

PREFACE

As one of my former graduate students once remarked, “drugs are everywhere you look in Greek and Roman literature.” So they are, and often the classical scholar either passes over such mentions as “irrelevant,” or “too technical,” thus reinforcing the separation – more like a wall – of the medical and other sciences from what are usually labeled the humanities. This almost rigid division is a most modern convention: even Charles Darwin was proud of his knowledge that might have stemmed from adolescent reading in Aristotle, Theophrastus, or Pliny the Elder, and until World War II, physicians and pharmacists frequently composed luminous histories of their professions, often in full command of the Greek and Latin texts that undergirded most sources ranging forward into the nineteenth century; other physicians penned some of the more memorable works of fiction in western literature, with Somerset Maugham and Conan Doyle often cited as examples of the multiply-talented and trained medical scientists who created lasting masterpieces, and Anton Chekhov’s plays and short stories remain on anyone’s canonical listings of Russian literature. Early nineteenth century schools of medicine in Europe and the United States generally required a background in the classical languages, but by about 1870, Greek had fallen by the wayside, and Latin gradually yielded its place of honor to the burgeoning fields of biology, chemistry, and physics. By the 1950s, few entered the profession knowing Latin, much less the classical origins of western medicine with its purported Hippocratic ideal. Occasionally, the better textbooks in biology, chemistry, and physics featured potted biographies of the Great Figures in the very short histories of these modern studies, and if a student was fortunate enough to have an instructor who understood how rapidly the theoretical notions have changed since the breakthrough research of Louis Pasteur, that student heard something of the ancient wisdom of an Aristotle, who had enunciated a principle that still holds in all of the sciences: our hypotheses will necessarily change the more facts are gathered.

Especially striking in the history of western medicine and pharmacy is the incredible durability of the Greco-Roman concepts of “how the body works,” “what constitutes disease” (and health), fused into what early twentieth century physicians still called a Humoral Pathology. One can discern the beginnings of such ideas in the pure speculations of the Pre-Socratic philosophers, shortly to be augmented by further presumably practical applications of the theoretical Elements and Qualities into the operative functions of living things, from plants

to people. By the fourth century BC, it had become intellectually fashionable (at least in Athens, southern Italy, and western Asia Minor) to assume *chyloi* (“liquids” thus “humors”) likewise existed in plants and animals in the continual and cyclical process of life, from birth through senescence and death. The task of the physician became the restoration and maintenance of an ideal proportion (a *krasis*) of particularly essential humors (there long remained much disagreement about how many of them there were, and what they actually might be). A lengthy debate among philosophers and physicians eventually narrowed them down to four, and once Galen of Pergamon (AD 129–after 210) canonized the theory of *the* four humors as adapted from the Hippocratic tract *Nature of Man*, those four (blood, phlegm, black bile, yellow bile) retained their authoritative status well into the early twentieth century. Durable also was the understanding of how the universe consisted of four elements (air, water, fire, earth), only experimentally disproven by a famous demonstration by Antoine Lavoisier in 1783 that water was *not* an element, but two of them.

Farmers and others who made their livings on and from the land were the vast majority of citizens in the Greek *poleis*, the succeeding Hellenistic states, as well as the Roman Republic, Empire, and the continually evolving “later” Roman culture we call “Byzantine.” What farmers, fishermen, and hunters knew was what most would know: agriculture, the seas and rivers that fed people living in the cities abutting them, and the world of wilderness that flanked every farm – all spoke of seasons; farmers measured them by weather-cycles spliced with rising and setting constellations, as they plowed, planted, weeded, harvested, stored, and consumed, beautifully resonated in the hexameters by Hesiod of Ascra (*fl. c.* 700 BC) in his *Works and Days*; millennial-ancient skills in fashioning nets, hooks, fishing spears, and multi-generational expertise in the catching of marine foodstuffs fused with what “parts” were edible (or not), varieties of sea and freshwater animals – from monk seals and sea urchins to the immense swarms of tuna that “ran” annually through the Aegean into the Black Sea – supplied most everyone with what today we like to think of as a “balanced diet,” coupled with the ordinary consumption of olives and their precious oils, honey gathered from the beehives that dotted many of the temperate locales from Spain through the Levant, and the wines and beers quaffed from earliest times. Children grew up knowing not merely the planting and harvesting of wheat and barley but also the many varieties of uncultivated plants, how and where they grew, whether in season their fruits (“berries”) were nourishing or dangerous, and the astonishing varieties of those smaller creatures whose life-cycles often paralleled the crops and wilderness botany likewise known from childhood. Those included beetles, grasshoppers, dipterids (flies, mosquitoes and their kin), the helicopter-like dragonflies clouding the surfaces of springtime lakes and ponds, and hundreds of others among the insects accompanied the wormy denizens with multiple

legs, and the gossamer beauty of a dewy spider web with its nightly quota of encased insects sometimes evoked poetic metaphor. Snakes were everywhere, some harmless and certainly beneficial (rat and rodent control depended on them), others death-dealing, especially to children and the elderly.

Custom, legend, magic, and folklore enwreathed plants and animals, particularly the kinds that killed or others that brought relief from pain or gave cures from illnesses, with explanations often tendered through rituals, themselves tied to the cycles of seasons: *miasmata* came and went in an ironclad regularity reflected in “wet” and “dry” months, and if mists rose on wetlands and swamps, diseases also appeared as they thickened and dispersed when the air returned to a clarity frequently commemorated in poetry; fevers were definite illnesses (not symptoms), so that when the Hippocratic *Epidemics* were set down sometime in the late fifth or fourth centuries BC, some physicians recorded case histories of patients who presented recurrent fevers as diseases linked with seasons, and thereby could devise prognoses (usually rather gloomy). An anonymous author extended the notion of “good climate” engendering “good health,” and the Hippocratic *Airs Waters Places* is a ringing argument for the salubrious natural settings that produced the “best people,” an argument some modern students have labeled an early variety of medical anthropology. Once doctors and philosophers assumed a triplicate theory of a balancing of Elements, Qualities, and Humors, it was logical to presume that cures for ailments consisted of diets and drugs (as early as Homer known as *pharmaka*) that restored any imbalances: an “earthy, cold, wet, phlegmatic” disease displayed a “bad proportion” (*dyskrasia*) treated by foods and substances that were “fiery, hot, and dry;” and suggested *pharmaka* derived from plants had “faculties,” “powers” or “properties” (*dynameis*) opposite the “powers” of the disease.

These “Hippocratic” theories were *not* held by most physicians or philosophers: in fact the pervasive and ordinary understandings of the natural world continued to be in terms of magic, botanical astrology, and the numberless kindred presumptions, first discerned in the three meanings of *pharmakon* as employed by Homer in the *Iliad* and *Odyssey*. “Drug” is but one of the basic concepts (and the poet is not interested in “how” it works), as is “magical spell,” or “magical potion,” neatly associated by the poet in the famous shape-shifting (men to pigs) performed by Circe on Odysseus’ men, and our hero is protected by something called *moly*, a “magical shield” against Circe’s wiles. And yet, side-by-side pharmaceutical magic was a hardheaded, agricultural sense of botany that provided occasional nomenclatures to specific kinds that caused specific actions on or in the body. When Theophrastus set down his herbal pharmacology and toxicology in Book IX of the *Historia plantarum*, his on-the-spot sources were the ever-present *rhizotomoi* (“rootcutters”). They were semi-professionals who dug up the roots, gathered seeds, stems, and leaves of the generally uncultivated

species in the countryside, those particular kinds of plants known to have *dynameis* (soporifics, sudorifics, etc.), as well as those known to be poisonous (hemlock, mandrake, henbane, and others). On market days, the *rhizotomoi* hawked the roots and plant parts as *pharmaka*, and Theophrastus recorded the kinds offered for sale, as well as how they were collected, the seasons that marked the “maturity” of each, and the rigidly observed rituals through which occasional types were “safely” collected. The *rhizotomoi* intertwined field botany and farm lore with magic explanations and rituals of gathering pharmaceutically active plants, beliefs quite in keeping with the combination of the rational and superstitious so vividly delineated in Theophrastus’ “Superstitious Man” in the *Characters*. Not too far distant are the spells, incantations, rituals, and curses displayed in the *Papyri Graecae Magicae*, which occasionally give unelaborated specific names for substances “as if anyone would know this.”

Once the Linnaean system of botanical nomenclatures became widespread in the late eighteenth century and throughout the nineteenth century, field botanists identified the numerous species of pharmaceutically active plants enumerated by Theophrastus and Dioscorides of Anazarbus (*fl. c.* AD 70), whose *Materia medica* had become a standard reference for drug lore of all kinds from his own day through the eighteenth century.¹ By the end of the nineteenth century, pharmacognocists and phytochemists had delineated “active principles” in the species described by Theophrastus and Dioscorides,² and these data often became incorporated into the widespread and encyclopedic dispensatories characteristic of pharmacy before about 1950.³ It was not, however, until the

¹ The sumptuous ten volumes of the *Flora Graeca* (1806–1840) remain a monument to the dogged determination, talents, skills (and wealth) of John Sibthorp (1758–96), Ferdinand Bauer (1760–1826), James Edward Smith (1759–1828), and John Lindley (1799–1865). Even though some of the locales in the *Flora Graeca* may not be precise and correct, the tomes reflect botanical distribution, taxonomies, and native utility long before modernization and urban sprawl blurred indigenous species, a “natural state” basically obliterated after World War II. See William T. Stearn, “From Theophrastus and Dioscorides to Sibthorp and Smith: the Background and Origin of the *Flora Graeca*,” *Biological Journal of the Linnean Society*, 8 (1976), 285–98 with plates 1 and 2.

² Still to be superseded is the running commentary on Dioscorides’ *Materia medica* by Berendes that accompanies his German translation, viz. J. Berendes, *Des Pedanios Dioskurides aus Anazarbos Arzneimittellehre in fünf Büchern* (Stuttgart: Ferdinand Enke, 1902; rptd Wiesbaden/Schaan [Liechtenstein]: Sändig, 1983). In English, we now have the generally accurate translation by Lily Y. Beck as *Pedanius Dioscorides of Anazarbus De materia medica* (Hildesheim and New York: Olms-Weidmann, 2005), but notes are brief and concerned with species identification.

³ E.g. the various editions of Horatio C. Wood and Charles H. LaWall, eds, *The Dispensatory of the United States of America*, 21st ed. (Philadelphia and London: J.B. Lippincott, 1926 [1792 double-columned pages]), 22nd ed. (1937 [1894 pages]), etc. Comparable and equally comprehensive were those in German, French, Italian, Spanish, etc., e.g. G. Frerichs, G. Arends, and H. Zörnig, eds, *Hagers Handbuch der Pharmaceutischen Praxis*, 2 vols (Berlin: Julius

growing importance of pharmacognosy in the practice of pharmacy – ironically coinciding with the near-disappearance of botanical drugs proffered by the giant industrial pharmaceutical companies – that the underlying assumptions of the ancient masters of drug lore became apparent,⁴ and with the publication of John Riddle’s *Dioscorides on Pharmacy and Medicine*,⁵ one could speak of “drug affinities” as understood by our Greek, Roman, and Byzantine predecessors. Although controversial among traditional scholars,⁶ Riddle’s combination of Greek and Latin texts, with the latest pharmacognostic research findings as drawn from laboratories throughout the world, demonstrated how Theophrastus, Dioscorides, and others in antiquity classed their drugs according to “what they did” in or on the body. Much of the current “alternative medicine” and “natural medicine” as revived in many countries, especially in the European Union, is founded on the presumption that isolation of active principles in natural pharmaceuticals indicates a plant’s utility,⁷ *but* always in its multi-substance, multi-chemical action and reactions as found in nature.⁸ Phytochemists, biochemists, plant physiologists, pharmacists, ethnobotanists, and pharmacognocists have produced a “natural medicine” that a Theophrastus or a Dioscorides would have comprehended in its broader scope, since a majority of

Springer, 1925); a reprint of 1938 appeared under Nazi auspices, and remained a standard reference throughout World War II, with prized copies employed for a half-century thereafter (my own copy comes from Cape Town, South Africa, where it was apparently used until recently as a basic work of reference by a German-speaking pharmacist).

⁴ Standouts in English include the multi-edition *Pharmacognosy* by George Edward Trease and William Charles Evans, 11th ed. (London: Baillière Tindall, 1978), with the 14th ed. (1996) as William Charles Evans, *Trease and Evans’ Pharmacognosy* (London and Philadelphia: W.B. Saunders). The 1st edition appeared in 1934.

⁵ Austin: University of Texas Press, 1985. See also John M. Riddle, “The Medicines of Greco-Roman Antiquity as a Source of Medicines for Today,” in Bart K. Holland, ed., *Prospecting for Drugs in Ancient and Medieval European Texts: A Scientific Approach* (Amsterdam: Harwood Academic, 1996), pp. 7–18.

⁶ Not surprisingly when applied to the question of “effectiveness” of ancient contraceptives and abortifacients, always a politically and religiously laden topic. John M. Riddle, *Contraception and Abortion from the Ancient World to the Renaissance* (Cambridge, Mass., and London: Harvard University Press, 1992), and *Eve’s Herbs: A History of Contraception and Abortion in the West* (same press, 1997). See the very perceptive and generally positive review of *Contraception and Abortion* by Paul T. Keyser in *Bryn Mawr Classical Review* 04.04.08.

⁷ See esp. Max Wichtl, ed., *Herbal Drugs and Phytopharmaceuticals: A Handbook for Practice on a Scientific Basis*, 3rd ed., trans. from the 4th German edition by Josef A. Brinckmann and Michael P. Lindenmaier (Stuttgart and Boca Raton: Medpharm and CRC Press, 2004).

⁸ Or as it is put regarding *Valeriana radix* in *ibid.*, p. 631, “...there is also evidence that the effectiveness of the total extract differs from that of the individual substances. Therefore, the general opinion in the practice of phytotherapy today is that the efficacy of valerian depends on the interplay between constituent groups rather than individual substances.” This statement could apply to almost *all* “natural” drugs.

the better handbooks on medicinal plants are careful to describe how the “natural product” “acts” when prescribed in treatment of particular ailments.⁹ Even with a continual hybridization, horticultural breeding for desirable characteristics, and re-distribution of species around the globe, one can – with some confidence – attribute specific physiological results to individual substances *within* the “natural” product. Of course, we assume that human physiology is basically the same as it was 2000 years ago, and we also assume that plant species in their broadest classifications exhibit similar phytochemical properties as they did among Greek, Roman, and Byzantine physicians and their patients.

The essays assembled in this collection are some of my investigations into the fascinating questions of how and why our Greek, Roman, and Byzantine forebears thought as they did about drugs and pharmaceuticals. By leading off with “The pharmacology of sacred plants, herbs, and roots” (I), I hope to suggest that whatever we might think about the biochemical or phytochemical properties of drugs, the ancients (and many folk medical practitioners to this day) explained “how drugs work” by means of what we call “magic,” but this does not mean “superstition” or “irrationality” if one thinks of “magic” as simply part of nature, as indicated repeatedly by Homer, the anonymous authors of the spells in the *Papyri Graecae Magicae*, the ancient Hermetics, and many other texts from the full sweep of classical antiquity. There is, from the very beginnings of Greek civilization (and likely the ancient Near Eastern cultures that preceded), a grand mixture of the precisely empirical with the hoarily traditional and deeply emotive religious customs that almost always package individual and community responses to illness. “Medications for burns” (II) surveys how farm lore in cultures from ancient Egypt through the Byzantine Empire contributed a most practical understanding of fats, oils, and other oleaginous substances, and how such substances were commonly employed in the treatment of burns, one of the most ordinary injuries sustained in any era, including our own. “Hippocratic pharmacology” (III) indicates some of the botanical drugs recorded in several tracts in the Hippocratic *corpus*, and the likelihood that certain Aristotelian concepts infuse the theoretical notions of “how drugs work” and – again – how rural expertise fed medical practitioners with much of their own skills in the use and compounding the drugstuffs in the fourth century BC and perhaps later. “Theophrastus” (IV) sets out some of the comparative phytochemistry and medical botany one can discern in Book IX of the *Historia plantarum*,

⁹ Among many: Ben-Erik van Wyk and Michael Wink, *Medicinal Plants of the World: An Illustrated Scientific Guide to Important Medicinal Plants and their Uses* (Pretoria: Briza, 2004); Ingrid and Peter Schönfelder, *Das neue Handbuch der Heilpflanzen: Botanik, Arzneidrogen, Wirkstoffe, Anwendungen* (Stuttgart: Franckh-Kosmos Verlag, 2004); Paul Schauenberg and Ferdinand Paris, *Guide des plantes médicinales* (Neuchâtel and Paris: Delachaux & Niestlé, 1977).

by identifying species and genera through modern nomenclatures, and why Theophrastus' *rhizotomoi* were the rural experts of the 4th century BC, and why Theophrastus chose to honor their knowledge within the templates of Peripatetic philosophy.¹⁰ Toxicology is the focus of the two "Nicander" essays (V and VI), and here is the panoply of snakes, scorpions, spiders, insects, and myriapods that caused fear and loathing among Greek and Hellenistic farmers and city-slickers alike. Of interest is the widespread study by Aristotelian-styled natural historians of poisonous creatures in the Hellenistic centuries, and Nicander's *Theriaca* and *Alexipharmaca*, likely written at Pergamon before 130 BC, not only adapted the works of an Apollodorus (*fl. c.* 250 BC), but also the results of research performed by Attalus III.¹¹ The analysis is based on the Greek text established by Gow and Scholfield,¹² whose notes were inordinately helpful as guides into the comparative natural history, only superseded by the long desired collection of entomological data published by Beavis.¹³ VII – XII take up Roman pharmacy from a number of angles: Dioscorides' lengthy account of opium is the basic text in VII, and I trust that we can leave behind the pernicious myth that Marcus Aurelius was a drug addict: he was *not*, as a careful analysis of Galen's relevant passages easily demonstrates; the Eastern commerce in drugs can explicate important aspects of Roman pharmaceuticals, as suggested in VIII, and Pliny the Elder's manners and methods of extraction of earlier Greek and Latin tracts on pharmacology indicate his usual enthusiastic sandwiching of sources, likely based on circulating handbooks of "inventors and their drugs," as detailed

¹⁰ Recently, I have published a recast, "updated" account in my "Drugs and Drug Lore in the Time of Theophrastus: Folklore, Magic, Botany, Philosophy and the Rootcutters," *Acta Classica*, 49 (2006), 1–29; in some respects, this is a response to the perceptive critique of my 1978 essay by Anthony Preus, "Drugs and Psychic States in Theophrastus' *Historia plantarum* 9.8–20," in William W. Fortenbaugh and Robert W. Sharples, eds, *Theophrastean Studies On Natural Science, Physics and Metaphysics, Ethics, Religion, and Rhetoric* (New Brunswick and Oxford: Transaction Books, 1988), pp.76–99. And superseding all previous editions of Theophrastus' *Historia plantarum*, IX, is Suzanne Amigues, ed., trans., and extended commentaries, *Théophraste. Recherches sur les plantes*, Tome V: *Livre IX* (Paris: Les Belles Lettres, 2006 ["Budé" series]).

¹¹ As I argue in "Attalus III of Pergamon: Research Toxicologist," in Louise Cilliers, ed., *Asklepios: Studies on Ancient Medicine. Acta Classica Supplementum II* (Bloemfontein/Pretoria: Classical Association of South Africa, 2008), pp. 138–56.

¹² A.S.F. Gow and A.F. Scholfield, eds, with a translation and notes, *Nicander: The Poems and Poetical Fragments* (Cambridge: University Press, 1953). A revised text with commentaries has been published in the Budé series by Jean-Marie Jacques as *Nicandre Oeuvres*, II: *Les Thériaques. Fragments iologiques antérieurs à Nicandre* (Paris: Les Belles Lettres, 2002) and III: *Les Alexipharmques. Lieux parallèles du livre XIII des Iatrica d'Aétius* (2007). Philologically, Jacques' edition solves many problems, but does not do justice to the natural history embedded in Nicander's two poems.

¹³ Ian C. Beavis, *Insects and Other Invertebrates in Classical Antiquity* (Exeter: University of Exeter Press, 1988).

in IX; how Methodist physicians, in particular Soranus of Ephesus, employed drugs in increasingly harsh prescriptions (the “metasyncritic” method), forms X, and XI takes up Criton, Trajan’s court physician and cosmetician, and would-be historian; Galen’s always complicated and occasionally warped understanding of an earlier Greek (esp. “Hippocratic”) and Hellenistic pharmacology receives comment in XII, and it seems clear enough that although Galen boasted of his deep mastery of pharmaceutical lore, with the exception of mineralogy, much of his drug lore is derivative. Finally, in XIII and XIV, are the Byzantine heritages, and in XIII there is a seriatim series of texts (some in translation) that show how Oribasius, Alexander of Tralles, Aetius of Amida, and Paul of Aegina were *not* parroting Dioscorides or Galen or any of the earlier texts in pharmacology, but rather streamlining, adapting, rearranging, and augmenting their sources; and it is especially important to note that each of the Byzantine writers – practicing physicians – offer a kind of commentary on the medical classics in reflection of their own practice: if Galen was wrong, he was wrong. And in XIV, one comes almost full circle, back to the farmers and woodsmen, who knew plants and animals in their natural settings: not only do the imaginary garden tracts indicate an ordinary knowledge of plants, but the tenth century *Geoponica* documents the practical and rural knowledge of insecticides, anesthetics, and presumably exotic foodstuffs quite in keeping with the millennial-old understandings of seasons, and the rhythms that defined the agricultural year. It should be of little surprise that mandrake roots and “apples” were known and used for exactly the same purposes as set out by Dioscorides 1000 years earlier.

After graduating from Baker University with double majors in History and Zoology, I spent a year as a student at the University of Kansas School of Medicine. As an undergraduate, any course marketed as “biological” gained my attention, and I became immersed in chemistry, botany, entomology, physiology, and comparative anatomy. At Baker, Ivan L. Boyd was a world expert on liverworts, and we spent a number of days on the banks of fern-infested streams in eastern Kansas, seeking these relatively rare bryophytes. At the same time, having had two years of Latin in what then was called Junior High School, I remained fascinated by languages and Roman history, and one of my minors (the other was chemistry) in college was German. At the University of Kansas, reforms were afoot in the curriculum of medical education, so that we were present at simple surgeries, accompanied famous professors of psychiatry and general medicine on their rounds, learning the nuances of diagnosis, prognosis, and therapies, as well as that unteachable art of how to ask a patient pertinent and seemingly neutral questions about symptoms of illness. L.R.C. Agnew delivered a series of guest lectures on the history of medicine in Scotland and England in the eighteenth and nineteenth centuries, and his occasional comments about the ancient heritages in near-modern practice set one to thinking about those historical

underpinnings. Biochemistry in those days had just begun to reflect the double helix, and our major textbook had a mere two lines on the subject,¹⁴ so that my independent research on how the eye perceived colors and shadows hypothesized about the rods and cones, and the physiological roles of fat-soluble vitamins, research that is rather “historical” in view of what current ophthalmology now knows about molecular structures and the always controversial nature of light. We learned anatomy the old-fashioned way, dissecting cadavers, and consigning to a proper burial the remnants of what once had been a thinking, living human being (unforgettable is one’s first glimpse of the coal-black lump that was a smoker’s lung). Attached to biochemistry were laboratory sessions on pharmacology in which we learned how the body’s organs and tissues responded to drugs, responses attested by staining technologies seen under the microscope in histology. Obstetrics and gynecology formed part of our early medical education, and we occasionally witnessed births, carefully supervised by world-class obstetricians, and the guest lectures by parasitologists introduced us to medical entomology and the fears of testicular infestation by soldiers in the Pacific Theaters of World War II. Kansas in those days was famed for its innovative techniques in reconstructive plastic surgery, and surgeons shared in vivid slides how reaping machines on the western plains sometimes ripped dermis and deeper structures from inebriated or less-than-attentive farmers. A wonderful year, all told, but the Romans remained, and I decided to switch from medicine into ancient history and seek a PhD in Roman history, continue study of Greek, and write that book on Roman medicine the librarians at the Logan Clendening Library said they did not have. History of Medicine at Kansas had fallen on lean times, but the Clendening Library’s splendid holdings (sorely lacking in pre-Renaissance texts) kept alive the older devotion by medical professors who wrote books about the long history of the profession, represented by Ralph Major’s two volumes,¹⁵ awarded each year to the winner of the still conducted history essay contest. My own “Galen of Pergamon” fetched an honorable mention.

¹⁴ “The mechanism of self-duplication [in a molecule of DNA] is a more difficult problem. Some insight into the mechanism of self-duplication is at hand. The Watson–Crick formulation of DNA structure states that each DNA molecule is a double-stranded helix in which the two strands are bound by hydrogen bonds between amino and keto groups on adjacent bases, adenine to thymine or guanine to cytosine.” Abraham White, Philip Handler, Emil L. Smith, and DeWitt Stetten, Jr., *Principles of Biochemistry*, 2nd ed. (New York: McGraw-Hill, 1959), p. 614, with Fig. 9.3 (p. 192) of “Model of a proposed structure of deoxyribonucleic acid (DNA) showing a double helix, as suggested by Watson and Crick.” In its 4th ed. (1968), *Principles* has greatly expanded the descriptives of DNA (pp. 193–200 and 649–60 [significantly titled as part of “Genetic Aspects of Metabolism”]), and in the 7th ed. (1983) in two volumes (Vol. I: *Principles of Biochemistry: General Aspects*; Vol. II: *Principles of Biochemistry: Mammalian Biochemistry*), Vol. I, part 4 (pp. 699–833) carries the title “Molecular Genetics.”

¹⁵ Ralph H. Major, *A History of Medicine*, 2 vols (Springfield, Illinois: C.C. Thomas, 1954).

So many fine mentors guided me that it becomes difficult to list them all. At the University of Denver, Allen Breck and Georg Barany fired their lectures and seminars with the panoramas of the Byzantine centuries and the complicated histories of medieval Hungary, the Czech lands, Poland, and Kiev Rus, and seminars in British history under the direction of Raymond Carey gave necessary skills in research, long before reliable photocopy machines and computer technologies. At the University of Pennsylvania, Michael Jameson's seminar on the Athenian Empire revealed how inscriptions can often supplement and correct the historical accounts (here mostly Thucydides) to gain a far better understanding than from written texts alone, and R.E.A. Palmer's instruction in Roman historiography (mostly Livy) showed why Latin is a nuance-packed language, eminently suited for law. At the University of Illinois, Chester G. Starr's magisterial knowledge of ancient and modern military history became an introduction into how armies and navies actually function, quite distant from romantic notions so popular among historical novelists, and Deno John Geanakoplos' seminars in Byzantium demonstrated a wealth of untapped texts, ranging from the early Byzantine medical encyclopedists to eye-witness accounts of the crusades and the final days of Constantinople in 1453; Raymond Stearns' expertise in Colonial American Science linked well with my primary interest in medical history, since the learned physicians almost always spoke in terms of humors, much as had their classical predecessors; John Heller's Greek classes incorporated texts that included Aristophanes, Plato, smatterings of Aristotle and Theophrastus, and many more, as well as the expected Aesop, Xenophon and the New Testament (only when I was a departing, former member of his classes, did John Heller shyly share that he was a widely known scholar in the Latin and Greek terminologies of the eighteenth century, especially of the *Species Plantarum* by Carl Linnaeus);¹⁶ in Latin, John Bateman insisted that I learn to scan poetry, even though I was not particularly fond of Catullus; and by means of William Donovan's spritely classes in Greek and Roman archaeology came an introduction into the history and major sites of Italy and Greece, as well as indications of proper excavation procedures, which served me in good stead while I was a field archaeologist for a season in Jordan. That book I vowed to write seven years before at Kansas was published in 1969.¹⁷

Post-doctoral mentors added much as I continued to wrestle with questions of context and sources in Greek, Roman, and Byzantine medicine, and the '70s were a now-storied time of numerous, special seminars, conducted by the then-

¹⁶ Ten essays (1945–78) collected and reprinted as John Lewis Heller, *Studies in Linnaean Method and Nomenclature* (Frankfurt am Main and New York: Peter Lang, 1983 [*Marburger Schriften zur Medizingeschichte* 7]).

¹⁷ *Roman Medicine* (London and Ithaca, New York: Thames and Hudson, and Cornell University Press); rptd. 1976.

doyens in their particular fields. At the 1970 Institute of Greek Philosophy and Science, held at Colorado College, the seminars and lectures by David Furley, Benson Mates, Kenneth Dover, and Gregory Vlastos emphasized the interplay among philosophers, physicians, and students of nature, from the Pre-Socratics to the Roman Platonists and Byzantine commentaries; the 1972 Institute of Roman Law (Boalt Hall, University of California, Berkeley) featured seminars and lectures by the gracious and witty David Daube on “Protecting the Non-Tipper” as well as hundreds of other topics, from sessions on how to read legal Latin to essential problems in Roman water law, slave law, and questions of *status*; the 1972 Institute also was highlighted by lectures and seminars conducted by Reuven Yaron, who gave us a solid introduction into the legal systems of the ancient Near East; the Second Institute of Roman Law (1973) continued with David Daube’s explications of such subjects as The Twelve Tables, the Praetor’s Edict, and why Cato the Elder’s farm lore linked securely with Roman land law, and we were honored to hear Peter Garnsey in guest lectures on how and why the Romans could think of justice as a two-tiered system, lectures based on his widely and warmly reviewed book on the topic.¹⁸ And when Sir Ronald Syme sponsored an invitation for me to become a Visiting Fellow at Wolfson College, Oxford, in 1981, that time among the “dreaming spires” included my first chills in frequently and gently turning the pages of a manuscript (Arabic, Dioscorides) a millennium old at the Bodley Oriental, the recurrent hours with Sir Ronald as he ruminated on coinages and inscriptions, the habitual meetings with Alistair Crombie at Trinity who indulgently fielded my queries about texts and sources in medieval medicine, and many others scattered among the colleges set in this green island of books and scholars and libraries unmatched elsewhere. My twisting and winding paths from Baker University and medical school in Kansas, through fortuitous circumstances to learn from mentors of skill, occasional genius, and frequent kindness in Denver, Philadelphia, Champaign (Illinois), Colorado College, Berkeley, and Oxford, may illuminate why I approach ancient and Byzantine medicine and pharmacy as I do, and why I believe I have been extraordinarily lucky to be able to combine medicine and pharmacology with the Classics.

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¹⁸ Peter Garnsey, *Social Status and Legal Privilege in the Roman Empire* (Oxford: Clarendon Press, 1970).