant.

ἰσχυρότερον γίνεται, ὅταν χολή ἢ φλέγμα συμ-
 stronger it occurs, whenever gall or mucus
 μιζθῇ ἐς τὸ αἷμα, ἢ τὸ ἕτερον ἢ ἀμφοτέ-
 be mixed into the same in the blood, either one or both;
 ρα· μᾶλλον δέ, ἢν τὸ φλέγμα συμμιχθῇ· ψυχρό-
 but especially should mucus be mixed; most
 τατον γὰρ τοῦ ἀνθρώπου φλέγμα, θερμωτάτον δ'
 cold for of humans mucus, and the warmest
 αἷμα, ψυχρότερον δὲ καὶ χολή αἵματος· ὅταν οὖν
 blood, colder and gall than blood; then whenever
 ταῦτα συμμιχθῇ, ἢ ἀμφοτέρα ἢ τὸ ἕτερον, ἐς τὸ
 these be mixed, whether both or either one, in the
 αἷμα, συμπήγνυσι τὸ αἷμα, οὐ παντάπασιν δέ, οὐ
 blood, will congeal the blood, not entirely but, not
 γὰρ ἂν δύναίτο ζῆν ὀνθρωπος, εἰ τὸ αἷμα πυκνό-
 for possible living of a human, if the blood more
 τερόν τε καὶ ψυχρότερον γένοιτο πολλαπλασίως
 frequent and colder might become many times
 αὐτὸ ἑωυτοῦ.
 itself.

Rigors develop in diseases from [exposure to] wind or water or clear weather and other factors like them, and it even occurs from eating and drinking. It is especially strong, however, when gall or mucus become mixed in with the blood, either one or the other or both, but especially with mucus, which is the colder. Blood is the warmest [of these liquids], and gall is cooler than blood. So when either both or one or the other are mixed in the blood, the blood will congeal, although not completely, for human life would not be possible if the blood became much thicker than it [usually] is.⁶⁶

b. ψυχομένου δὲ τοῦ αἵματος, ἀνάγκη ψύχεσθαι
 being cold from the blood, inevitable to be cold
 καὶ τὸ ἅλλο σῶμα πᾶν, καὶ καλεῖται ῥίγος· ὁκό-
 and over the entire body, and it is called a rigor; whenever
 ταν τοῦτο τὸ τοιοῦτον γένηται, ἢν μὲν ἰσχυρῶς
 this and like situations develop, should it severely
 γένηται, ῥίγος τε ἰσχυρόν καὶ τέτραμος· αἱ γὰρ
 develop, rigors severe and trembling for the
 φλέβες συσπώμεναι καὶ ἐφ' ἑωυτὰς ἐοῦσαι,
 blood vessels are brought together upon themselves,
 πηγνυμένου τοῦ αἵματος, συσπῶσι τε τὸ σῶμα
 congealing of the blood, contracting the body

⁶⁶ Cooling is here thought to thicken liquids, just as it was thought that shed blood clotted because it cooled. Thus, neither mucus nor gall *per se* cause fever; they would tend to counteract fever by cooling the blood and causing rigors unless the blood was heated as it coursed through the body core.

καὶ τρέμειν ποιέουσιν· ἤν δὲ ἐπὶ ἔσσον ἢ ζύνοδος
 and to tremble they make; should less the coming together/joining
 γένηται τοῦ αἵματος, τοῦτο δὲ καλέσεται ῥίγος·
 develop of the blood, this is called a rigor;
 φρίκη δὲ τὸ ἀσθενέστατον.
 chill is mildest.

When the blood is cool, the entire body is cool. This is called a rigor. Whenever this and like situations develop, should it be severe there will be shivering and rigors. This is because the blood vessels squeeze together against each other, congealing the blood. This, in turn, draws together (contracts) the body and makes it tremble. Should there be less coming together of the blood, this is called a rigor; a chill is its mildest form.⁶⁷

c. ὅτι δὲ μετὰ τὸ ῥίγος ἀνάγκη πυρετὸν ἐπιλα-
 because after the rigor inevitable fever to be

βεῖν ἢ πλείω ἢ ἐλάσσω, οὕτως ἔχει· ὅταν τὸ αἷμα
 superimposed either more or less, thus it is; whenever blood
 διαθερμαίνεται τε καὶ ἀποβιᾶται καὶ ἀπὴν πάλιν
 is heated throughout and is forced away and at a distance returns
 εἰς τὴν ἑωυτοῦ φύσιν, συνδιαθερμαίνεται καὶ τοῦ
 into its own nature, it is heated thoroughly together and with
 φλέγματος καὶ τῆς χολῆς τὸ ἐν τῷ αἵματι συμ-
 mucus and gall in the blood being
 μεμιγμένον, καὶ γίνεται τὸ αἷμα θερμότερον αὐτὸ
 mixed, and becomes the blood hotter
 ἑωυτοῦ πολλαπλασίως· τούτων οὖν διατεθερμα-
 than its usual many times; these having been thoroughly
 σμένων ἀνάγκη πυρετὸν ἐπιγενέσθαι ὑπὸ τῆς
 heated inevitably fever will supervene because of the

⁶⁷ The trembling described here is a sequence of rapid and involuntary generalized muscular contractions that when severe can be called “rigors” and when less severe can be called “mild shivering” or chills. That the distinction is a real one will be recognized by anyone who has worked with patients with bacteremia or malaria, among other causes. ῥίγος will, therefore, be translated as “rigor” (the British “rigour”), although it is possible that the writer meant for ῥίγος ἰσχυρόν to mean a true rigor or “shaking chill”, ῥίγος as the usual chill with limited shaking, τρόμος as a chill with trembling, and φρίκη as the mildest expression, including goose-bumps (piloerection). It is now realized that repeated muscle contractions are a way the body has of raising its core temperature. Certain inflammatory cytokines and the temperature of the blood are sensed as the blood passes through the hypothalamus, so the idea that blood temperature is a factor in causing rigor is correct. As for body contraction, it is only the muscles that contract to cause shivering, but it is not likely that shivering of the liver, brain, etc., was meant by the Hippocratics. And the idea that blood vessels “contract” as part of the process is also partially correct, for peripheral blood flow is restricted as the body in a cold environment diverts more blood to internal organs in an attempt to conserve body heat. For whatever reason, some basic concepts of the body’s mechanism for temperature control as held by the Hippocratics are now known to be correct. Others, such as the congealing of the blood, are incorrect.

ὑπερθερμασίης τοῦ αἵματος μετὰ τὸ ῥίγος.
overheating of blood after the rigors.

Fever, high or low, inevitably follows rigors for the following reason: whenever blood is heated through and through and then is forced away, it returns to its former nature at a distance [*i.e.*, becomes cooler when in the periphery], and is then mixed and heated together with mucus and gall. The result of this mixing is that blood becomes many times hotter than usual, and it can transfer this heat to the rest of the body as “fever.” With this mixture being thoroughly heated, fever inevitably supervenes because of the overheating of the blood after the rigors.⁶⁸

25. A mechanism for sweating is presented, along with a differentiation between hot and cold sweats.

a. ἰδρὼς δὲ γίνεται διὰ τόδε· οἷσιν ἂν κρὶ-
sweating occurs in this way; in those are
νωνται αἱ νοῦσοι ἐν τῇσι κυρίησι τῶν ἡμερέων καὶ
resolving the disease in the expected part of the day and
τὸ πῦρ μεθίη, ἐκτῆκεται ἀπὸ τοῦ ἐν τῷ σώματι
the heat is released, it is dissipated from in the body

φλέγματος καὶ τῆς χολῆς τὸ λεπτότατον καὶ
mucus and by gall the thinnest and

⁶⁸ Apparently warm blood normally cooled as it reached the peripheral circulation, then was warmed up again in its return to the body’s core. It has been pointed out that mucus and gall were considered cooler than blood. Blood was thought to be cooled by that mixing with gall and mucus when in the periphery, and thus is thicker and more congealing. But when it returns to the core and is rewarmed it now also contains gall and mucus. All three components are heated together, but because gall and mucus are present the central mechanism of heat production is triggered (see above), the resulting mixture thereby becoming hotter than blood normally is. This is the reason the Hippocratics thought the blood is able to become superheated, *i.e.*, by the presence of something released from the periphery that activates the central heating mechanism to overheat and cause fever. Furthermore, whatever is located centrally that heats the blood is triggered to overheat by something in the blood, probably gall or mucus. The heating site is not identified by the Hippocratics, but it heats by using the energy generated by the body’s metabolic action on ingested foodstuffs (see Section 1). Putting all this together in a modern context, logically the heating mechanism that causes fever must be the result of something unique to inflammatory lesions. It is now known that endotoxin from infectious agents and endogenous agents (cytokines) from a focus of inflammation, whether in the presence or absence of infection, can trigger the hypothalamus to induce fever. The Hippocratics had no idea of the role of the central nervous system in temperature regulation, but their clinical observations indicated the basic mechanism to produce fever was initiated from an inflammatory lesion itself. As proposed in vol. 2 of *The Natural State of Medical Practice*, the Introduction to the Translations, the Hippocratics were not only 500 years ahead of Celsus in recognizing a clinical definition of inflammation. They also had a plausible, and in some respects accurate, theoretical explanation of its pathophysiology.

ἀποκρίνεται καὶ χωρέει τὸ μὲν ἔξω τοῦ σώματος,
 it is separated and proceeds (makes room) externally from the body,
 τὸ δὲ καὶ αὐτοῦ ἐν τῷ σώματι ὑπολείπεται· τὸ δὲ
 but the same in the body is retarded; and the
 ὑπὸ θερμασίης λεπτυνόμενον ἀτμός γίνεται, καὶ
 by the warmth being thinned vaporization occurs, and
 σὺν τῷ πνεύματι μισγόμενον ἔξω χωρέει.
 with in the lungs being mixed externally it proceeds (and makes room).

Sweating occurs in this way: in those in whom diseases are resolved at the expected time of day [or “expected days”] and heat is released, it [the heat] is dissipated by the body’s mucus and very dilute gall proceeding externally via the sweat. But some can be retarded in the body. This then is diluted by being vaporized from the warmth, and being mixed [with the air] in the lungs they can then proceed externally [during exhalation].

b. ἔστι μὲν οὖν ταῦτα τοιαῦτα καὶ ἀπὸ τούτων ὁ
 it is then something like this and from them the
 ἰδρώς. ὅτι δὲ ὁ μὲν θερμός, ὁ δὲ ψυχρός· ὁ μὲν
 sweating. because then the hot, and the cold; the
 θερμός ἀπὸ δια τεθερμασμένου τε τοῦ κακοῦ καὶ
 hot from having been thoroughly heated the foulness and
 ἐκκεκαυμένου καὶ λελεπτυσμένου καὶ ἀσθενέος
 having been burned and having been diluted and being weak
 καὶ οὐ λίην πολλοῦ ἀποκρίνεται, καὶ ἀνάγκη θερ-
 and not too much is separated, and it is inevitably more
 μότερον αὐτὸν ἐκκρίνεσθαι ἐκ τοῦ σώματος· ὁ δὲ
 warm the same [*i.e.*, the fouless] to be released from the body; but the
 ψυχρός ἀπὸ πλέονος τοῦ κακοῦ ἀποκεκριμένος
 cold from large amount of foulness having been separated
 τοῦ τε ὑπολειπομένου καὶ ἔτι ἰσχύοντος καὶ οὐπω
 from the remainder [of the foulness] and still being excessive and not yet
 συσσεσηπότος οὐδὲ λελεπτυσμένου οὐδὲ ἐκκεκαυ-
 decomposed together nor having been diluted nor having been burned,
 μένου, ψυχρότερος καὶ παχύτερος καὶ κακωδέστε-
 colder and thicker and more virulent
 ρος ἐκχωρέει.
 it departs.

It is, therefore, from the likes of these elements that sweating [occurs]. Then there are hot [sweats] and cold [sweats]. The hot sweats arise from a lesion being thoroughly heated and, having been burned, diluted, and weakened, only a small amount remains to be released, and it is unavoidable that [some of] the same heat be released from the body [*i.e.*, a hot sweat]. On the other hand, cold sweats arise when a larger amount of the cause of the illness/lesion has been released from the body but there remains behind that which has not yet been decomposed nor diluted nor burned, and it is this that, being cooler,

thicker, and more virulent, departs [*i.e.*, cold sweats indicate a more virulent problem than do hot sweats].

c. δῆλον δὲ τῷδε τοῦτο· οἱ ψυχρῷ ἰδρῶτι ἰδρῶν-
evident thusly this; those with cold sweating
τες μακρὰς νούσους νοσέουσιν ὥς ἐπὶ τὸ πολὺ, ἔτι
prolonged sickness they suffer generally, yet
ἰσχύοντος τοῦ κακοῦ τοῦ ἐν τῷ σώματι ὑπολειπο-
excess of foulness which in the body remains;
μένου· οἱ δὲ θερμῷ ἰδρῶτι ἰδρῶντες ταχύτερον
but those with hot sweats sweating quickly
ἀπαλλάσσονται τῶν νοσημάτων.
are being relieved of the diseases.

And this is obvious from the following: those suffering with cold sweats generally have prolonged illnesses, yet foci of disease remain in the body, while those with hot sweats are being quickly relieved of their diseases.⁶⁹

26. A discussion of chest wall disease is presented in the context of inebriation, and referred pain patterns from chest disease are described and explained by provisional anatomical notions.

a. πλευρίτις καὶ περιπλευμονίη γίνονται
chest wall disease and acute nonpurulent pneumonia problems develop
ὧδε· ἡ μὲν πλευρίτις· ὅταν πόσιες ἀλέες τε καὶ
as follows. chest wall disease: whenever drinking excessively and
ἰσχυραὶ κάρτα λάβωσι, διαθερμαίνεται τὸ σῶμα
strong very be seized [by a disease], it is heated thoroughly the body
πᾶν ὑπὸ τοῦ οἴνου καὶ ὑγραίνεται· μάλιστα δὲ ἡ
entire by wine and is moistened; especially the
τε χολή καὶ τὸ φλέγμα διαθερμαίνεται τε καὶ
gall and the mucus is thoroughly heated and is

ὑγραίνεται· ὅταν οὖν τούτων κεκινημένων τε καὶ

⁶⁹ Not so. Long-term diseases with fever may have night sweats but not cold sweats, for the latter, commonly a consequence of anxiety, also occur with acutely severe medical conditions including shock, hypoglycemia, and in response to a severe autonomic stimulus. The present paragraph is incorrect. This is supported by prior translations by the author (see vol. 2 of *The Natural State of Medical Practice*) of sections describing cold sweats. Without exception, all comments on cold sweats referred to clinical observations of patients *in extremis*. The term used here for “cold” is ψυχρός (ψυκτήριος - cool, shady; ψύξις = a cooling). The term for “night” is νύξ (nightly = νύκτερος, νύκτιος). Simple transcription error does not seem a likely explanation for the error in this paragraph despite a faint degree of similarity in alphabetical composition, so the error must be attributed to ignorance of the writer.

hydrated; whenever then they having been moved and
 διυγρασμένων ζυγκυρήση, ὥστε ῥιγῶσι μεθύοντα
 having been melted come together by chance, so that they will be chilled being intoxicated
 ἢ νήφοντα, ἅτε ἐὸν τὸ πλευρὸν ψιλὸν φύσει σαρ-
 or sober, because being the chest wall bare
 κὸς μάλιστα τοῦ σώματος καὶ οὐκ ἐόντος αὐτῷ
 muscle especially of the body and not being in them
 ἔσωθεν τοῦ ἀντιστηρίζοντος οὐδενός, ἀλλὰ κοι-
 internally by being supportive nothing, otherwise of the
 λίης, αἰσθάνεται μάλιστα τοῦ ῥίγους· καὶ ὅταν ῥι-
 chest cavity, it perceives especially a chill; and whenever there
 γώση τε καὶ ψυχθῇ, ξυνέλκεται τε καὶ συσπᾶται
 is a chill or it be cold, it is drawn together to a point and is combined
 ἢ τε σᾶρξ ἢ ἐπὶ τῷ πλευρῷ καὶ τὰ φλέβια, καὶ
 whether the tissue on the chest wall or the blood vessels, and
 ὅσον ἐν αὐτῇ τῇ σαρκὶ ἐνὶ χολῆς ἢ φλέγματος ἢ
 inasmuch as in it the tissue there is present gall or mucus or
 ἐν τοῖσιν ἐν αὐτῇ φλεβίοισι, τούτου τὸ πολλὸν ἢ
 in the themselves blood vessels, of it most or
 πᾶν ἀποκρίνεται ἔσω πρὸς τὸ θερμόν, πυκνουμέ-
 all separates internally toward the heat, being closely
 νης τῆς σαρκὸς ἔξωθεν, καὶ προσπῆγνυται πρὸς
 packed the tissue externally, and it is affixed toward
 τῷ πλευρῷ· καὶ ὀδύνην τε παρέχει ἰσχυρὴν καὶ
 the chest wall; and tenderness it renders severe and
 διαθερμαίνεται, καὶ ὑπὸ τῆς θερμότητος ἄγει ἐφ’
 heating throughout, and because of the hottest it leads to
 ἑωυτὸ ἀπὸ τῶν πλησίον καὶ φλεβῶν καὶ σαρκῶν
 itself from the proximity both of the blood vessels and tissues
 γλέγμα τε καὶ χολήν. γίνεται μὲν οὖν τούτῳ τῷ
 fluid and gall. it develops then in this
 τρόπῳ.
 way.

Chest wall problems and nonpyogenic lung parenchyma problems develop as follows. Chest wall: whenever excessive and strong drink assault [a patient], the body is completely heated through by the wine and is hydrated; in particular the gall and mucus are heated and liquefied. And so when they have been dissolved and are moving about they combine fortuitously so that the patient will have rigors whether intoxicated or sober. A feature of the chest wall is its limited tissue/muscle mass and internally there is nothing unaffixed to the chest wall, so this location is most sensitive to perceiving a chill. So whenever there is a chill and [feeling of] cold it contracts to a point and the tissues on the chest wall and the blood vessels are squeezed together. Inasmuch as there is gall or mucus in blood vessels themselves most of it or all separates internally towards the heat, and as the muscle mass is tightly packed on its outside it becomes affixed to the [internal] chest wall; and there is exquisite tenderness and extensive warmth. The heat also attracts mucus

and gall from vessels in the vicinity. This, therefore, is how this chest wall disease develops.⁷⁰

b. ὅταν δὲ τὰ πρὸς τῷ πλευρῷ προσπαγέντα
 whenever that near the chest wall being fixed
 σαπῇ καὶ πτυσθῇ, ὑγιέες γίνονται· ἤν δὲ τό τε
 be necrotic and be coughed up, they healthy become; but should the
 ἀρχαῖον πολλὸν προσπαγῇ πρὸς τῷ πλευρῷ καὶ
 initial much be fixed toward the chest wall and
 ἄλλο προσεπιγένηται, αὐτίκα ἀπόλλυνται, οὐ
 other is augmented, promptly he dies, not
 δυνάμενοι ἀναπτύσαι ὑπὸ πλήθους τοῦ σιάλου, ἢ
 being possible to expectorate because of the abundance of [expectorate, not saliva], or
 ἔμπτυοι γίνονται· καὶ οἱ μὲν ἀπόλλυνται, οἱ δὲ ἐκ-
 empyema develops; and they [those with empyema] also die, or they
 φεύγουσιν. διαδηλοῖ δὲ ταῦτα ἐν τῇσιν ἑπτὰ
 survive. appears clear this by the seventh
 ἡμέρησιν ἢ ἑννέα ἢ ἑνδεκά ἢ τεσσαρεσκαίδεκα.
 day or the ninth or eleventh or the fourteenth.

Whenever the lesion fixed to the chest wall becomes necrotic and is coughed up, the patients become healthy. But should the initial chest wall lesion be large and should other material be added to it, the patient either promptly dies because of the inability to expectorate the abundant necrotic material, or he develops an empyema. The latter patients might die or might survive, and this becomes apparent by the seventh, ninth, eleventh or fourteenth day.

c. ὀδύνην δὲ παρέχει ἐς τὸ ὤμον καὶ ἐς τὴν
 tenderness and it brings into the shoulder and into the
 κληΐδα καὶ ἐς τὴν μασχάλην διὰ τὸδε· ἡ φλέψ ἡ
 clavicle and into the axilla in this way: the blood vessel
 σπληνίτις καλεομένη τείνει ἀπὸ τοῦ σπληνὸς ἐς
 splenic being called extends from the spleen to

⁷⁰ In other words, gall and mucus become more fluid (less viscous) with drinking booze and, while being carried in the blood, come together (?combine) to cause a chill (by cooling the blood). The association of inebriation with pneumonia, aspiration pneumonia, lung abscess, empyema appears to have been a big problem in ancient Greece just as it is today. As the chest wall is relatively bare and is a relatively thin-walled structure with little covering of muscle and fat, it is more reactive to this source of coldness, and therefore the gall/mucus combination affixes to it on the inside, for the coldness causes contraction of the tissues and blood vessels, and as a consequence the gall/mucus combination exudes from the blood vessels. Because of chest wall muscles and bone are dense the exudation occurs on the inside (pleural) and warmer surface of the chest wall as it can't seep outwardly. Once in place it grows in size by impressing more gall, mucus, and heat from the surrounding areas.

τὸ πλευρόν, ἐκ δὲ τοῦ πλευροῦ ἐς τὸν ὤμον καὶ ἐς
 the chest wall, and then from the chest wall to the shoulder and into
 τὴν χεῖρα τὴν ἀριστερὴν· ἡ δὲ ἥπατιτις ἐς τὰ
 the left arm and hand; the [blood vessel] of the liver on the
 δεξιὰ ὡσαύτως· καὶ ὅταν ταύτης τὸ ἐπὶ τοῦ
 right similarly; and whenever of this the upon the
 πλευροῦ συνειρυσθῇ ὑπὸ τοῦ ῥιγέος, καὶ φρίξῃ τὸ
 chest wall be joined together because of rigors, and by shivering the
 αἷμα ἐν αὐτῇ, ἔς τε τὴν μασχάλην καὶ τὴν κληί-
 blood in it, into the axilla and the clavical
 δα καὶ τὸν ὤμον ξυνέρχεται τε καὶ σπᾶ, καὶ ὀδυ-
 and the shoulder it extends and should it close, tenderness
 νην παρέχει.
 it causes.

This is the way [this disease causes] tenderness in the shoulder, clavicle, and axilla: the so-called splenic blood vessel extends from the spleen to the chest wall and on to the shoulder and left arm, whereas on the right side the hepatic blood vessel extends similarly. Whenever this blood be adjoined to the chest wall during rigors and the blood be shivering in [the blood vessel], it [the shivering blood] extends into the axilla, clavicle, and shoulder and should it close it produces tenderness.⁷¹

d. κατὰ δὲ τὸν αὐτὸν λόγον καὶ τὰ περὶ τὸν νῶ-
 consistent with this logic and the around the
 τον χωρία διαθερμαίνεται ὑπὸ τοῦ προσπεπηγό-
 back place is being heated up by the further maturation
 τος πρὸς τῷ πλευρῷ φλέγματός τε καὶ χολῆς.
 toward the chest wall of the mucus and gall.

According to theory [by the same logic] the posterior of the body is warmed by the chest wall-affixed gall and mucus mixture as they turn purulent.⁷²

e. παρέχει δ' ὀδύνην ἐνίοτε καὶ τοῖσι τοῦ πλευροῦ
 it imparts and tenderness sometimes and in the chest wall

⁷¹ This seems to be an attempt to explain what is now known as referred pain. On the left the aorta is the mechanism for referred discomfort rather than a nerve pathway, and the inferior vena cava would do the same for the right side. But could “similarly” be replaced by “the same,” in which case the inferior vena cava would serve as both the “splenic” and “hepatic” vessels, rather than the splenic being the aorta? Not likely. And why is “splenitis” used in this way, as it usually means “a problem with the spleen?” This suggests some transcription problems with this manuscript.

⁷² Heat produced by development of purulence? Not consistent with their postulated effect of gall and mucus in the blood as a trigger for fever. But probably the heating in this statement refers to a mechanism for local heat rather than fever. If so, gall and mucus can trigger both systemic fever and local heat.

κάτωθε χωρίοισι. πολλάκις δέ, ἤν ἐς τὰ κάτω
 from lower places. frequently and should inferiorly
 τράπεται ὀδύνη, διαδιδοῖ ἐς τὴν κύστιν διὰ τῶν
 it be diverted tenderness, it can extend into the bladder via the
 φλεβίων, καὶ οὐρέει πολλόν τε καὶ χολῶδες. νο-
 blood vessels, and the patient urinates frequently and gall-like. they
 μίζουσι δὲ ταύτης τῆς νόσου τὸ ῥίγος αἴτιον
 suggest of this disease the chill blame
 εἶναι καὶ ἀρχήν.
 to be and the source.

Sometimes there is tenderness in the lower parts of (below?) the chest wall. If diverted inferiorly there frequently is pain, and the patient urinates frequently and with irritation. It is thought that the chill is to be blamed as the source of this disease.⁷³

27. More on nonpurulent pneumonia, clarification of the role of gall and mucus in the development of purulence, and evolution of an empyema.

a. ἡ δὲ περιπλευμονίη· ὅταν κεκινημένου
 regarding acute nonpurulent pneumonia; whenever having been activated
 τε καὶ ὑγραινομένου τοῦ φλέγματος καὶ τῆς χο-
 and hydrated mucus and gall
 λῆς ἐλκύση ὁ πλεύμων ὑπὸ θερμασίης ἐφ' ἑωυτόν
 be drawn the lungs because of warmth towards itself
 ἀπὸ τῶν πλησίον χωρίων πρὸς τοῖσιν ὑπάρχουσιν
 from proximal places toward them they begin
 ἐν ἑωυτῷ, διαθερμαίνει τε πᾶν τὸ σῶμα καὶ ὀδυ-
 into themselves, it heats throughout completely the body and
 νην παρέχει, μάλιστα δὲ τῷ τε νώτῳ καὶ τῇσι
 tenderness it imparts, mostly however in the back and in the
 πλευρῇσι καὶ τοῖσιν ὤμοισι καὶ τῇ ράχει, ἅτε ἀπὸ
 chest wall and in the shoulders and in the spine, as/since from
 τούτων ἔλκων ἐς ἑωυτόν τὴν ἱκμάδα τὴν πλεί-
 these lesions into itself the moisture the nearest
 στην καὶ ὑπερξηραίνων τε ταύτα καὶ ὑπερθερ-
 and dehydrating these and overheating;
 μαίνων· ὅταν δ' εἰρύση ἐς ἑωυτόν, καὶ ἔδρεν λάββη
 whenever and it draws into itself, and a seat it takes
 ἢ τε χολη καὶ τὸ φλέγμα ἐν τῇ πλεύμονι, σή-
 or gall and mucus in the lungs,

⁷³ Here the tenderness is attributable to the chest wall lesion, but it may have been due to a perinephric or renal infection, left-sided (it's higher than the right kidney) and originally thought to be a low chest lesion. Less likely is hematogenous spread of the pulmonary infection, and least likely is a chest lesion eroding into the renal system, a complication of approximately 1% of chest empyemas today. This statement is partially correct.

πεται καὶ πύεται.

it becomes necrotic and is expectorated.

Regarding nonpurulent pneumonia: when activated and hydrated mucus and gall are drawn because of the warmth into the lungs from the surrounding area toward that present from the beginning, the body becomes heated throughout and there is tenderness primarily in the back, chest wall, shoulders, and spine because the fluid of [these] nearby tissues is drawn into the [affected] area. This causes dehydration and overheating. When the lungs extract this into themselves gall and mucus settle in the lungs and there become necrotic and are expectorated.⁷⁴

b. καὶ ἢν μὲν ἐν τῇσι κυρίησι τῶν ἡμερέων
and should by the expected the day
σαπέντα πτυσθῇ, ὑγιὲς γίνεται· ἢ δὲ τὰ τε ἐπ-
the necrotic material be expectorated, healthiness occurs; but should that which
ελθόντα τὴν ἀρχὴν δέχεται, καὶ προσεπιγίνεται
is come upon at the beginning receive, and it is augmented
ἕτερα, καὶ μήτε πτύων μήτε σήπων κρατῇ ὑπὸ
by other, and neither expectorating nor necrosis obtains the upper hand because
πλήθος τῶν ἐπιγινομένων, ἀπογίνονται ὥς τὰ
of the abundance of additional [material], they are taken away
πολλά· ἢν δὲ πρὸς τὰς ἡμέρας διαγένωνται τὰς
mostly; but should the day will have passed the
δύο καὶ εἴκοσι, καὶ τὸ πῦρ μεθῇ, καὶ ἐν ταύτῃσι
twenty-second, and the fever released, and in this
μὴ ἐκπτυσθῇ, πάντες ἔμπυοι γίνονται, μάλιστα
it not be expectorated, in all of them a collection of pus occurs, especially
δὲ τούτων, οἷσιν ἰσχυρόταται ἢ τε πλευριτίς καὶ
in them, in those with the most severe chest wall disease and
ἡ περιπλευμονίη.
the acute nonpurulent pneumonia.

And should that necrotic material be expectorated by the appropriate time, the patient regains health. But should that [mucus/gall] which originally settled [in the lungs] be augmented by more and neither expectoration nor necrosis suffices [to clear it], most [patients] cannot survive. Should the twenty-second day arrive and fever develop without expectoration, these patients are likely to be developing a chest empyema, especially those with the severest chest wall disease or severe nonpurulent pneumonia.

28. Chest wall disease and acute nonpurulent pneumonia, both without purulent sputum expectoration, are discussed here, as well as recommendations as to therapy, particularly phlebotomy, hydration, and dilution.

⁷⁴ The point of interest here is the statement that both gall and mucus are capable of becoming necrotic and then purulent, as can blood. This seems to be their distinguishing feature, one not shared by other tissues or substances.

a. γίνεται δὲ καὶ πλευρίτις ἄπτυστος καὶ
 it occurs chest wall disease without expectoration and
 περιπλευμονίη, ἄμφω ἀπὸ τοῦ αὐτοῦ, ἀπὸ ξηρα-
 acute nonpurulent pneumonia both by the same, from
 σίης· ξηραίνει δὲ καὶ τὰ θερμά, ὅταν ὑπερθερμαί-
 dryness [dehydration]; and the heat dries, whenever it is overly
 νη, καὶ τὰ ψυχρά, ὅταν ὑπερψύχῃ. πηγνυται δὴ
 heated, and the coldness, whenever it be too cold. it combines
 τὸ πλευρὸν καὶ τὰ ἐν αὐτῷ τῷ πλευρῷ φλέβια,
 the chest wall and the blood vessels in the chest wall,
 καὶ ξυσπᾶται, καὶ ὅσον ἐν αὐτῷ ἐνι χολῆς ἢ φλέγ-
 and squeezed together, and whenever there is in it gall or
 ματος, τοῦτο ὑπὸ τῆς ξηρασίης ἐνέσκληκέ τε
 mucus, this from the dryness stiffens
 καὶ ὀδυνὴν παρέχει καὶ ὑπὸ τῆς ὀδύνης πυρετόν.
 and tenderness it imparts and from the tenderness fever.

The absence of expectoration in chest wall (pleural) disease and nonpyogenic pneumonia is caused by dehydration. The heat dries them when it is overheated, and the cold dries them when it is too cold. The chest wall and blood vessels in the chest wall are squeezed together, sometimes with gall or mucus, and when this happens there is stiffening from the dehydration and fever from tenderness.

b. τούτου ξυμφέρει τὴν φλέβα ἐποσχάσαι τὴν ἐν
 for this it is beneficial the blood vessel to be slit open in
 τῇ χειρὶ, τὴν σπληνίτιν καλεομένην ἢ τὴν ἥπα-
 the arm, the splenic vein so-called or the
 τίτιν, καθ' ὁποῖτον ἂν ἡ τὸ νόσημα· καὶ οὕτως ἡ
 hepatic, on whichever [side] the disease happens to be; and thus the
 ὀδύνη μαλακωτέρη γίνεται τοῦ πλευροῦ τε καὶ
 tenderness lessened becomes on the chest wall and
 τῶν ἄλλων· ἢ γὰρ φλέψ, ὅσον ἐνι ἐν αὐτῇ χολῆς
 the rest; for the blood vessel, when there is in it gall
 ἢ φλέγματος, αὐτοῦ τοῦ αἵματος νενοσηκότος,
 or mucus, by the blood having been diseased,
 μετὰ τούτου μεθίησι τὸ πολὺ ἔξω· τὸ δ' ἐκ τῆς
 with this is released most externally; and that from the
 σαρκὸς ὑπὸ τε φαρμάκων ποτῶν διαχεῖται καὶ
 tissues by medicines drinking is dispersed and
 ὑπὸ χλιασμάτων προστιθεμένων ἔξωθεν, ὥστε
 by warmth being applied externally, so that
 τὴν νοῦσον σκίδνασθαι ἀνά πᾶν τὸ σῶμα. καλέε-
 the disease to be scattered all over the body. is
 ται δ' αὕτη ἡ νοῦσος πλευρίτις ἄπτυστος.
 called this disease chest wall disease without expectoration.

For this problem it is beneficial to incise the blood vessel in the arm, the so-called splenic vein or the hepatic, depending on which side the disease happens to be. Thereby the tenderness on the chest wall and elsewhere is lessened. [This is so] because the blood vessel, by carrying within it gall and/or mucus, the blood itself has become diseased, and with this (phlebotomy) most is released externally (*i.e.*, removed). That [gall and mucus] in the tissues is dispersed by drinking medicines and by application of external warmth so that the disease will be scattered all over the body. This disease is called chest wall disease without expectoration.

c. ἡ δὲ περιπνευμονία, ὅταν ὁ πλεῦμων ὑπερξη-
and the nonpurulent pneumonia, whenever the lungs are
ρανθῇ καὶ αὐτός· καὶ ὅσον ἐν αὐτῷ ἐνι χολῆς ἢ
dehydrated, the same; and while in it sometimes gall or
φλέγματος, οὔτε σήπει ὁμαλῶς, οὔτε τὸ σίελον
mucus, neither necroses regularly nor sputum
ἀναδιδοῖ· ὅσον τε ἐν αὐτῷ ἐστὶν ἰκμάδος, ἢ ἀπὸ
brings up; while in it is moisture, or from
ποτοῦ ἢ ἀπὸ ρυφήματος ἢ ἀπὸ τῶν πλησίον
drink or from food or from proximal
χωρίων, τοῦτο πᾶν ἐκκαίει ὑπὸ τῆς ὑπερξηρασίης
places, this completely it burns from the dehydration
τε καὶ θερμασίης.
and the heating.

As for nonpurulent pneumonia, when the lungs become dehydrated, the same thing [happens]. Thus, even though some gall or mucus might be in them, neither becomes homogeneously necrotic nor is brought up in sputum. Although some moisture is in the lungs that is derived from drink, from soups, or from proximal tissues, this is completely evaporated by the dehydration and heating.

d. τοῦτῳ ξυμφέρει πόματα πίνειν, ὅφ' ὧν
by this means it is beneficial potions to drink, by which
ὕγραίνεται ὁ πλεῦμων καὶ πτύσσεται· ἣν γὰρ
are hydrated (moistened) the lungs and expectorate; for should
μὴ πτυσθῇ, σκληρός τε γίνεται ὁ πλεῦμων καὶ
not be expectoration, stiff have become the lungs and
συναυαίνεται, καὶ τὸν ἄνθρωπον ἀπόλλυσι.
withered, and the person dies.

It is beneficial to drink potions that hydrate the lungs and permit expectoration, for, should there be no sputum production, the lungs will stiffen and wither and the patient will die.⁷⁵

⁷⁵ This is a curious statement in that it suggests postmortem examination was performed, for how else could a dry and withered lung have been confirmed in dehydrated patients. Equally curious is what kind of lung disease might cause such a pathology. The explanation is that the statement is fictitious.

29. A discussion of typhoid-like fevers is presented, with emphasis on secondary pulmonary infections and on the role of χολή.

a. καῦσος δὲ λαμβάνει μὲν μᾶλλον τοὺς χο-
 kausos fever seizes more like gall,
 λώδεας, λαμβάνει δὲ καὶ τοὺς φλεγματίας, λαμ-
 it attacks but also by mucus, and
 βάνει δ' ὥδε· ὅταν χολὴ κινηθῇ κατὰ τὸ σῶμα,
 it attacks thus: when gall be moving against/around the body
 καὶ συγκυρήσῃ ὥστε τὰς φλέβας καὶ τὸ αἷμα
 and comes together by chance so that the blood vessels and the blood
 εἰρύσαι τῆς χολῆς - εἰρύσαι δὲ τὸ πλεῖστον ἐκ
 extracts gall - to extract mostly from
 τε τῶν σαρκῶν καὶ τῆς κοιλῆς τὸ πρόσθεν
 the (chest) tissues and of the [chest] cavity the front
 ἐνέον - ἅτε τῇ φύσει θερμότατον ἐὼν ἐν τῷ σώ-
 inside - because by its nature hottest being in the
 ματι, τὸ αἷμα, ὅταν διαθερμανθῇ ἐκ τε τῶν σαρκ-
 body, the blood, when it has been heated out from (by) the tissues
 κῶν καὶ τῆς κοιλῆς πρὸς τῷ ἐνέοντι ὑπὸ τῆς
 and [out from, by] the (chest) cavity near the inside because of
 χολῆς, διαθερμαίνει καὶ τὸ ἄλλο σῶμα πᾶν. καὶ
 gall, it heats and the rest of the body. and
 τὰ μὲν ἔνδον ὑπὸ πολλῆς ἱκμάδος οὐ δύναται
 the internal by much moisture it is not possible
 ἀποθνήσκει ὠνθρωπος· τὰ δ' ἐν τοῖσιν ἀκρωτη-
 he dies the man; but in the extremities
 ρίοισι τοῦ σώματος, ἅτε ξηρὰ ἐόντα φύσει, ἀπο-
 of the body, because dry being its nature,
 ξηραίνεται τε καὶ ἐκκαίεται ἐξ αὐτῶν τὸ ὑγρὸν τὸ
 it becomes dehydrated and is burned up out of them the moisture
 πλεῖστον· καὶ εἰ ἐθέλοις ψαύειν, ψυχρὰ τε αὐτὰ
 most; and if one might wish to touch, cool this
 εὐρήσεις καὶ ξηρὰ· καὶ διὰ τοῦτο ὅσοι ὑπὸ καύσου
 you will find and dry; and through this those who from kausos fever
 ἀλίσκονται, τὰ μὲν ἔνδον καίονται ὑπὸ τοῦ πυρός,
 are overcome, the internally are heated/burned from the fever,
 τὰ δ' ἔξω ψυχροὶ εἰσιν, ἡ δὲ γλῶσσα καὶ ἡ
 but the external cold is, the tongue and the
 φάρυγξ τρηχύνεται τε καὶ ξηραίνεται ὑπὸ τοῦ
 throat is roughened and dry from the
 πνεύματος τοῦ ἔνδον καὶ τῆς θερμότητος.
 breath of the internal and the heating.

Whenever kausos fever grips a person [it is] primarily due to gall, but it also afflicts with mucus, and thus its attack is as follows: when gall is moving around the body and happens to comes together [with the blood] so that the blood and the blood vessels extract gall –

most being extracted from the tissues and inside the anterior chest - because blood by its nature is the hottest component in the body. Now the blood, when it has been heated from the [lung] tissue and the inside of the chest [*i.e.*, centrally heated] and being the hottest [substance] in the body, it heats the rest of the body. But there is much moisture internally, so it is not lethal for the person, whereas in the extremities, being drier in nature, become dehydrated and most of the water has evaporated from them. And if you wish to touch [the patient] you will find it cool and dry. Because of this those who are overcome by *kausos* fever are heated internally from the fever but the external is cold and the tongue and throat is roughened and dry from the internally heated breath.⁷⁶

b. ὅσον δ' ἂν ἐν τῇ κοιλίῃ ἢ ἐν τῇ κύστι ἐγγέ-
and in whenever in the bowel or in the bladder develops
νηται χολῆς, τὸ μὲν ἐν τῇ κοιλίῃ ἐνίοτε μὲν δια-
gall, the in the bowel sometimes thoroughly
ταράσσεται κάτω, τὰ δὲ πολλὰ ἐμέεται ἐν τῇσι
disordered below, and much is vomited in the
πρώτησιν ἡμέρησιν ἢ τέσσερσιν ἢ πέντε· ἐμέεται
first days or the fourth or fifth; it is vomited
δὲ διὰ τόδε· ὅταν ἡ ἄνω κοιλίῃ ὑπερθερμανθῇ,
through this way; whenever the upper cavity (chest) is overheated,
ἔλκει ἐφ' ἑωυτήν, καὶ γίνεται ἔμετος· διὰ τοῦτο
it attracts to itself, and occurs vomiting; through this
δ' αὐτὸ καὶ ἐς περιπλευμονίην ἐκ καύσου τε καὶ
and the same into nonpurulent pneumonia from *kausos* fever and
πλευρίτιδος μάλιστα μεθίσταται τὰ νοσήματα·
chest wall disease especially abruptly changes the diseases;
ὅταν γὰρ ἡ ἄνω κοιλίῃ ὑπερθερμανθῇ, ἔλκει ἐφ'
whenever for the chest is overheated, it attracts to
ἑωυτήν, καὶ ὑποδέχεται ὁ πλεύμων, καὶ γίνεται
to itself, and receive [it] the lungs, and occurs
περιπλευμονίῃ, καὶ ὥς τὰ πολλὰ ἀπόλλυνται,
nonpurulent pneumonia, and from this most die,
ἅτε ἐόντες ἤδη ἀσθενέες καί, ἐτέρης νόσου
because being already weakened and, by the other disease
καινῆς ἐπιγεννηθείσης, οὐ δυνάμενοι τὰς ἡμέρας
heated supervening, it may not be possible the day
διατελέειν, ἄχρι οὗ τὸ σίαλον πεπανθῇ ἐν τῷ
to live through, even when the sputum be not purulent in the
πλεύμονι, ἀλλ' ὥς τὰ πολλὰ προαπόλλυνται
lungs, but in any case most die

⁷⁶ An interesting and remarkable internally consistent point in this description is the explanation for the unexpectedly cool, dry, skin, lack of sweating, and parched tongue of patients with *kausos* fever, features of typhoid fever discussed in detail, along with associated pulmonary complications, in volume 2 of *The Natural State of Medical Practice*, p. 40ff.

ὑπὸ ἀσθενείης· ἔνιοι δὲ περιγίνονται.
from cachexia; but sometimes they are saved.

And whenever gall is in the bowel or bladder, the bowel movements are sometimes badly disordered, and much is vomited in the first days or the fourth or fifth. Vomiting occurs because the chest is overheated and it attracts to itself [upwardly?], and vomiting occurs. The same mechanism applies to abrupt changes in the disease called *kausos* fever from either parenchymal pulmonary disease or in chest wall disease. For when the chest is overheated, it attracts to itself and the lungs receive (gall), and this produces nonpurulent pneumonia, and from this most die because, being already weakened, another heated disease may supervene. It may not be possible, therefore, to live through the day even though the sputum may not be purulent in the lungs. Thus, in most cases the patient dies of cachexia, although sometimes they can be saved.

c. ὅσον δ' ἐς τὴν κύστιν συρρέει χολῆς, οὐρεῖται
whenever in those whom in the bladder it flows together with gall, it is urinated
παχύ, παχὺ δ' ὑπὸ φλέγματος καὶ χολῆς·
thick, the thickness from mucus and gall;
χολῶδες δὲ διαχωρεῖ, ὅταν διαχωρῇ, ὑπὸ τοῦ
gall-like and he passes, whenever he defecates, because the
ξυγκεκαύσθαι ἐν τῇ κοιλίῃ τὰ ἐνεόντα.
to have been burned in the bowel the internal contents.

Whenever it (gall) flows into the bladder, viscous urine is produced, the high viscosity being due to the presence of mucus and gall, and when it passes through [in the stool] during defecation it is irritating, the internal contents having been charred in the bowel.

30. This section discusses the mechanism of delirium and clinical depression.

a. φρενίτις δ' οὕτως ἔχει· τὸ αἷμα ἐν τῷ ἀν-
delirium is as follows: the blood in the
θρώπῳ πλεῖστον συμβάλλεται μέρος συνέσιος·
person the most brings together part of comprehension;
ἐνιοι δὲ λέγουσι τὸ πᾶν· ὅταν οὖν χολὴ κινηθεῖσα
sometimes and they say all; when then gall is being moved
ἐς τὰς φλέβας καὶ ἐς τὸ αἷμα ἐσέλθῃ, δι' οὖν
into the blood vessels and into the blood enters, then
ἐκίνησε καὶ διώρρωσε τὸ αἷμα ἐκ τῆς ἐωθυίης
was moved and was disassembled the blood from [its] accustomed
συστάσιός τε καὶ κινήσιος, καὶ διεθέρμηνε· διαθερ-
assemblage and movement, and was heated; it then
μαίνει δὲ καὶ τὸ ἄλλο σῶμα πᾶν, καὶ παρανοεῖ
thoroughly heats the entire body, and it deranges
τε ὁ ἄνθρωπος καὶ οὐκ ἐν ἑωυτῷ ἐστὶν ὑπὸ τοῦ πυ-
the person and he is not in himself because of the

ρετοῦ τοῦ πλήθους καὶ τοῦ αἵματος τῆς διορρώ-
 fever excessive and of the blood of the disassemblage
 σιός τε καὶ κινήσιος γενομένης οὐ τῆς ἐωθυίας.
 and of the movement having developed unaccustomed.

Delirium is as follows: the blood in a person links together the largest part of comprehension, and some say “all.” When, therefore, gall is being moved into the blood vessels and enters into the blood, the blood moves but is disassembled and moves in an unaccustomed form. It is then heated [as it moves centrally], after which it thoroughly heats the entire body. This deranges the patient who is [afterwards] not himself because of the development of excessive fever and an unaccustomed change in the blood and its movement.⁷⁷

b. προσεοίκασι δὲ μάλιστα οἱ ὑπὸ τῆς φρενίτιδος
 there is a resemblance special they from the delirium
 ἐχόμενοι τοῖσι μελαγχολώδεσι κατὰ τὴν παρά-
 they have in clinical depression concerning the
 νοιαν· οἷ τε γὰρ μελαγχολώδεις, ὅταν φθαρῇ τὸ
 derangement; for whoever is being depressed, whenever polluted the
 αἷμα ὑπὸ χολῆς καὶ φλέγματος, τὴν νοῦσον ἴσχουσε
 blood from gall and/or mucus, they have a disease
 καὶ παράνοσι γίνονται, ἔνιοι δὲ καὶ μαίνονται· καὶ
 and derangement develops, and sometimes mania [severe delirium]; and
 ἐν τῇ φρενίτιδι ὡσαύτως· οὕτω δὲ ἥσσον ἢ μανίη
 in delirium likewise; but merely less the mania
 τε καὶ ἡ παραφρόνησις γίνεταί, ὅσῳ περ ἡ χολὴ
 and the anxiety develop, thus all around the gall
 τῆς χολῆς ἀσθενεστέρη ἐστίν.
 of the [other] gall weaker is.

There is a particular resemblance of delirium to those with [mental] derangement from clinical depression, for those having depression, when the blood is polluted with gall and

⁷⁷ In other words, delirium is caused by two factors: fever and something abnormal in the blood, identified here as gall. Modern research has not determined the pathogenesis of delirium associated with sepsis (excluding including drugs and trauma), but a substance or alteration in the blood must be the factor(s). But fever *per se* is not a factor until tissue-damaging levels are reached, generally over 106 degrees. Thus, delirium from infection can be seen with mild or even no fever, whereas no evidence of delirium is often present in patients with temperatures up to 105 degrees. In blaming delirium on an abnormality of the blood, however, the Hippocratics were correct. Notably the opening of this paragraph indicates the Hippocratics considered all the feedback to the brain (*e.g.*, sensation) that allowed it to make judgments/decisions (but not consciousness) was transmitted via the blood rather than a network of nerves. The comment on heating of the blood is consistent with gall triggering increased heat production and thereby fever as it passes centrally through the body.

mucus, have a disease and derangement develops, and sometimes even mania. In delirium it is similar, but here less mania and anxiety develop, for the gall is weaker.⁷⁸

31. The significance of expectoration in chest wall disease and in nonpurulent pneumonia, as both diseases now turn purulent.

ὑφαιμον δὲ καὶ πελιδνὸν ἔν τε τῇ πλευ-
extravasated blood and cyanosis/duskiness in the chest wall
πίτιδι καὶ ἐν τῇ περιπλευμονίῃ διὰ τόδε πτύουσι·
disease and in nonpurulent pneumonia throughout this they spit up;
κατ' ἀρχὰς μὲν ὥς τὸ πολὺ οὐδέτερα πτύουσιν,
at the beginning much neither expectorate,
οὔτε πελιδνὸν οὔτε ὑφαιμον· εἰδέναι δὲ χρὴ ἰσχυ-
neither cyanotic nor admixed with blood; to be seen and one must
ρὴν ἐοῦσαν τὴν νοῦσον, ὅταν τὸ σίαλον ἄρξωνται
severe being the disease, whenever the sputum they seem to begin
ὑπόπαχυν πτύειν, καὶ καθαίρεσθαι μάλιστα τότε.
a little thick to expectorate, and to clear out most this.
πτύεται δ' ἀπὸ διατάσιος τῶν φλεβῶν, τῆς μὲν
and it is expectorated from severe stretching of the blood vessels, in
πλευρίτιδος ἐκ τῶν ἐν τῷ πλευρῷ, τῆς δὲ περι-
chest wall disease from those within the chest wall, and in
πλευμονίης ἐκ τῶν ἐν τῇ πλεύμονι, καὶ θερμα-
nonpurulent pneumonia from those in the lungs, and
σίην ἐπάγει ἐφ' ἑωυτήν. ἦν δὲ ῥωγματίης ἡ ὁ
warmth it attracts to itself. But should there be a sudden worsening or the
τὴν νοῦσον ἔξω καὶ σαβακός, ἀπὸ τῆς πρώτης
the disease having and destroy, from the first
ἡμέρης καὶ αἷμα καὶ ὑφαιμον καὶ πελιδνὸν σὺν
day blood and blood-streaking and duskiness with
σίᾳλω πτύει· τὸ δὲ πελιδνὸν ἀπὸ τοῦ αἵματος γί-
sputum he expectorates; and the duskiness from the blood
νεταί, ἦν ὀλίγον συμμίσγεται ἐς πολὺ σίαλον, καὶ
develops, should a little be mixed with it in a lot of sputum, and
μὴ παραυτίκα πτύεται, ἀλλ' ἐμμένῃ ἡμισαπὲς
not suddenly it can be expectorated, but should it remain partially necrotic
ἐὸν καὶ ἐκτεθλησμένον ἐν τῷ σώματι.
being and having become softened in the body.

⁷⁸ The writer assumed a variation in the virulence of gall (bile) but has not specified “black bile” as a cause of clinical depression (melancholy), another indicator of the irrelevance of humoral theory to the writer. But clinical depression is not typically associated with mania. This is so obvious that there either is an error or the writer is referring to what is now termed “bipolar disorder,” formerly called manic-depressive disorder. As for delirium, any clinician will vouch for the intense agitation seen in some delirious patients, an ongoing issue regarding limitation on physical restraint, so the writer is inaccurate.

In chest wall disease and nonpurulent pneumonia patients spit up sputum like this: it can be blood-streaked and dusky. At the onset, however, neither the bloody nor the dusky sputum may be produced. One must remember that the disease becomes more severe when patients begin to expectorate slightly thick sputum and to clear out most of it. It is coughed up from severely stretched blood vessels; for chest wall disease from those in the chest wall, and for nonpurulent pneumonia from those in the lungs, and this attracts warmth to the area. But should there be a rapid worsening or damage from the disease, the blood and blood-streaking and duskiness will be seen with the sputum he expectorates from the first day. The duskiness occurs because of the blood, and should a little (blood) be mixed in with much sputum and not be promptly expectorated, it may remain partially necrotic and become softened in the body.⁷⁹

32. Mechanism of death in chest wall disease.

ἀποθνήσκουσι δ' ἀπὸ μὲν πλευρίτιδος,
 they die from chest wall disease,
 ὅταν πολλὸν μὲν τὴν ἀρχὴν τῷ πλευρῷ προσπα-
 when much the beginning in the chest wall are
 γῇ φλέγμα τε καὶ χολή, πολλὸν δὲ προσεπιρρυῇ
 affixed mucus and gall, and much also flows toward it
 καὶ ἐκ τοῦ ἄλλου σώματος, καὶ μήτε πτύων κρα-
 from the rest of the body, and neither expectorating
 τῇ ὑπὸ πλῆθους τούτων μήτε σήπων, πιμπλῶν-
 strongly from abundance of them nor necrosing, filling
 ται δὲ αἱ ἀρτηρίαι ὑπὸ τῶν ἐνεόντων φλέγματος
 up the bronchi with the internalized mucus
 τε καὶ πύου· τότε δὲ ῥέγκει καὶ ἀναπνεῖ πυκνόν
 and pus; this the patient inhales stertorously and rapidly
 τε καὶ αὐτόθεν ἄνωθεν, τέλος δὲ ἀποφράσσεται
 and from thence from above, and the end it is closed off
 πάντα καὶ ἀποθνήσκει. τὸν αὐτὸν δὲ τρόπον καὶ
 completely and the patient dies. the same nature and
 ἐκ περιπλευμονίης ἀπόλλυνται.
 from acute nonpurulent parenchymal lung disease he dies.

Patients die from chest wall disease when at the beginning there is much gall and mucus affixed [to the chest wall] and much more flows towards it from the rest of the body, and [they] neither forcefully expectorate nor decompose such a large quantity. Thus, it fills up the bronchi with the internalized mucus and pus. The patient thereby breathes rapidly and with stertor and thence upwardly (upper chest respirations), and terminally they (the

⁷⁹ The “severely stretched” blood vessels must leak fluid (plasma components) for this to make sense, for the result of the *διάστασις* is both expectoration and a focus of fluid (mucus) that would attract more fluid to itself. The significance of duskiness as mentioned four lines from the end of the paragraph is uncertain, but it may refer to cyanosis of the patient as the diseases worsen and extensive purulence leads to desaturation of hemoglobin. This would indeed be a bad, probably terminal, sign.

bronchi) are closed off completely and the patient dies. Patients die the same way from parenchymal lung disease (pneumonia).⁸⁰

33. Mechanism of death from kausos (typhoid-like) fevers.

ὅσοι δ' ὑπὸ καύσου ἀποθνήσκουσιν, πάν-
 those who from kausos fever die, all
 τες ὑπὸ ξηρασίης ἀποθνήσκουσιν· ἀποξηραίνεται
 from dehydration they die; it is dehydrated
 δ' αὐτῶν πρῶτον μὲν τὰ ἀκρωτήρια, πόδες τε
 of them first the extremities, feet
 καὶ χεῖρες, ἔπειτα δὲ τὰ ἐπιξηρότερα· ὅταν δ' ἐκ-
 and hands, and then the body surface; when
 καυθῇ τε καὶ ἀποξηρανθῇ παντάπασι τὸ ὕγρὸν ἐκ
 it be heated and evaporated completely the moisture from
 τοῦ σώματος, τὸ μὲν αἷμα πήγνυται τε παντελῶς
 the body, the blood congeals utterly
 καὶ ψύχεται, τὸ δ' ἄλλο σῶμα ἀποξηραίνεται, καὶ
 and is cooled, and the rest of the body dehydrates, and
 οὕτως ἀποθνήσκει.
 in this way he dies.

In those in whom kausos fever is fatal, all die from dehydration. They become dehydrated first in the extremities, feet and hands, and then the body surface. When the fluids of the body are heated and completely evaporated the blood completely gels and cools, and the rest of the body dehydrates. In this way the patient dies.⁸¹

⁸⁰ The “upwardly” has been interpreted by some translators as upper lungs, for most airflow occurs in the upper lobes when a large volume of pleural effusion collapses the lower lobes. But how could this statement be corroborated? Simultaneous palpation of the chest bilaterally can identify decreased pulmonary movement on one side of the chest, but the rib cage is too sturdy to permit such a differentiation between upper and lower chest. And pleuritic chest pain can cause the patient to decrease chest wall motion on the affected side, but not upper vs. lower chest. Thus, this statement cannot refer to the lungs unless the examiner put his ear to upper and lower chest. Alternatively, it could refer to stertor being apparent at first in the chest and later, terminally, over the trachea and throat, the “death rattle.” A faulty understanding of chest anatomy may have led Hippocratic physicians to conclude that a chest wall problem can communicate with the bronchial tree inside the lungs. But this only happens with a bronchopleural fistula, and perhaps this is exactly what the writer is describing. If so, the statement as to terminal clinical course is approximately correct.

⁸¹ Typhoid generally causes a septic death. What clinical observations might have suggested the terminal event was dehydration? Prior to the availability of intravenous fluids and nasogastric tubes there probably was, at some point, insufficient hydration for bodily functions, but this scenario would not have been unique to typhoid. Dr. Austin Flint presented clinical observations of the death of some typhoid patients: *Clinical Reports on Continued Fever*, Phila. 1855. The majority were observed to die from “asthenia.” This suggests that during the course of the illnesses of those patients there was an inability to provide adequate nutrition, and perhaps hydration, over a long enough time that inanition could develop even without fluid loss from diarrhea. Perhaps the

34. Mechanism of terminal delirium and death from kausos (typhoid-like) fevers.

a. ὑπὸ δὲ τῆς φρενίτιδος ἀπόλλυνται οὕ-
 from (with?) the delirium he dies in this
 τως· παραφρονέουσιν ἐν τῇ νόσῳ διὰ παντός,
 way: they are deranged in the disease throughout,
 ἅτε τοῦ αἵματος ἐφθαρμένου τε καὶ κεκίνημένου
 because of the blood being polluted and having been moved
 οὐ τὴν ἐωθύαν κίνησιν· καὶ ἅτε παραφρονέοντες
 unaccustomed movement; and because of being deranged
 οὔτε τι τῶν προσφερομένων δέχονται, ὅ τε καὶ
 not some of the prescribed [things] they accept, which and
 ἄξιον λόγου, ὅταν τε προίῃ ὁ χρόνος, μαραίνονται
 worthy of the word, and as time goes forward, they regress
 τε καὶ μινύθουσιν ὑπὸ τε τοῦ πυρετοῦ καὶ ὑπὸ τοῦ
 and decline from the fever and from the
 μηδὲν ἐσιέναι ἐς τὸ σῶμα· καὶ πρῶτα μὲν τὰ ἐν
 nothing to be eaten into the body; and first the
 τοῖσιν ἀκρωτηρίοισι μινύθει τε καὶ ψύχεται, ἔπει-
 in the fingers it weakens and is cooled, then
 τα δὲ τὰ ἐπ' ἐγγυτάτῳ.
 the closer.

Patients with delirium die in this way: they are deranged throughout the disease because of polluted blood having been moved in an unaccustomed way. Because of the [mental] derangement they do not accept proffered items that are good for them, and as time progresses they wither and decline from the fever and from lack of nutrition. First the hands weaken and cool, and then it moves proximally.

b. καὶ ψύχεος δὲ καὶ πυρὸς καὶ πόνων ἀρχὴν
 both cold and fever and distress origin
 ταύτην ἴσχει· ὅταν τὸ αἷμα ἐν τῇσι φλεψὶν ὑπὸ
 this it is; whenever the blood in the blood vessels
 τοῦ φλέγματος ψυχθῇ, μεταπίπτει τε καὶ ξυσπᾶ-
 from the mucus is chilled, it abruptly changes and is crystallizes
 ται ἀλὲς ἄλλοτε ἄλλη καὶ τρέμει· τέλος δὲ ψύχε-
 a mass here and there and trembles; the end he
 ται πάντα καὶ ἀποθνήσκει.
 is chilled completely and he dies.

relevant point is that massive hemorrhage, strokes, seizures, and other catastrophic terminal events were not the usual proximal cause of death in typhoid fever. If this were the situation in Hippocratic times the conclusion that such patients died from dehydration (ὑπὸ ξηρασίνης) was at that time a reasonable and often correct conclusion. And this the following Section confirms.

Thus, the origin of the coldness, fever, and distress is this: when blood in the blood vessels is cooled by the mucus it promptly changes and an accumulation gels here and there and trembles. Terminally the patient is completely chilled and dies.⁸²

End of volume 3

⁸² The coldness indicates cessation of metabolic processes that produce the energy/heat necessary for life. *Diseases I* indicates in several places a relation between heat and the viscosity of mucus, so as a terminal event the Hippocratic physicians may have considered gelation/crystalization the ultimate result of cooling, similar to ice being the crystallization of water. This fits ξυσπάω better than “squeezing” or “contraction.”

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The Natural State of Medical Practice

After analyzing twelve ancient primary civilizations/proto-civilizations using metrics derived from the five primary civilizations that successfully developed, at least circumstantially, a nascent medical profession, Dr. Adams concludes that the overwhelming cause of obstruction to initiating an effective medical practice and to progress in general was the *egalitarian kinship*. This explains how seemingly benign and stable civilizations could persist unchanged for a thousand years with no discernible improvement in the human condition, evidence being life expectancies for the common man and woman averaging little more than thirty years and with no evidence of any formal medical practice and no alleviation of misery and premature death from trauma, disease and difficult birthing. Escape from egalitarianism was made possible in great part because commercialization contributed to severing of traditional egalitarian bonds. It is proposed that medical practices emerged in the five successful primary civilizations during a transient period in early urbanization known as “settlement hierarchy,” a spontaneously devised apolitical hierarchy supporting an enlarging and prospering population. Political authoritarianism (as described in volume 1 of this series) and egalitarian authoritarianism (as described in this volume) have, over thousands of years, obstructed repeated attempts by mankind to improve its circumstances, thereby contravening the natural law of our species and leading to a Sisyphean recycling of civilizations. Global progress today finds its origins in the Judeo-Christian ethos of Western culture, but the global distinction between free and non-free societies has been camouflaged as inventions are stolen, copied, or purchased and then implemented by authoritarian cultures. Bleak prospects face humanity as power is willfully ceded to authoritarian governance.

William H. Adams, MD, FACP, DCMT (London), began his search for the natural state of medical practice while on the staff of a large municipal hospital in New York City. Dissatisfied by aspects of medical practice as incorporated in recent decades he continued the search after retirement which , after twenty years, has culminated in this four-volume testimonial to the role of group freedom in human progress.