"This is a book that celebrates the old-fashioned way—by chronicling the progressive triumph of science over superstition.... Dr. Nuland is a gifted and inspiring storyteller."

—*The New York Times Book Review*

Doctors

The Biography of Medicine

SHERWIN B. NULAND

Author of How We Die
and The Wisdom of the Body

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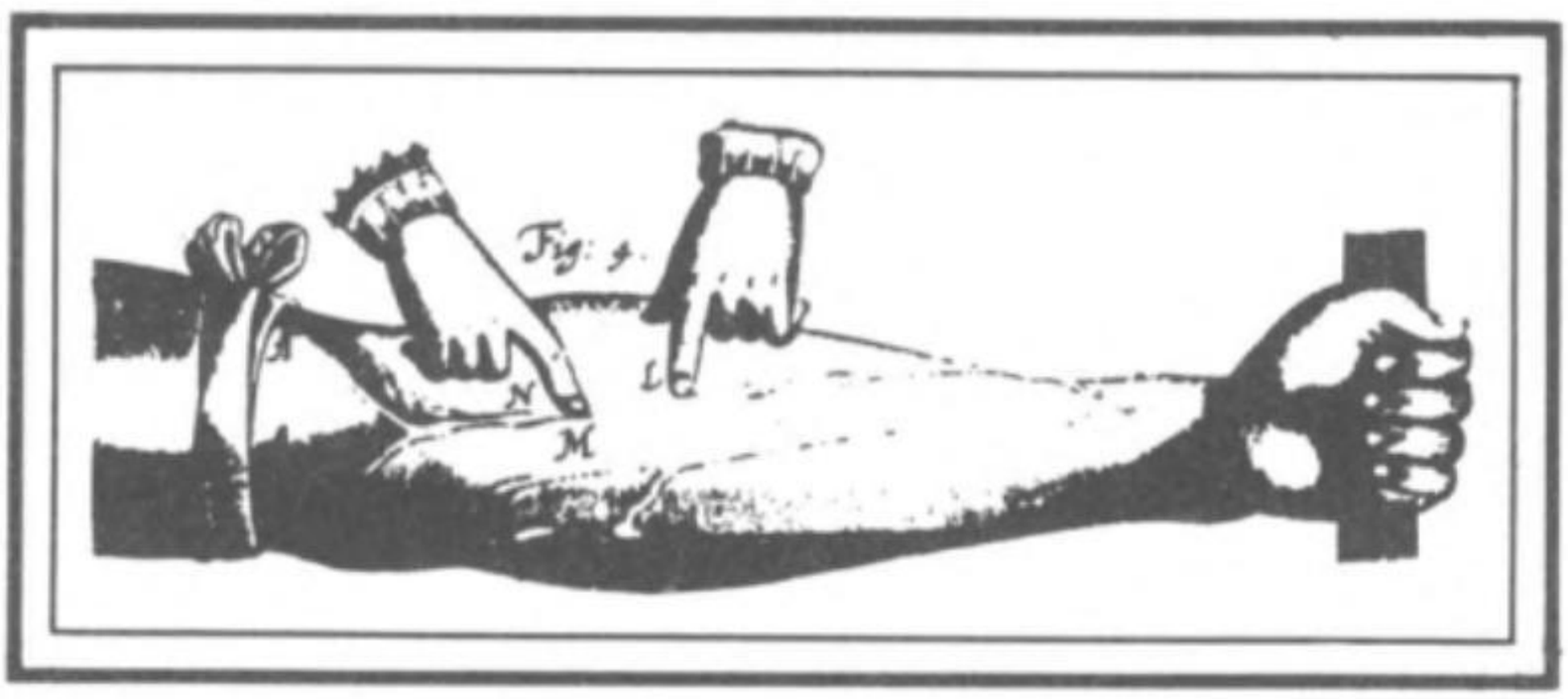
Doctors



The Biography of Medicine

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Contents

Acknowledgments

Tattooed onto the surface of my psyche is a pedagogical motto that was thundered at me and my college-biology classmates four decades ago: in order to receive a proper grade, the answer to every examination essay-question must fulfill the five criteria of being clear, consecutive, concise, complete, and correct; anything less would be considered defective. Delivered by a crusty, nematode-loving misanthrope who had only disdain for those of us who cared about mammals (or, heaven forbid, planned careers in clinical medicine), that ringing admonition has echoed in my thoughts ever since, on each new occasion of putting thoughts to paper. I have treated Professor Horace Wesley Stunkard's dictum like an article of religious faith, perhaps to assuage my guilt at letting him down when I rejected the laboratory in favor of the clinic. More likely, though, I remember his alliterative adjectives because they add up to sound advice.

With Stunkard in mind, I ran the sundry chapters of this volume through a gauntlet of readers. A book, of course, is not an exam essay, and it is impossible (and surely not even desirable) to make it complete. To replace that one *c,* I added two others: cohesive and consistent. If the reader finds that the Stunkardian criteria have been met, it is to the credit of those colleagues and friends who were willing to

take potshots at this book during the course of its writing; if there are deficiencies, it is only because I have sometimes not heeded their counsel. It is not enough to list names in acknowledgment; what follows is meant as a tribute, not only in gratitude for the contributions of my gauntlet-gang, but also for their skillful pummeling.

My wife, Sarah Peterson, has always been my first editor, and my toughest. Her specialty is the recognition of rambling and the discouragement of drift. Fortunate indeed is the author whose initial manuscript-surveyer knows exactly what he is trying to say, and insists that he get on with it. I would like to write much more about the contributions of this particular editor, but she would make me delete it, on the ground that it sounds sentimental and sappy.

After the scrutiny of Sarah, certain chapters were sent off to colleagues who are especially knowledgeable about some particular topic or period. Every one of those essays was returned with comments or suggestions that were extremely helpful. In alphabetical order, I am in debt to: Raymond Edwards, Marc Lorber, Robert Massey, Jeremy Norman, John Harley Warner, and Ruth Whittemore.

I am particularly grateful to four other friends for applying their critical faculties to the entire volume. They are, respectively, a teacher of literacy, a medical historian, a biomedical scientist, and the director of a library of medical history: Joan Behar, Thomas Forbes, Ion Gresser, and Ferenc Gyorgyey. To Ferenc, a special tribute: without our countless hours of discussion, his vast knowledge of the medical-historical literature, and the generosity with which he made available the treasures of his unique library, this book would have died a-borning; without the inspiration of his friendship, the project would never have been conceived—Köszönöm kedves barátom!

I began to write a series of medical biographies at the suggestion of Leslie B. Adams, Jr., approximately five years ago. His Classics of Medicine Library published a group of some fifteen of my monographs and my book, *The Origins of Anesthesia.* It is characteristic of the support he has always given to my endeavors that he and his house, Gryphon Editions (now a subsidiary of Macmillan), have kindly allowed me to use considerable material from some of those publications. Sections of the chapters dealing with the following individuals first appeared in essays that I wrote for Les Adams: Hippocrates, Paré, Morgagni, Hunter, and Halsted, as well as the chapter on anesthesia.

Much of the material on Ignac Semmelweis is taken from my essay in *The Journal of the History of Medicine and Allied Sciences,* published in 1979. The Lister chapter was presented in part as the

32nd Annual Samuel C. Harvey Lecture in the History of Surgery, at Yale, in 1987.

I have made two new friends during the several years of this book's gestation:

Robert Gottlieb had faith in the project from the beginning, and made himself the captain of my cheering section; he fueled the engines of my enthusiasm with his warmth and intellect. When he left Knopf, he did not leave me.

And finally, there is Corona Machemer. Although she picked up the manuscript in midstream, she has treated it with the care of a devoted parent. She is a marvelously skilled lover of the English language who understands what I have wanted to do in this book. After thirty years as a surgeon, I thought I knew something about tender care, until she entered the life of *Doctors* and began to share her insights with me. When Bob Gottlieb took his sneakers and blue pencil off to *The New Yorker,* he assured me that he had found "the absolutely perfect editor" to replace him. To that encomium, I can only add, "Yes, and amen."

S. B. N.

Introduction

The good physician knows his patients through and through, and his knowledge is bought dearly. Time, sympathy, and understanding must be lavishly dispensed, but the reward is to be found in that personal bond which forms the greatest satisfaction of the practice of medicine. One of the essential qualities of the clinician is interest in humanity, for the secret of the care of the patient is in caring for the patient.

—Dr. Francis Weld Peabody,
lecture to Harvard medical students, 1927

This book was written in a library. Of all the libraries in all the educational institutions of our world, there is none quite like this one. I like to think of it as my own personal place, even though it is shared by hundreds of men and women very much like me, who are often overwhelmed by the need to look backward in the midst of trying to go forward. None of us has yet been turned into a pillar of salt.

That large, comfortable book-lined room of mine is a sanctum containing the lore and the collected reminiscences of the art of healing. It is a museum, a portrait gallery, a storehouse of the literature of medicine's past, and a refuge from the hurly-burly of modern

scientific technology that surrounds it. For those of us who are privileged to care for the sick or to carry out the research that makes that care possible, the Yale Medical Historical Library has been at once a safehouse from daily disquiets and a nurturing spring for renewal and strengthening of purpose.

There is no laboratory or patient-care area of our medical center that is more than a few minutes' walk from that high-vaulted, balcony-rimmed reading room and its layers of treasured stacks. The library is exactly the length of two football fields away from the operating rooms where I spend much of my day. Three decades ago, I could have covered the distance in twenty-five seconds. Even my present middle-aged shuffle gets me there in something under three minutes, counting the staircases.

That it is so easy to make what one of the library's donors called "voyages to other times and other places" is due to the vision of three ardent bookmen, who banded together in the 1930s to create a bibliophile's paradise in which their extensive personal collections might be joined into one, and domiciled in such a way as to be accessible to everyone wishing to learn about the history of medicine. They were John Fulton, one of America's most productive researchers in neurophysiology, and a human dynamo whose restless stimulus catalyzed many a major project in the science and humanism of medicine; Harvey Cushing, who had recently come to Yale after his retirement as Chief of Surgery at Harvard's Peter Bent Brigham Hospital, where he had established the specialty of neurosurgery; and the Swiss physician-bibliographer Arnold Klebs, who wrote the phrase about voyages. In honor of their communal project, they dubbed themselves the Trinitarians.

Since its opening ceremonies in 1941, the library founded by those three friends has grown at a rate beyond even their most optimistic predictions. The Yale Medical Historical Library has become one of the very few places in the world where medical *littérateurs* can book passage on uninterrupted pilgrimages to yesteryear. Indeed, if we accept Lord Macaulay's criterion that "The perfect historian is he in whose work the character and spirit of an age is exhibited in miniature," then this library that I call my own is the perfect historian for Western medical civilization, in a way that no flesh-and-blood striver can hope to be. There is to be found in it the visible evidence of Macaulay's concept of the writing of history as "a compound of poetry and philosophy."

Over the huge fireplace built into the wall at the far end of the reading room, there is a large plaque on which is engraved an inspirational inscription, addressed to those who would best use the col-

lections for their intended purpose. The visitor has but to wander among those collections, and "listen," in order to appreciate the wisdom of its opening words: "Here, silent, speak the great of other years."

This book is the result of a lot of listening. It is subtitled *The Biography of Medicine* because I have chosen to tell healing's history in the form of biographies of some of its landmark contributors. But I have wondered, especially as I came to the writing of the last few chapters, whether I might not have better explained myself by using the word "*Auto*biography." For what I have tried to do in this book is to describe the evolution of the process by which every doctor of today has come to his or her basic suppositions, and the shared theories by which all of us view the process of disease. The story of medicine is therefore the story of my professional life.

When I sit at the bedside of a patient, trying to reconstruct the sequence of pathological events within his body that has brought him to me, I am applying a method of reasoning that originated in Greece twenty-five hundred years ago. Each time I trace the development of an illness to the point at which it presents itself to me, I trace also the development of the theories upon which modern medicine is based. I begin afresh on every occasion, with the very concept of just what it is that constitutes a departure from health, and I proceed on the principle that a disease can be effectively treated only when I as a doctor understand its causes in that particular patient, its site of origin, the internal havoc it creates, and the course which the process is likely to take whether treated or not. With that knowledge, I can make a diagnosis, prescribe a program of treatment, and predict an outcome.

Greek physicians originated each of those steps in the days of Hippocrates, the Father of Medicine. The history of medicine has been the history of the increasingly successful efforts made by succeeding generations of doctors to find the ingredients that might bring the entire process to a state of perfection. Beginning in the sixteenth century with the first real knowledge of man's internal anatomical structures, and then proceeding in the eighteenth to an understanding of the ways in which those structures are distorted by sickness, the healers went on to develop a method of physical examination by which they could trace symptoms and signs to their organs of origin; they could then evaluate their diagnostic accuracy by following many of their patients to the autopsy table.

The identifying of disease sites became gradually more specific as diagnostic tools, such as the stethoscope, were invented. With the aid of improved technology in the making of lens systems, it came to

be appreciated that organs sicken because the microscopic cells within them sicken. Having identified the minute locus in which disease originates, doctors next turned their attention to finding the primary inciting agents that make normal physiology go awry. This is where things stood in the middle of the nineteenth century.

As the decades of that century went by, this entire developmental process of the art of healing became more and more dependent on the objective study of organs, tissues, and cells, and therefore more and more dependent on the ways of science. The result was that doctors, necessarily focusing down in a way that historians call reductionist, sometimes lost sight of the whole patient who had come to be healed. As much as the best of the healers always strove to keep in perspective the entire reality of a patient's life, the demands of science made it ever more difficult to be a "whole-ist."

Of course, there is nothing about "whole-ism" (or holism) that makes it inconsistent with scientific medicine, and the truth is that now, in the last years of the twentieth century, as we gather more information about the processes by which healthy people get sick, we have begun to appreciate more fully the complexity of the factors involved. Much less than before do we now look for single causes; much more do we find ourselves seeking out each one of the plentiful number of elements that take part in the sickness of any individual patient. For someone to be sick, a sequence of things must have gone wrong, and the individual events are probably different for each of us. Though they may both harbor the streptococcus, your sore throat and mine have different antecedents, different ways in which the stage was set for the microbe to do its dirty work.

This emerging new way of looking at disease has been lucidly expressed by W. Jeffrey Fessel, who is both a physician and a prophetic philosopher of medical theory:

> In most circumstances, disease is not an inevitable outcome of a single event occurring at a point in time but generally a probabilistic result of many events, each impinging on the organism at separate times and each producing its own sequence of biological reactions. The sum total of these events produces sufficient discomfort to the person to be recognized as illness. . . .
>
> Although the ultimate tissue reaction that has clinical expression may be the same in different persons, suggesting a uniform illness and, by extension, a disease entity in its own right, each person nevertheless probably has a unique and separate illness by virtue of the probability that no one else has the same

> combination and permutation of antecedents and their time relations. In this sense, every disease consists of multiple diseases; in this sense, too, there are no diseases but only sick people.

It is a statement that Hippocrates and every caring physician since his time could subscribe to. And so Jeffrey Fessel and I, and all physicians who have ever tried to make a diagnosis and then carry out a plan of therapy and attempt a prognosis, are heirs to the same tradition—the beneficiaries of the heritage of the doctors described in the following chapters. For that reason, this book is the autobiography that any one of us might have written.

I present it with a small handful of caveats. The first is almost a necessity for anyone who uses the biographic form to write history. It consists of begging readers' indulgence, that they not quarrel with my choices of eminent contributors. A few other stars shine just as brightly in the medical galaxy, and would have been just as appropriate for my purposes. In fact, some of those others are more luminous and perhaps objectively more deserving of tribute than are several of my subjects. I have picked those I have picked because they are the ones who interest me most; that has seemed to be the best way for me to tell my story.

I could also be criticized for inserting into the narrative anecdotes and colorful episodes that may not always be considered of significance by the professional historians who have studied the lives of my heroes. In this I find some justification in Macaulay, who said, "The perfect historian . . . considers no anecdote, no peculiarity of manner, no familiar saying, as too insignificant for his notice which is not too insignificant to illustrate the operation of laws, of religion, and of education, and to mark the progress of the human mind. Men will not merely be described, but will be made intimately known to us." But while I am grateful for those words, and obviously don't hesitate to quote them, they do not totally apply to an imperfect (and quite amateur) historian like myself. Besides, my motives are less pure, and have to do with what is perhaps an idiosyncratic view of historiography, as well as one of my own hidden reasons for pursuing it: I confess to being a voyeur, and a gossip to boot. I like to peek in on the lives of famous doctors, and I write about them to tell what I have seen. The perfect historian, the human kind, has not yet been born. Until he or she comes along to shame our pretensions, we can all presume to be tellers of tales.

One final warning. One of the colleagues whose opinions I most value has pointed out what some may perceive to be a very real defect—a tendency toward too much of a "gee whiz!" kind of writing.

I seem to be so impressed, says my friend, with the contributions of all but a few of my characters that I cannot have enough of heaping compliments on them. Well, that certainly is an accurate perception. But I do not apologize. I *am* most assuredly not only impressed but quite frankly flabbergasted at the talents, industriousness, and accomplishments of most of these people. They are, after all, among the greatest medical innovators who have ever lived. The distinguished (see what I mean?) medical teacher William Osler once said that it is for what he called "the silent influence of character on character" that we study history, as much as for the events themselves. I have come away from examining the lives of my chosen doctors with a renewed optimism about the future of our civilization.

In these days, when it seems unrealistic to predict a future for mankind that is anything but bleak, I find something in this "procession of characters" of mine that gives me hope. The reverence for life, the zeal for learning Nature's secrets, the willingness to sacrifice for progress that you will read about in these chapters—these are characteristics that I believe are inherent in our species, notwithstanding the mass self-inflicted tragedies to which our century has been witness. I will go even further: I am convinced that there is a biologically determined characteristic that is the human spirit—that there is a gene or genes for it just as surely as there is a gene or genes for the color of our eyes or the length of our fingers. I have no idea whether it was put in place by the power that some call God or the power that some call chance, but it is reproduced within us with the same predictability as the rising and setting of the sun. It is not our intellect or even our physical structure that is the criterion of our human-ness; man is the most fulfilled animal on this planet because there resides in us the motivating and civilizing force of the human spirit. It gives us the ability to think courageous thoughts, do courageous deeds, and give courageous sustenance to our fellows. I predict that it will one day be the subject of scientific research and validating experiment. Though such studies will probably begin in a very soft science like sociology, they will eventually proceed into the realm of quantification and analysis. I don't believe for a minute that minds capable of solving the mysteries of DNA will not, in some distant future, elucidate what are now seen as the miraculous mysteries of human nature. There are, as Goethe tells us, no miracles; there are only those mysteries of nature, and they wait to be solved.

When the biological basis of the human spirit is understood, we will be able to explain such qualities as altruism and the inborn capacity of one person to nurture another back to health. Though similar capabilities have been observed in other species of animals,

they are nowhere so highly developed as in our own. They form the underpinnings for many of the relationships we think of as uniquely human. Among them is the eternal foundation of the relationship between doctor and patient.

About this I am also encouraged. Unlike so many pessimistic seers of our time, I have faith in the future of medical caring, even if only because it is an expression of that biological quality I have called the human spirit. I use the word "eternal" advisedly—I do not think it will ever vanish.

More than half a century ago, Dr. Francis Weld Peabody addressed a class of Harvard medical students on the dangers of allowing the *science* of medicine to interfere with the *art* of medicine. "They are not antagonistic," he said, "but supplementary to each other." He concluded his lecture with the three sentences that I have used as the epigraph to this Introduction. They have since been repeated countless times before countless groups of students, because they so clearly identify the greatest key to being a good doctor, and its greatest bounty as well.

New Haven
January 1988

S.B.N.

Doctors

1

The Totem of Medicine

HIPPOCRATES

There are those who believe that the Jesus of the New Testament never existed. They dispute the deeds attributed to him, and doubt that his scriptural words were ever spoken. Much the same suspicion has been expressed concerning the founders of many of the other major religions and sects of the world. Even when seemingly solid evidence of sacred lives is available, some thinkers remain unconvinced.

In spite of personal commitments that each of us may have to either rationalism or religion, we possess no indisputable knowledge of where the reality lies. Those with deep traditional faith see a certainty that requires no documentation. History is for them illuminated by the light of God, which shines gloriously over precisely the same area that appears as an obscure emptiness to the skeptics. And so debates will go on as long as our successors survive to inhabit this earth, between those who pursue the truth and those who pursue the Truth.

On a strictly practical level, it makes not an iota of difference which group of pursuers is right. Investigating the shrouded origins of the modern ethical religions is far less important than understanding what the various groups have grown to be, and what effects each has had upon the history of the world and upon its moral vision. Most

meaningful of all may be the question of their collective impact upon the thinking of contemporary man.

It is much the same with Hippocrates, the Greek physician whom we call the Father of Medicine. We think we know a few facts about his life that are separable from legend, and we think also that we have good reason to honor him in the parareligious way that has been taught us by the keepers of our medical lore. But beyond that, there is certainty about nothing except the existence of his scripture. Tradition is a persuasive teacher, even when what it teaches is erroneous. It tells us that all of the Hippocratic writings are the work of one author; it says the same of the Pentateuch of the Old Testament, and yet hard literary evidence denies such a claim as forcefully for the former as it does for the latter.

As with the books of the Bible, different Hippocratic writings seem to have been composed by different scribes at different times, setting down a permanent record of what had previously been an oral tradition of belief and practice. Although to a lesser extent than the Biblical writ with which we make analogy, the Hippocratic Collection (or, as it is often called, the Hippocratic Corpus) contains some eternal truths and some soaring literature. The whole is united by a theology, and it is the theology, rather than the author, which makes it Hippocratic. Both the Bible and the Corpus deal with man's relationship to man and to another power outside himself. In the Greek writings, however, that power is Nature; God and other forces that can be seen only with supernatural sight are excluded.

This injunction to turn a blind eye to the possibility of a deity or mystical influence in the causes and treatment of disease was the greatest contribution made by the school of Hippocrates. The Swiss medical historian Erwin Ackerknecht has called it "Medicine's Declaration of Independence."

There is not, in the entire Corpus, the slightest hint that disease is traceable to causes beyond the powers of the physician to understand. Each set of symptoms has a specific cause or causes, and treatment must be directed toward correcting the circumstances in which they appear, and not only the consequences of their presence. Thus, the setting in which the illness takes place should be considered as important a factor as the manifestations of sickness themselves. The Greeks were the first to believe that the universe functions by rational, reasonable rules. They gave us the concept of cause and effect, and thereby laid the groundwork for science. Even before Aristotle, there was Hippocrates; what we have in the Corpus is a treasure house containing the earliest extant scientific treatises in any language.

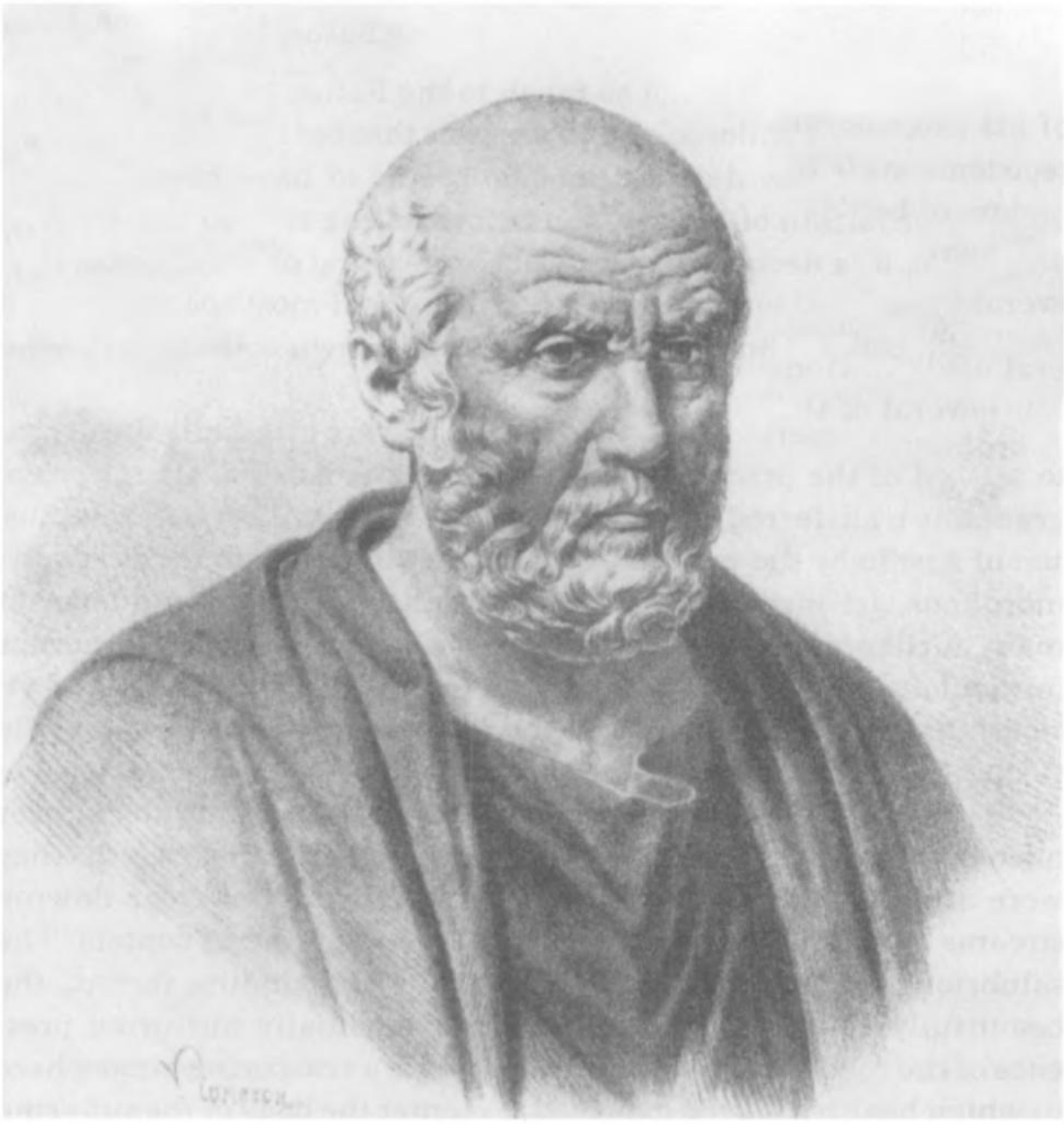
. . .

Though our debt is not so much to the Father of Medicine himself as it is to the philosophy and practice that bear his name, Hippocrates nevertheless did live, and he seems to have been a distinguished physician of his day. But before telling what little is known of his life, it is necessary to describe something of his mythical antecedents and contemporary counterparts, and most specifically the system of belief whose practitioners were known collectively as the cult of Aesculapius.

In post-Homeric times, the healing powers originally attributed to several of the principal gods, Apollo, Artemis, and Athena, were gradually transferred in large measure to a lesser deity, Aesculapius, son of Apollo by the nymph Coronis. The Aesculapian myth is polymorphous, arising, as did Greek culture itself, from a confluence of many earlier civilizations and traditions. Legend ascribes numerous miraculous cures to the god, carried out primarily by means of visions attained in dreams which the faithful sick experienced while sleeping in temples dedicated to him.

The sites of Aesculapius' shrines had qualities which all cultures have recognized as ideal for the purpose of restoring health: they were often on breeze-touched hills in the vicinity of clear flowing streams or springs, whose waters were of high mineral content. The salubrious air, the visual comfort of the surrounding forests, the beautifully cultivated gardens, and the spiritually nurturing presence of the robed priests combined to create a reassuring atmosphere in which health could be expected to reenter the body of the suffering pilgrim. Of course, the stricken petitioners had come to beg the help of a divinity, and so there were also prayers, animal sacrifices, and the diligent carving of votive tablets. Sacred serpents anointed injured limbs, licking and slithering their silent restorative way from one raw wound to another. While all of this inspirational theotherapy was in progress, the sonorous voices of the priests could be heard intoning solemn incantations and magical formulas. Surrounded by their eagerly devout supplicants, they recounted the wondrous cures that had been brought about by the power of Aesculapius and his legendary children, among whom were his daughters, Hygeia and Panacea. The god himself was present in effigy bearing a long staff around which was entwined the famous sacred snake; from this otherworldly origin comes the symbol of the modern scientific medical profession.

The focus of the cure was the god-given dream, in which Aesculapius conveyed to the sleeping patient, either directly or in sym-



An eighteenth-century French engraving presents Hippocrates as he has traditionally been portrayed through the ages. Though based on scant evidence, this is the universally accepted image. (Courtesy of the Yale Medical Historical Library)

bols, the means by which recovery might be attained. Having been brought to the proper level of emotional readiness by the mystical ceremonies and the supernal atmosphere of the shrine, the patient spent several nights sleeping in the awesome temple itself, until the oracular vision made its appearance. The spectral message was then interpreted by the priests in ways that were consistent with their system of therapeutics, which meant that they were likely to see in it such treatments as might be obtained through diet, exercise, or what we nowadays call recreational or music therapy. Sometimes the

cure required bloodletting or purging, or even an occasional quite fanciful directive that instant restoration of health occur, probably meant to invoke the power of suggestion. If the priestly treatment was successful, the credit went to Aesculapius and to his agents, who accepted the prayers and the money of their patients with equal piety. If the treatment failed, the petitioner himself was to blame.

In sum, the Aesculapian system—despite the "health-resort" methods to be found in its therapeutic arsenal—was based on a theurgical philosophy of disease: illness was caused by unknowable supernatural forces, and so the cure had also to come from those same sources.

For many centuries, it was thought by historians that the medicine of the Hippocratic physician grew out of these roots, and that the priests were the forerunners and teachers of Hippocrates and his school. The truth is somewhat different: The teachings of the Hippocratic physicians came about in opposition to the supernaturally based precepts of the shrines. The new teachings were rational, empirical, and founded on the principle that every disease has a cure which is not only quite natural, but quite discoverable as well. The historical confusion probably arose from the fact that some of the physicians called themselves Asclepiads, thus giving the mistaken impression to later observers that they were followers of the cult of Aesculapius.

Hippocrates himself was born about 460 B.C. on the island of Cos, near the western coast of Asia Minor. In spite of all subsequent historical and legendary embellishment, this is all we truly know, from our only contemporary sources, two of the dialogues of Plato, the *Protagoras* and the *Phaedros.* Later writers said of him that he was the son of Heraclides, a hereditary Asclepiad. Unfortunately, twentieth-century archaeological evidence suggests that the cult of the god Aesculapius settled on Cos after 350 B.C., when the Father of Medicine was no longer living, which casts considerable doubt on the rest of the traditional biographical account. It is easy enough to dismiss the myth that he was the nineteenth lineal descendant of Aesculapius, but much of the rest of the traditional life history is neither provable nor disprovable, so it will be here presented as it is usually recounted. Most of the details come from the adulatory biography written by one Soranus of Ephesus in the second century A.D., when its revered subject had been dead for more than five hundred years. It deserves as much credence as could be given to a modern biography of Joan of Arc that was based only on oral accounts and was written by a leader of the French women's movement who was also

a religious mystic. Nevertheless, it appears to be the first written description of the life of the Father of Medicine, and it is the source of our present sketchy outline.

Hippocrates is said to have been taught medicine by his father, Heraclides. Like all physicians of his day, he spent a considerable amount of time traveling, practicing his art throughout the neighboring cities and Aegean islands. He apparently lectured on medicine and surgery during these travels, and was paid fees by both students and patients. As his fame grew, his services came more into demand. Tales were told of various remarkable cures that he was able to effect and of the many honors he received. No one is at all sure what he looked like, but in several pieces of statuary that have been "identified" to the satisfaction of enough authorities he is depicted as an elderly, distinguished-looking sage with a bald head, a bearded chin, and an intelligent, sensitive face. As a highly respected member of the medical academy centered on the island of Cos, he was one of the most influential physicians of his era. He seems to have lived to a great age, being approximately one hundred years old when he died in Larissa.

In placing Hippocrates temporally, it is helpful to remember that his long life spanned those of Socrates and Plato, and that he died about a decade before the birth of Alexander the Great, when Aristotle was a young man. Pericles, Euripides, Aeschylus, Sophocles, and Aristophanes were his contemporaries. Obviously, it was a time of great intellectual ferment in Greece—a veritable premier Father's Day of the mind, with Hippocrates, Herodotus, and Aristotle in the midst of giving life to medicine, historiography, and literary criticism, respectively. It was the period of one of those great bursts of mental energy which from time to time appear in the culture of Western civilization to thrust it forward into new patterns of thought and deed, and new ways of expression.

With the Hippocratic physicians, medicine as we know it began to develop. Divorced from superstition and necromancy, devoted to systematic observation of disordered life processes, and committed to a set of ethical principles that declared the physician's primary obligation to be to his patient, it formed the trellis upon which subsequent growth of medical thought could be guided.

It is one of the ironies of this history that the academy of Cos, the so-called Coan School, had a rival, situated on the opposite peninsula at Cnidus, which practiced a form of medicine that was in some ways more like our own than that of the physicians of Cos. The Cnidian

focus was on the disease, while that of Hippocrates was on the patient. The Cnidian physicians, like those of today, were reductionists, fine-tuners who directed their efforts to the classification of the processes of sickness and to exact diagnosis. They sought to know the specific local organ disturbances that caused the symptoms they so assiduously categorized. Why, then, one might ask, is it the Hippocratics whose teachings survived to become the foundation of modern medicine?

In ancient Greece, the Cnidians' approach had an inherent weakness: to succeed, the Cnidians would have required a much more accurate knowledge of anatomy and organ function than was possible at the time. Proscriptions against human dissection existed, arising out of the prevailing religious dicta of the day, which required burial immediately following death. There was, in addition, a culturally based horror of corpses that was difficult to overcome, even by the more detached physicians. Although some degree of anatomical knowledge was acquired from studies of animals and rare, hurried, partial postmortems of humans, it remained only sketchily supplemented by an occasional lucky look into the slashed body cavity of some wounded combatant. In the entire Hippocratic Collection, there is no conclusive, indisputable evidence of formal dissection of the human body.

Even had the requisite detailed information been available, it would have been necessary to do thousands of meticulous studies of diseased organs in order to understand the ways in which morbid processes cause the symptoms exhibited by patients. And even then, who would be benefited by a physician who understood a pathological process he had no way of treating? Specificity of diagnosis does not help the sufferer unless it can be followed by specificity of treatment, a fruitless fantasy in that scientifically primitive age. The fulfillment of the Cnidian philosophy had to await the coming of modern medicine, with its gradual evolution of understanding of the physical and biochemical bases of the mechanisms of disease, and subsequent strides in the technology of cure. That succession of triumphs would not get under way until the late Renaissance; the Cnidian physician entered the arena long before his time.

Given the limitations of Greek science, the Coan School fared much better. The Hippocratic physicians saw diseases as events that happen within the context of the life of the entire patient, and they oriented their treatment toward restoration of the natural conditions and defenses of the sick person and the reestablishment of his proper relation to his surroundings. To be sure, they suffered the consequences of the major error of their system, which was the grouping

of dissimilar clinical conditions under one fused, and therefore *con*-fused, heading, a state of affairs that arose out of their propensity to categorize a disease on the basis of its major symptom, such as fever. However, by concentrating their treatment not on the actual diagnosis but on the patient and his environment, and by making him a member of his own therapeutic team, they achieved successes that eluded their rivals; in this can be recognized the seeds of what has come to be called holistic medicine, or at least holistic medicine divorced from some of the crackpot ideas which have encumbered it of late.

(In the preceding paragraph I have used the word "clinical," for the first of what will be many times. Although taken for granted by physicians, "clinical" is a term often confusing to others. It derives, appropriately for its present context, from the Greek *klinē,* a couch or bed, and therefore came to be used in reference to a patient lying down. In fact, one of its philological descendants is "recline." What is clinical is that which deals with sick people and their diseases, as distinct from lectures, laboratories, and pure science—in other words, it is bedside medicine. The healer is a clinician; his expertness is in clinical medicine; his venue is the clinic, whether it is a small outpatient department at the end of a hospital corridor or a complex corporate structure with a famous name like Mayo or Lahey associated with it. Although the people who make their way to such facilities are known as patients—from Latin *patior,* "to suffer"—they might just as well be called clients, another word that has evolved from *klinē.*)

It was, thus, the basically holistic clinical approach of Hippocrates that provided the clear light which led Greek medicine out of the mire of theurgy and witchcraft. Unfortunately, however, its clarity was to endure for only half a millennium. It became misinterpreted and garbled after the fall of the Roman Empire; then its distorted form refused to yield the stage for yet another thousand years thereafter. Having originally cleared the way for progress, Hippocratism was destined to become, in the end, an obstacle to the same kind of inquiring spirit which had given it birth.

Even after the Renaissance, the hoary-minded adherents of the corrupted residues of Hippocratic medicine continued to man the barricades against the gradually strengthening forces of the dissectors and the chemists who sought answers in organs, then in tissues, and finally within the structure of the cell itself. The next baton-passing in the struggle between Coan and Cnidian did not take place until two centuries ago, when the scientific world was ready to take a firm stand in favor of specific organ pathology. When that hap-

pened, the microscope replaced the clinician's scrutinizing eye, and the molecule replaced the patient. The reductionists took over, and brought with them the principles of modern medical science.

The Hippocratic Corpus, misunderstood (and for a time lost) though it was, sustained the formulations of the physicians of Cos during the long centuries between Rome and reductionism. It is thought by most authorities to be the remains of a library collected on that island center of medical learning. That such libraries existed is beyond doubt, even though this particular one is their only surviving relic. It is safe to assume that they contained many different types of texts, ranging from the works of the leading Asclepiads to books acquired by chance, and including clinical records, lectures, handbooks and manuals, and essays dealing with medicine or its related philosophy. In other words, the books and papers of any medical library are related to each other by no other criterion than the fact that they all contain material that is of use in the study of disease. That describes the Hippocratic Corpus. It consists of a group of some seventy variegated texts, all written in the Ionic dialect, in a wide assortment of styles, and sometimes contradicting each other on doctrinal points. Very likely, the entire Corpus found its way to one of the other later ancient libraries, perhaps the great one at Alexandria, and was there treated as one great work of one great man whose name was already famous.

By common consent of the foremost scholars of this material, certain of its texts stand out among the rest for the clarity of their thought, the high moral message they transmit, and the scientific objectivity of their approach. Because these qualities result in certain stylistic similarities, this group of treatises was in former years thought, even by those convinced of the mongrel nature of the Corpus as a whole, to have a single author, and therefore to be what are called *The Genuine Works of Hippocrates.* Although the "genuineness" of even this subset is unlikely, the distinction is useful, because it separates out the particular portions of the Corpus that represent the greatest contributions of Greek medical thought. It is chiefly for these specific works that we memorialize the name of Hippocrates and honor him as the Father of Medicine.

The disciples of most great leaders, either of the divine or political sort, cling to the more pithy pronouncements of their patriarchs and make philosophical amulets of them. For the Cos-inspired physicians, these were the *Aphorisms of Hippocrates.* The very first of those medical proverbs is the most-quoted single statement in the

entire collection of ancient medicine, perhaps of all medicine, or, as the Greeks were fond of calling it, the Art:

> Life is short, the Art is long, opportunity fleeting, experience delusive, judgment difficult.

Has there ever been a better description of the obstacles faced by those who would be healers of the sick? That it is too long and too arduous a calling to be mastered in any human lifetime is known by everyone who has ever tried it. But does everyone, do even all doctors, realize how few are the genuine opportunities to study people and their diseases carefully enough to add anything of lasting importance to the sum of man's knowledge? We speak often of the value of experience, but we all know how misleading anyone's accumulated collection of memories can be, even when viewed with all of the clinical objectivity that a mature physician can muster. Remarkably, the quantifying and measurement of the combined disease encounters of many clinicians, which we dignify with such puffed-up names as biometrics and statistics, are also delusive. If they were not, everyone's numbers would always agree—and they often don't. Whether we rely on memory, data, or interpretation, experience too frequently leads us astray.

And finally, there is judgment. We try to teach it to our students, but we wonder if we understand it ourselves. After thirty years in medicine, I don't even know how to define the word, much less recognize its presence in my thoughts at the bedside. I try to do what seems right, but sometimes the course that seems right for this particular patient today is exactly the opposite of what seemed right for someone with what seemed to be exactly the same problem yesterday. If even statistics give fuzzy answers, how much more unsteady must be judgment? Were it infallible, doctors would never disagree. Like statistics, the judgment of one doctor often conflicts with that of another; and like statistics that disagree, there is no guarantee that one course or the other will lead to a successful outcome. The problem thus distills itself down to the first aphorism of Hippocrates: judgment is difficult to learn, to apply, and even to recognize; medicine has few certainties—the ancients correctly called it the Art.

To the Hippocratic physician, the fundamental principle of his Art was the concept that Nature seeks to maintain a condition of stability; its forces are constantly adjusting and readjusting the normal constituents of the body to preserve a balance among them. When this balance exists, we are healthy. Under any of a variety of influences, the equilibrium may be disturbed, resulting in one con-

stituent's appearing in excess. When this happens, sickness develops, the particular disease depending primarily upon which substance has gained the ascendancy. It is the function of the physician to help Nature restore the state of equilibrium. Since each disease has a distinctive natural course of its own, the physician must make himself so familiar with it that he can predict the sequence of events and know whether and precisely when to intervene with treatment that will help Nature to do its work.

The concept of the equilibrated harmony of Nature's forces was not original with the Hippocratics. Long before they came upon the scene, disease was thought by certain groups of physicians to be caused by an imbalance among the four "humors"—blood, yellow bile, black bile, and phlegm. These four primary fluids were said to be constantly renewed by means of the food which is eaten and digested. The blood was thought to originate in the heart, the yellow bile in the liver, the black bile in the spleen, and the phlegm in the brain.

The theory had considerable appeal to the Greeks because it satisfied the requirement of objectivity in their system, in the sense that the humors were visible under various circumstances, so there could be no doubt about their existence. They were tangible substances. Black bile is the only one of them whose observability is a little difficult to explain, but it is thought to have been represented by the black stools of gastrointestinal bleeding or the coffee-grounds vomit frequently seen in a variety of clinical conditions.

The Greeks believed that the humors were moved and mixed in the body by the driving force of the "innate heat," which was a form of energy generated by the heart, and which in turn generated the humors from the food that was eaten, and tended to keep them in balance. "Innate heat" was thus the essential ingredient of man's composition. It was part of Nature's healing power, the force that acted both to maintain equilibrium and to restore it when it was lost.

The humors bore a direct relationship to the four "elements," fire, air, earth, and water, and therefore to the four "qualities" of hot, dry, cold, and wet. So the blood represented the hot-wet characteristics, the yellow bile the warm-dry, the black bile the cold-dry, and the phlegm the cold-wet. Because of the role of the qualities, the body's equilibrium was influenced by the seasons. It was readily observable that phlegm, the cold-wet humor, increased in the winter. Since the Greek spring was wet and hot, there was thought then to be an increase in blood. Yellow bile was more prevalent during the dry heat of the summer, while the cold, dry autumn encouraged the dominance of black bile. Bilious vomiting, dysentery, nosebleeds, catarrh,

jaundice, and fevers of various sorts are frequent in the Hippocratic descriptions of disease, and each of them could be related to one or more of the humors and the season in which it predominated. This was particularly true of those infectious diseases which are most prevalent during certain times of the year. Thus was man's health related not only to the humors within him, but also to the greater universe of which he is a part.

There are other implications of this system. Normal seasonal variations in the humors were thrown awry if the season itself had some abnormal features in any given year. Moreover, inhabitants of certain areas were predisposed to particular diseases depending upon the prevailing winds, the source of the water supply, the angle of the sun, and even such considerations as the direction faced by the town in which they lived. As might be imagined, marked and rapid fluctuations in temperature and humidity were considered to be particularly dangerous because of the sudden changes in humoral balance they brought with them. Obviously, the ingestion of foods of different sorts and in different amounts would have a significant effect on the quantity of any particular humor.

There were numerous other influences that the Hippocratic physician had to take into account in his attempt to discover the cause of any disease and support Nature in restoring balance. Not the least of them was his patient's fundamental constitution, since the basal state of the humoral interaction affected personality and character. Our language and our literature have been enriched by our ability to describe people's dispositions as sanguine, melancholic, bilious, or phlegmatic.

In order to determine the nature of the humoral imbalance that was at the root of a given disease process, it was necessary to look beyond the obvious symptoms, to seek objective evidence of the effects being produced. To this end, a highly sophisticated type of physical examination was developed, in which the physician, by skillful use of his five senses, sought manifestations of the underlying disorder. It is fascinating to read some of the Hippocratic case reports, with their descriptions of changes in temperature, color, facial expression, breathing pattern, body position, skin, hair, nails, abdominal contour, and a host of other clues that today's best diagnosticians still seek out during the course of a careful consultation. Anticipating the laboratory tests that would only come into being twenty-five hundred years later, the Hippocratics tasted the blood and the urine, and did not hesitate to do the same for skin secretions, ear wax, nasal mucus, tears, sputum, and pus. They smelled the stool, and they took

reasons for this, which had to do with the conditions under which he worked. In a society where there was no licensing and no certain way of proving one's qualifications, the trained physician needed some method of distinguishing himself from anyone else who might claim to have powers of healing. Most of the doctors of the day were itinerants, traveling from place to place, offering their services in much the same way as did wandering craftsmen. If things went well in a particular community, the healer might stay for a while, until the need for his doctoring lessened. In such a situation it was necessary to acquire a reputation quickly, in order that patients might know that they were dealing with a well-trained master of the healing art. What better way could there have been to build up confidence than by making an accurate prognosis?

The Hippocratic physician was trained in a school in which the study of the course of the disease process was a paramount consideration. Insofar as the level of contemporary science allowed it, he was an expert on the evolution of clinical syndromes. He understood how certain symptoms often come together in specific groupings, and how some conditions of sickness frequently follow predictably after others have made their appearance. Thus, he was well equipped to prognosticate, and he was encouraged by the ethos of his school to do so. As is well recognized today, a physician in whom one has confidence serves not only himself, but his patient as well. It comes as no earth-shaking revelation that the confidence of the patient in his physician is one of the cardinal factors in the art of healing. In the words of our ancient author:

> Some patients, though conscious that their condition is perilous, recover their health simply through their contentment with the goodness of the physician.

The validity of that Hippocratic aphorism is well illustrated by the following case history. It is not a unique tale that you are about to read—any experienced clinician would be able to tell several like it.

Twenty-five years ago, I was one of several physicians involved in the care of the then chaplain of Yale, the charismatic (a word much in use during those heady days of the Kennedy Camelot) William Sloane Coffin. Following a particularly bitter civil-rights campaign, Bill Coffin had returned to New Haven feverish, coughing, and exhausted from a sojourn in a filthy Mississippi jailhouse. The chaplain was known for his remarkable physical and moral resilience, but after a few days of worsening symptoms, even that good-natured

toughness that we so much admired gave way, and he reluctantly allowed himself to be admitted to the Yale–New Haven Hospital.

His disabling symptoms were found to be due to a severe form of pneumonia, with a large collection of staphylococcal pus in the chest. The outcome remained uncertain for days, as his temperature hovered in the 102° range and his "morbid cause" resisted the combined efforts of the infectious-disease specialists with their antibiotics, and me with my pus-draining needles and tubes. Finally, it became apparent that only an operation of considerable magnitude and risk would save his life. The difficult decision having been made, and discussed with the patient, I scheduled the surgery to take place on the following morning, a Wednesday. On Tuesday evening, the enervating fever suddenly broke, exactly as though some miraculous coction and crisis had taken place at the penultimate moment before the perilous surgical journey. The operation was canceled, and the chaplain went on to recover rapidly over the course of the succeeding days. None of us would ever be able to explain what invigorating event had occurred in the immune system of our critically ill patient, or so we thought.

Some five years later, I found myself at a faculty wedding at which the robustly healthy Reverend Mr. Coffin was officiating. Although ours is a small city, our paths had not crossed since his recovery. At the reception, I cornered him, and asked what he thought had happened on that dramatic evening to account for his sudden and, to my mind, almost preternatural cure. Expecting to hear a recounting of some personal religious insight, I was quite unprepared for his answer. "I did it," he said with absolute conviction, "for Bizzozero."

Had I heard wrong? Had he said "Beelzebub"? Was it possible that Yale's leading divine, in a fit of fever, had actually believed that he had made a contract with the devil just to avoid the hazards of spending a few hours with me in the operating room? Having as little tolerance for such magical ministries as did the Hippocratics, and knowing also that a healthy William Coffin was the most rational of men, I dismissed the possibility. Cupping my hand behind my ear to trap the sound waves that were being lost in that noisy room, I half-shouted, quite ungrammatically I fear, "For who?" This time I heard the name distinctly—Bizzozero.

Who was this inspirational afflatus, this mahatma Bizzozero who had so aroused the chaplain's natural forces as to enable him to expel the lethal humor from his fever-racked body? Gurus then having recently come into vogue, it flashed across my consciousness that what I was hearing was the unconventional Coffin's personal pronunciation of some Hindu title. Then I remembered. Bizzozero was

no guru—he was the intern on the case, a dedicated, talented, and extremely compassionate young man who had spent countless hours at his patient's bedside, now adjusting this therapeutic modality, now titrating that one, and modifying the others as needed; in short, doing everything that a devoted physician could to bring his patient out of the valley of the shadow. Most evenings, when things quieted down a bit, they had long talks, this embryonic doctor and his dreadfully sick charge. In time the talks and Dr. Bizzozero's scrupulous care (and caring) began to fill Bill Coffin's chest with the medicine it needed most, the radiant insight that to at least one of his medical attendants the real challenge was to restore health to a human being, and not merely to cure an interesting disease that happened to reside in someone's body. To die would have been unfair to a doctor who gave so much of himself. And so Joe Bizzozero brought about a miracle where the rest of us were failing. He was able to do it because he knew, better than his teachers did, what it means to be a healer. As his now vibrantly healthy patient said to me on that celebratory evening, "I did it for Bizzozero; I couldn't let him down."

The marriage that had occasioned my reunion with Bill Coffin lasted only a few years. The lesson I learned during the reception will be with me all of my life. The Hippocratic physicians understood things that we are only now, millennia later, beginning to study and quantify. After a century of pursuing single causes to explain single diseases, even the laboratory scientists are beginning to reach for new explanations, and new factors. We will discover that it takes more than the pneumococcus to produce pneumonia, and more than cigarettes to make a lung cancer. When we have learned how to frame the ultimate questions, their answers will be found in a model of disease that requires not one but many conditions to be fulfilled before sickness can occur. Most of the chapters of this book tell the story of medicine's search for specificity of diagnosis and of treatment, of the coning-down on causes that was an essential step in the conquest of medical ignorance. The chapter that cannot yet be written will tell of the next step. That achievement will prove to be the formulation of a construct that philosophers of science are beginning to call a new paradigm, in which disease is recognized as being due to the combination of entire sets of disordered function, and it is well within the range of probability that some of them will be found in the mind.

Thus, now near the end of the twentieth century, we seem to be readying ourselves for yet another phase in the old struggle between Cnidian and Coan, a phase of rapprochement in which the two systems may prove to be quite compatible. Both in the maintenance of

health and in the treatment of disease, the ancient antagonists are proving to be mutually supportive. More and more, there is less and less to fight about. The whole patient, and every one of his cells, will be the better for it.

Doctors who have been accused of not paying enough attention to the emotional needs of their patients can take heart from the knowledge that this particular charge has been leveled at members of their profession since the days of Hippocrates. Perhaps professional impersonality is particularly characteristic of the technological era in which we now live, but the coolness of some doctors was as much discussed on the pathways near Cos as it is in the condominiums of New York. It was his emphasis on prognostication that was the main basis for criticism of the Greek physician. Even in retrospect today, he is seen by some, usually nonmedical, historians as being not much more than an observer and a minute-taker of Nature's behavior. Critics of this persuasion claim that he was more interested in the progress of the disease than he was in the recovery of his patient. That accusation implies a certain callousness to the plight of a suffering fellow creature. That there is no justification for such a charge is easily demonstrated by a careful reading of the major treatises in the Corpus, and by even the most superficial acquaintance with the famous Oath of Hippocrates.

The fact remains, nonetheless, that for many of his patients the Hippocratic physician had but little therapy to offer beyond searching for hopeful signs or confirming the reality that they must make their peace with the gods and their earthly intimates. The healer's ability to make reasonably accurate predictions by recognizing prognostic factors arose out of his highly developed knowledge of the course of disease. The more he observed and the more he recorded, the greater grew his understanding, and the greater became his ability to intervene in those situations in which he could be of some help. The help that can be given by a physician comes in many forms, ranging from the placebo of psychological support to the actual intervention of physical methods. Of the latter, the doctors of ancient Greece had a few that they depended upon.

Some of those Hippocratic remedies became staples in the medical storehouse that would not be replaced for almost twenty-five hundred years. They included purgatives, emetics, baths, fomentations, bloodletting, wine, bland drinks, and a calm atmosphere. Obviously, the purpose of much of this battery of available treatments was to aid Nature in her attempts to rid the body of excessive humors. Except for the addition of botanicals and a few drugs, the authors of the Corpus could easily have been describing the medical arsenal of an

early-nineteenth-century physician in Paris or Philadelphia—which says as much about the great and lasting contributions of the Greek physicians as it does about the inhibiting effect which the misinterpretations of their successors exerted on the advancement of true science until relatively recent times.

The Hippocratic philosophy of objective evidence had its greatest test in the realm of surgery. Theories are fine so long as diseases arise in invisible internal organs and exert their major influences through the silent streaming of the circulation. When the problem is right there on the outside of the body where everyone can see it, the situation demands a cure that is equally visible and unquestionably successful. Surgical methods have to work, or their failings, as well as those of their proponents, are quickly discovered. Particularly was this true in ancient times, when all operations were done on the body's surface. It is in the area of surgery that the Hippocratic physicians left the tranquil meadows of philosophy and entered the harsh arena of direct confrontation.

They often won. Above all else, the Greeks were practitioners who knew the value of what could be learned from experience, and they did not delude themselves by ignoring a poor outcome. They developed a useful body of technical expertise that was much less subject to distortion by later generations than was their strictly medical treatment. To the modern reader there is nothing recondite to be found in any of the Hippocratic surgical teachings. The recommendations, clear and useful, were obviously made by practitioners of considerable skill and wisdom.

As may be imagined, the Greeks treated a great deal of trauma. They understood the principles of setting and splinting fractures, and they knew the necessity of sawing off the projecting bone ends when the fractures were compound. They drained blood and pus from the chest, and they were skillful at the removal of fluid from the abdomen. Liver and kidney abscesses were vented, and rectal diseases like hemorrhoids and fistula had a high rate of cure, through the use of principles that to this day underlie the successful treatment of two ailments whose miseries are only fully appreciated by those unfortunates who have been afflicted with them. Who knows—it may have been the successful Hippocratic treatment of his sore anus that motivated a grateful Soranus to write that adulatory biography.

The Hippocratics were particularly successful in the treatment of head wounds. They had sensible rules to determine which sorts of injuries required trepanning, or perforation of the skull. They well understood the implications of pressure on the brain if it was allowed

Cos became careful observers and recorders of the processes of disease, sensitive therapeutists, accurate prognosticators, and the founders of a system of ethics that has been the hallmark of the art of healing ever since it first emerged from its pragmatic sources. This point is well put by the German historian Markwart Michler:

> As much as this ethic may, in a strictly philosophical sense, still be far removed from a theoretical system of medical moral principles, it might yet be compared with that *arete* which Aristotle later on assigns to the morally noble actions of the statesman. Such a *praxis kale* in a specifically medical guise increases its "help" and equates it with the words of the Oath, according to which the physician should order what is to the advantage of the patient; it makes it the nucleus of a moral philosophy which later on helped to establish the *humanitas* of the Greek physician.

These are persuasive arguments, and no doubt valid ones. But the reality that Greek medical ethics arose against a background of pragmatic necessity does not in any way vitiate the proposition that high principles of morality were just as important a motivating force. One cannot read either the Hippocratic texts that concern therapy or those that deal with the conduct expected of the physician without recognizing a sense of justice, a sense of obligation, and a sense of personal decorum that is transmitted throughout. These writings deal with what are called deontological concepts, concepts that arise from a sense of duty and the obligatory doing of things because they are, quite simply, the right things to do. There is a moral law which is universally valid, and it is this moral law that pervades the philosophies of the Hippocratics.

Hippocrates thus becomes the ideal physician, and therefore the idealized physician. In every age, his principles have been looked to as the highest fulfillment of ethical medical behavior and intellectual purity. In western society he has taken on the aspect of an icon. Through him, healing is equated on the one hand with religion, and on the other with humanism—in his *Precepts* we read, "Where love of mankind is, there is also love of the Art."

Hippocratic ethics finds its fullest affirmation in the Oath. Laymen who have never heard the words of the Oath and doctors who have long since forgotten them are united in their certainty that all of the ills of modern medicine would undergo coction and lysis if only we would return to what they conceive to be its unambiguous code of virtue. Undeterred by their total ignorance of the contents of the

acclaimed document, some of medicine's critics are nevertheless convinced that its lofty title must mean that it contains some all-embracing statement of ethical impeccability. Like all seekers after a lost perfection, they yearn for something that never was; the moral purity of the ancient Oath-takers is about as lost, and as irretrievable, as the continent of Atlantis.

Nevertheless, the fact that this particular retrospectroscope is equipped with rose-colored lenses should not be taken to mean that there is no value in looking back, and perhaps trying to reexamine, some of the simpler virtues of a simpler time. Consistent moral decency is not a goal any less worth pursuing merely for being beyond the reach of ordinary human behavior. The Greeks understood this, and they tried, as we try, to do what was expected of them. I suspect that in their everyday practices, they were neither more nor less successful at it than we are.

The Oath divides itself into two sections, one of which may be called the covenant and the other the ethical code. As with all ancient writings, scholars have debated the origins, interpretations, and intentions of each of the parts, and will probably continue to do so until civilization's last classicist shuffles off this mortal coil. Some view it as a product of the ascetic moralism of the Pythagorean sect, while others credit that group with much less influence, or even none at all. An element of confusion is added also by the fact that certain of the Oath's prohibitions, such as those against abortion, cutting for stone, and aiding a suicide, fly in the face not only of the usual medical practices of the time, but specifically of those in which some of the Hippocratics are known to have engaged. In addition, the Oath contradicts, in the area of surgery, certain passages that appear in other sections of the Corpus. The only way to deal with the disputes in a work of the present kind is to avoid them, which I will try to accomplish by the simple stratagem of taking the text at face value. Since none of the authorities seem to have irrefutable proof concerning a single one of the disputed issues, what follows is less a digest than an attempt to present a point of view.

The first section of the Oath deals with the ground rules of a professional society. There is nothing so awe-inspiring to the beginning medical student of today as the realization that, from the very first day of classes, his senior professors have begun to look on him as a colleague with whom is to be shared a huge mass of knowledge that is technological and scientific at the same time that it is philosophical and subjective. The opening paragraph of the Oath is a statement of the obligation, willingly accepted by all members of the profession, to share that knowledge with one another and to impart

—THE OATH OF HIPPOCRATES—

I swear by Apollo the physician, and Aesculapius, Hygeia and Panacea and all the gods and goddesses, that, according to my ability and judgement, I will keep this Oath and this covenant:

To reckon him who taught me this Art equally dear to me as my parents, to share my substance with him, and relieve his necessities if required; to look upon his offspring on the same footing as my own brothers, and to teach them this Art, if they shall wish to learn it, without fee or stipulation; and that by precept, lecture, and every other mode of instruction, I will impart a knowledge of the Art to my own sons, and those of my teachers, and to disciples who have signed the covenant and have taken an oath according to the law of medicine, but no one else.

I will follow that system of regimen which, according to my ability and judgment, I consider for the benefit of my patients, and abstain from whatever is deleterious and mischievous.

I will give no deadly medicine to anyone if asked, nor suggest any such counsel; and in like manner I will not give to a woman an abortive remedy. With purity and with holiness I will pass my life and practise my Art.

I will not cut persons labouring under the stone, but will leave this to be done by such men as are practitioners of this work.

Into whatever houses I enter, I will go into them for the benefit of the sick, and will abstain from every voluntary act of mischief and corruption; and, further, from the seduction of females or males, of freemen and slaves.

Whatever, in connection with my professional practice, or not in connection with it, I see or hear, in the life of men, which ought not to be spoken of abroad, I will not divulge, as reckoning that all such should be kept secret.

While I continue to keep this Oath unviolated, may it be granted to me to enjoy life and practice of the Art, respected by all men, in all times. But should I trespass and violate this Oath, may the reverse be my lot.

it to succeeding generations of those most qualified to receive it. The teaching of medicine was, and is, considered to be a principal duty of the physician.

The second portion of the Oath is actually no more than a capsulized form of the ethical doctrines that permeate the entire Corpus. Although the Hippocratic works contain several treatises devoted specifically to the behavior expected of a physician *(The Law, On Decorum, The Physician,* and *Precepts),* students were required to take the Hippocratic Oath as an avowal of the entire credo that was elsewhere sprinkled throughout the textual material. Whether this took place at the beginning of medical education or at the time of completion of formal studies is debated, but what is important is that one was not permitted to treat patients until Apollo had heard the promise sworn to him.

It is important to note that though it invokes Apollo and the Aesculapian family, the Oath is not a religious statement; it is meant specifically to be a pledge of trust rather than a priestly document. Although the first and last sentences are the product of Greek religious or mystical belief, the gods are not invoked as agents of disease etiology or treatment, either here or anywhere else in the Corpus. The separation of science from religion is complete.

The Oath's prohibition against abortion has given rise to much scholarly speculation. It is well known that abortion was common among the Greeks, and was in fact viewed by some, including Plato and Aristotle, as a desirable option in an ideal state. Given this attitude, there still remained the question of how late in pregnancy the procedure could safely be accomplished and still avoid the possibility of killing a conceptus that was already a human being.

Those who expect that such a perpetual moral dilemma will be solved by late twentieth-century philosophy, science, or goodwill are well advised to review the social history of ancient Greece. The arguments will be familiar. Aristotle favored abortion before animal life commences, but even modern neonatologists have been unable to resolve that sticky issue, with respect to either the word "animal" or the word "life." The Platonists and the Stoics held that the auspicious instant was the moment of birth, but the Pythagoreans placed it at the moment of conception. Given the Pythagorean viewpoint, all abortion should be forbidden, which is the doctrine expressed in the Oath. That doctrine placed the Hippocratics in the minority of informed opinion. Why, in view of their general sense of obligation to the well-being of those who came to them for help, would Hippocratic physicians refuse to terminate a pregnancy?

The reason, I think, is to be found in the implied general princi-

ple of *Primum non nocere* which guided their treatment. They were not interventionists, but rather facilitators of the will of Nature. Abortion, in those pre-antisepsis days, must surely have had an unacceptable rate of complications and a significant mortality. Risking injury to a healthy person was not the Hippocratic way. A woman who died as the result of an abortion was a woman who had been killed; such an outcome not only was morally reprehensible but devastated the reputation that meant so much to the Hippocratic physician. Abortion was a form of risk-taking that violated his principles of morality and his principles of pragmatism both, the two predominant concerns of the Father of Medicine.

It is difficult to know why the Hippocratics would not help patients take their own lives. Here again, the general attitude of Greek society was a liberal one; suicide, usually by poison, was an accepted solution to painful illness and desperate suffering. Why, then, did the Hippocratic physician dissociate himself from it? Very likely, the answer is again to be found in the same two basic considerations. From the pragmatic viewpoint, suicide meant a failure of treatment, and from the moral viewpoint, it meant a deliberate destruction of human life. Neither was considered an appropriate basis of action, regardless of the agony and despair endured by the suffering patient.

These arguments apply equally well to the proscription against "cutting for stone." Later commentators have recorded horrifying descriptions of the brutal methods required in those far-off times to extract bladder stones through holes cut and torn between the spread legs of shrieking sufferers, their torments diminished but barely by the ingestion of poppy or mandrake. Many patients died, some postoperatively and some during the most agonizing moments of those savage surgical assaults. Others were left with permanent draining fistulas that constantly leaked infected and foul-smelling urine. These were not operations that fell within the ethical province of the Hippocratic physician. They were best left to "such men as are practitioners of this work," a group of itinerant craftsmen who were specialists in this particular form of necessary medical mayhem.

The disciples of Hippocrates were not reticent about calling for help when it was needed, either from such surgical artisans as the stone-cutters or from their fellow physicians. In fact, the very nature of the professional brotherhood celebrated by the Oath encouraged consultation and fraternal discussion of cases, as did the words of the Corpus: "When a physician is uncertain as to the condition of a patient and is disturbed by the novelty of an affection that he has never seen before, he should never be ashamed to call in other physicians to examine the patient with him."

2

The Paradox of Pergamon

GALEN

All nature is but art, unknown to thee;
All chance, direction, which thou canst not see;
All discord, harmony not understood;
All partial evil, universal good;
And, spite of pride, in erring reason's spite,
One truth is clear: Whatever IS, is RIGHT.

—Alexander Pope,
Essay on Man

When he wrote these couplets in 1734, Alexander Pope was giving voice to the doctrine of predeterminism, which had formed the basis of medical thinking for fifteen hundred years. To the skeptical mind of the modern scientist, the belief that all is preordained to serve some greater good is an unthinkable proposition. That it should have endured so long without being overthrown by the forces of rationalism seems, in retrospect, beyond comprehension. And yet, at the very time when the English poet was composing his masterpiece, the mighty struggle which would separate medicine once and for all from the master-plan philosophy that had been its keystone since the days of the Roman Empire had barely begun. That the doctors of the Middle Ages and Renaissance were educated to affirm a dogma so

inimical to scientific progress was the intellectual heritage of one man: the second-century Greek physician Galen of Pergamon.

Galen's theology-biology was made up of a series of contradictions, and so was his life. His career was one long exercise in inconsistency: his trust in a supernatural Creator belied his unbiased contributions as a researcher; his often odious personal deportment made a mockery of his self-proclaimed philosophic serenity; he was at once the originator of the experimental method in medical investigation and the obstructing force that inhibited its further development for a millennium and a half after his death; to him we owe the origin of modern medicine's appreciation of anatomical accuracy as the foundation for the understanding of disease, and upon his abiding influence must be cast the onus of impeding research in anatomy until the sixteenth century; he was the ancient world's most eloquent proponent of direct observation and planned experiment, and yet he allowed philosophical and theological conjecture to influence his interpretation of what he saw. He was medicine's best influence, and he was its worst.

Students of ancient science and philosophy will recognize in this description of Galen some of the elements of the thinking of the classical period. Like Aristotle, to whose investigative reasoning methods his have been compared, Galen sometimes made brilliant observations only to draw faulty conclusions from them. But in the case of Galen, the problem was more disabling. His inconsistencies loom so large that he emerges not only as the strongest of the many physician influences on medical history in its twenty-five-hundred-year evolution, but as its greatest paradox as well.

Because the words "God," "Creator," and "Nature" occur so often in Galen's writings, it is necessary to understand what he meant by them. He did, after all, live during the earliest period of Christianity's development, and he was familiar enough with the new religion to know the characteristics with which both it and Judaism endowed the Supreme Being they mutually worshipped; in several of his books he took great pains to distinguish his own beliefs from those of the Judeo-Christian formulation. His theistic concepts arose out of a different tradition, one in which uncritical faith was seen as a hindrance to the discovery of truth. His was the tradition of Socrates, of Plato, and of Aristotle. It was the same tradition that had enabled the Hippocratic physicians to break away from the mystical theories and cures of the cult of Aesculapius and to abandon a pagan trust in deities-by-the-dozen. It was a tradition that cherished no belief in miracles or in divine revelation. It was therefore a tradition which, in its very nature, stood opposed to Jewish and Christian theology.

The one doctrine held in common by all three heritages was the belief in a Supreme Being. It was in their differing conceptions of the characteristics of that Being that they parted theological company. To the Jews and Christians of the second century, God created the world, its botany, and its zoology out of nothing. Having done so, He continued to make fine adjustments to the product of His creativity by performing periodic miracles of various magnitudes. He spoke to His creatures, He parted waters, He cured the incurable, He inflicted scourges on those who rejected His Word or harmed His Chosen, and He sent a Messiah to heal the moral ills of mankind or, according to the Jews, at least promised that He would one day do so. That these events had taken or would take place was not to be questioned, was accepted through a purity of faith that rejected any possibility of the facts being eventually proved to be not facts at all but simply misunderstandings or myths. Accepted also by the faithful was the certainty of the resurrection of the dead from the putrefaction and dust of the grave.

This last was, of all the attributes of Judeo-Christian belief, the one least palatable to the Greek—and therefore Roman—mind. Aulus Cornelius Celsus, a first-century Roman medical compiler, summarizes the classical pagan opinion of this sort of thing:

> For what sort of body, having once been completely destroyed, can return to its previous nature and to that very structure from which it has been released? Having no reply to offer, they take refuge in the ridiculous position that everything is possible for God. But God is not capable of anything ignoble nor does He will things contrary to nature; nor, if one in his wickedness desires what is disgusting, will God be able to produce it, and one ought not to believe that it will happen instantly.

It is the "everything is possible for God" that the Greeks disputed. Their philosophers had to a great extent replaced the primacy of the multiple gods of an earlier time with that of a single Supreme Being, but not one with the unlimited power of a Jehovah. He could not create matter from nothingness, nor could He act contrary to the never-changing laws of Nature. The world of Aristotle and Galen was a world in which events are determined by natural laws unbreakable even by the Deity. It became, in this view, the duty of the pious to discover those laws by use of their own critical faculties, and to accept nothing on faith. Uncritical faith, the basis of Jewish and Christian orthodoxy, was to Galen the enemy of true knowledge; a belief in divine revelation was seen as an opacity between intellect

and truth. The proper way to worship the Creator was therefore not with prayer and sacrifice but with experiment and observation, in order to know His ways and to bring His perfection to all things. In his greatest extant anatomical work, *De Usu Partium,* Galen described his text as "the sacred discourse which I am composing as a true hymn of praise to our Creator." He continued:

> And I consider that I am really showing Him reverence, not when I offer Him unnumbered hecatombs of bulls and burn incense of cassia worth ten thousand talents, but when I myself first learn to know His wisdom, power, and goodness and then make them known to others. . . . To have discovered how everything should best be ordered is the height of wisdom, and to have accomplished His will in all things is proof of His invincible power.

The Hippocratic physicians had rejected supernatural forces in order to learn the ways of Nature; Galen studied Nature in order to learn the great and perfect ways of his Creator. Neither metaphysics nor miracles had any role to play. It was a credo worthy of a modern scientist.

Obviously, Galen's thesis did not go unchallenged. Jewish writers in particular attempted to refute him, especially since several of his statements are attacks on the Creation story and the Pentateuch of Moses, according to which God's power is limitless. His most eloquent critic, however, was not to be heard from until a thousand years later, when the greatest of Judaic physician-philosophers, Maimonides, who revered Galen as his principal source of medical knowledge even as he deplored his theology, addressed the problem in his *Aphorisms in Medicine.* Declaring that God *is* almighty—that is, able to act against the laws of Nature—Maimonides asked only that any perplexed doubter accept but a single miracle that he has witnessed, for if even one such has occurred, it must follow that God can perform every kind. In the words of the Hebrew sage, "The perception of one miracle on the part of him who perceives it is a stringent proof of the creation of the world."

According to Maimonides, God's power is limited only by His inability to do evil. Here the two theologies meet. The Greeks used the Platonic word "Demiurge," or "Craftsman," which we find in earlier English translations; but in this one sense the Supreme Being of Greeks, Christians, and Jews embodies that single characteristic which is the foundation stone of monotheism: God is goodness; we must learn His ways that we may be like Him. As pointed out by the

Oxford medievalist Richard Walzer in his brief monograph *Galen on Jews and Christians,* this idea among the Greeks is traceable to Plato's *Timaeus,* in which the philosopher writes, "The Demiurge was good, and in the good no jealousy in any matter can ever arise. So being without jealousy He desires that all things should approach as much as possible to being like Himself." This was the God of Galen: on the one hand He was a stimulus to research that might demonstrate the perfection of His work, while on the other the belief that structure and function were created in perfection made further investigation unnecessary once the basic facts had been identified.

The first, the most lasting, and the most pervasive of Galen's contradictory contributions, then, was this: he used experiment and observation to learn about Nature, but he left a body of knowledge that he and his successors treated as a form of writ so conclusive that it inhibited further research for fifteen hundred years. For that period of time, to study medicine was to study Galen. His reverence for the dispassionate observational methods of Hippocrates served not only his methodology but his image as well. He sought to appear as the prime interpreter of the venerated Hippocratic writings, and in this he succeeded. He proudly boasted that he was the first of Hippocrates' successors to clarify the teachings of the Father of Medicine so that they could be made useful. He invoked the analogy of Trajan's paving of the military roads of the Roman Empire, which had originally been cut by the ancients: by improving the rough roads of the Hippocratic Corpus, he made them passable. That he was considered the intellectual heir to the physicians of Cos was due not only to a careful attention to objectivity in his studies, but to a self-promotion at which he was very skilled. He was legitimized by the value of his contributions, but also by the general acknowledgment of succeeding generations that he was the vector of the Hippocratic philosophy.

After the golden period of Greece, the solid body of Hippocratic teachings had begun to diverge in several different directions, each based upon one form or another of speculative thinking. The result was the gradual emergence of a group of medical-philosophical sects in a continuous state of conflict with each other. Except that each group retained the rejection of mysticism, the rational tradition of Cos began to fade even as the reputation of Hippocrates as a healer increased with the passage of time. The various sects created systems based more on conjecture than reality. Theory replaced experience; with a few notable exceptions, the accurate descriptions of the Hippocratics gave way to surmise, guesswork, and unsupported infer-

scholars and people of culture. It was customary to write all scientific works in Greek, for the practical reason that all science of the time was based on Hellenic thought, and Rome was permeated with an atmosphere of Hellenic cultural superiority, which Galen affirmed his whole life long. In later years he wrote, with his usual directness:

> Would you then neglect the Grecian language, so very pleasant and so expressive of man's deepest feelings, a language, too, in which so much grace and beauty abound? Would you prefer to acquire your medium of expression from methods of speech that are as unsuitable as they are ugly? It were much better to learn one language, and that one the most perfect of all, than to acquire six hundred debased tongues. . . . You do not wish, Sir, to learn the language of the Hellenes, well, be a barbarian if you will!

And so it was into a totally Grecian atmosphere that Galen was born on September 22, A.D. 130, the son of Nikon, a cultivated and highly successful architect and landowner. The boy's name was derived from the Greek word *galenos,* meaning calm and serene, qualities that, according to Galen himself, very well describe his father, but not his mother: "It was my good fortune to have a father who was perfectly calm, just, gallant, and devoted; my mother on the other hand was so irascible that she sometimes bit her maids. She was always babbling and quarreling with my father, as did Xanthippe with Socrates . . . and while he was not affected by the most serious, she choked with anger over the pettiest inconvenience." Sad to tell, it was not for the personality traits inherited from his father that Galen was to become known among his contemporaries, but rather for those that were the most obnoxious legacies of his mother.

Until his fourteenth year, Galen was educated in literature, grammar, arithmetic, geometry, and the rudiments of philosophy by Nikon, who taught him also the skills necessary for running the family's large and profitable farm. From age fifteen to eighteen he was sent by his father to study the separate philosophies of all the leading systems of the time. It was not Nikon's intention that his son choose one of the sects, but rather quite the opposite: he sought by this means to impress the boy with the importance of maintaining his independence from all of them. His father's advice was often quoted and never forgotten. Throughout his life, Galen avoided being identified with any one school of philosophy or medicine, choosing to go his own way and develop his own patterns.

Another lifelong practice also made its first appearance at this

time, but this one was of a far less rational nature. Nikon, who had provided his son with such a superior education in order to prepare him for a career in the service of the empire, had an Aesculapius-inspired dream telling him to guide the boy into the study of medicine. He and Galen accepted the revelatory message, with the result that the youth shortly thereafter started his professional education. Thus begins a chronicle of the contradictions that were to mark Galen's life. When he was twenty-seven years old, a dream told him to open an artery in his hand to cure himself of an abdominal abscess; when he was thirty-eight, a dream told him not to go off to war with the Emperor Marcus Aurelius; when he was forty-three, a dream told him to complete an unfinished treatise on the structure and function of the eye. Throughout his career he would from time to time use treatments revealed to him during sleep. The repudiator of miracles never lost a childlike faith in the power of Aesculapius.

Pergamon was the site of one of the greatest of the god's shrines; perhaps neither Galen nor Nikon could have failed to become taken with its mysteries, despite Hippocrates' denial of them. There is evidence, in fact, that Galen looked upon the physician of Cos as himself having been elevated to the position of a god, whom he might one day meet in the eternal home of the immortals. This reverence probably never struck him as incompatible with his rejection of miracles. If he had thought he was being inconsistent, he would surely never have written so openly on both sides of the issue. Perhaps it is only post-Enlightenment westerners who are troubled by such incongruities, insisting upon a purity of allegiance to either atheism or faith, at least in others. Somehow it seems to be a standard to which most of us can only aspire.

Galen commenced his training in medicine at the age of seventeen. After he had studied four years in Pergamon, his father died, and he left home, perhaps to get away from his mother. He then attended lectures and demonstrations at other centers of medical learning, chiefly Smyrna and Corinth. In the year 152, he arrived at the great city of Alexandria, where he spent five especially valuable years.

Although in his experimental work Galen stands alone, his ability to discover and describe previously unknown anatomical structures put him in a tradition begun by Greek investigators during the golden years of Alexandria. Herophilus and Erasistratus, for example, had actually managed to dissect human cadavers in the third century B.C., and perhaps even some living condemned criminals. Unfortunately for the advancement of knowledge, the period of investigative freedom during which they were allowed to open dead

bodies was all too brief, Roman law finally putting a premature end to it and forcing the few serious anatomists to return to the study of animals, with all of its inherent potential for error. Still, the results of those earlier researches were available at Alexandria, and Galen doubtless learned a great deal about human structure from them. Also available to him was the first full-scale anatomy text, a work in twenty books written in the first century by the Roman Marinus and now lost, to which Galen later made considerable reference, much of it surprisingly respectful.

After his first period at Pergamon, Galen had become very much the equivalent of the modern graduate student, attending courses even as he pursued his own beginning research and writing. He had worked with some of the leading physicians of his day, and benefited from the best medical education available, not only learning what little was then known of anatomy and physiology, but becoming expert in the theory and practice of the Hippocratic medical legacy, splintered though it was.

In the second century, theories of disease causation were still based, as they would be for centuries to come, upon the Coan factors of climate, diet, geographical location, occupation, temperament, and the effects of each on the balance of the four humors. The body of the patient was carefully inspected, as the Hippocratics had taught, and its various effluvia scrutinized. Therapies were somewhat more aggressive than they had been five centuries earlier, though there is no evidence that they were any more successful, and a large number of botanical and animal products had entered upon the therapeutic scene, which seem to have been prescribed with an enthusiasm that was not justified by any demonstration of their efficacy.

As to theory, the Greeks were vitalists—they believed that living creatures differ from inanimate objects because they are endowed with a spiritual essence that is the life principle. In various forms the concept of vitalism has persisted throughout the course of history, and even modern molecular biology has not yet completely had done with it. In the Greek belief, there was an undefined, undescribed spirit in the world, having neither substance nor texture, to which was given the name *pneuma*. According to this system, we are surrounded by a world-pneuma, which, while it is not exactly air, is drawn into the lungs by breathing, whence it enters the left side of the heart and then passes into the arteries, whose pulsations are caused by its rhythmic dilatation; the arteries, being filled with the pneuma, were thought to be bloodless. Thus was life brought to the flesh of man. The blood, on the other hand, was believed to be carried

only in the veins, to give nourishment of a more physical sort to all parts of the body. In the Greek formulation, the essential elements of the human body were the four humors created by the process of digestion, the innate heat produced in the heart, and the pneuma introduced from without.

By the time Galen returned to Pergamon in 158 he was not only a physician fully trained in this system but was already celebrated for a series of treatises he had written on anatomy and physiology. He was also, like the Hippocratics, equipped to practice surgery.

During his twelve years of training he had learned to treat fractures and dislocations, and to deal with head injuries by the technique of trephination, or venting, of the skull. Lacerations were stitched or strapped, torn vessels were tied with a ligature, and external cancers, cysts, and polyps were removed with the knife or the hot iron. Fluid was drained from the chest and abdomen, and various types of hernia incised and stitched; even bladder stones were commonly operated upon, the Hippocratic Oath and the screams of the victims notwithstanding.

Galen's skills and his good relations with the local Aesculapian cult served him well, for the high priest was authorized to select the surgeon to care for the gladiators of the city's coliseum, and he awarded the position to Galen, who carried out his duties so effectively that the appointment was renewed each year during the period he resided in the city. The post afforded the young physician an unmatched opportunity to study living anatomy and the ways in which function is altered by various types of injuries. As may be imagined, the ghastly open wounds sustained by some of the contestants provided a kind of human vivisection that would have been impossible under any other circumstances. The beating of the heart, the forceful pulsations of the major internal blood vessels, and the snaky undulations of the gut could be observed in animals, but to a physician trying to discover the secrets of man's body, there is no substitute for the real thing.

By the year 162, however, Galen had decided that he had accomplished all that he could in Pergamon; filled with a driving ambition and conscious, to a fault, of his considerable abilities, he yearned for a more suitable arena in which to expand his activities. When a war broke out between the Pergamenes and the neighboring Galatians, he pulled up stakes and moved to Rome. He began his career in the imperial city at the age of thirty-two.

Rome at that time was a magnificently prosperous metropolis of a million souls, whose medical needs were served by some two thousand healers of various persuasions. In addition to the five major

sects—Dogmatic, Methodist, Empiric, Pneumatic, and Eclectic—there were subsidiary groups and mixtures of doctrine, some with unwieldy names such as Thessalon Methodists, Erasistratean Pneumatists, and Pneumatist Eclectics. There were also approximately 150 midwives, who not only delivered babies but functioned as physicians to women. Besides these, one hundred religious healers lived in the city. It is estimated that there were at least another hundred slave practitioners, who treated the minor illnesses of members of their owners' families. Interestingly, many of these were Jews captured after the unsuccessful Judean revolt led by Bar Kochba in 132.

Fortune smiled on Galen from the beginning. By a combination of circumstance and skill, he swiftly accomplished a few impressive diagnostic feats and soon found favor with members of the upper echelons of Roman society. His excellent education in literature and philosophy attracted the friendship of some of the leaders of those circles. The philosophers in particular welcomed him as one of their own. During his first two years in the city he gave public demonstrations in anatomy that proved popular beyond his expectation. These and his newly made connections brought him celebrity among both patients and those impressed by his research and pedagogical talents. But jealousy followed not far behind.

The medical community was divided not only by its sects, but also by widely different levels of learning and ability within each group. The competing physicians perpetrated vicious verbal assaults on each other, publicly ridiculing opponents in the most insulting terms. Galen made the double mistake of being both talented and arrogant about it. The greater his achievements, the more shrill became the derogations, and the more forceful in turn became his own denunciations of his adversaries and the sects to which they belonged. He boasted shamelessly of his successes and poured scorn, albeit often justified, on the heads of lesser men. It was a tasteless display, mitigated not at all by the inferior quality of many of his rivals.

Enemies appeared everywhere. Although Galen was lionized in the literary circles of Rome and adored by the moneyed elite who paid him high fees, his attacks on the various sects and their individual members eventually put him in some physical danger. In time, it became unsafe for him to remain in Rome. He left the city in haste and in secrecy, making his way back to Pergamon. It has been charged that Galen feared more than assassination—that the real reason for his flight was the rapid approach of a major epidemic of plague that was overrunning the eastern part of the empire. The

side it of a beautiful clarity of intellect. This was the case with Galen of Pergamon. Competitive, arrogant, contentious, and often a hypocrite, he was gifted with an intellectual vision that enabled him to look directly at the phenomena of Nature and see truth where others constructed fantasy. By rejecting the dogmatic notions of the various sects of his day, he approached his observations unburdened by preconceptions. When his doctrine emerged, it was one that would transform the heretofore philosophical approach to disease into the experimental. Hippocrates had introduced the healers to the concept that medicine is an art; Galen now taught them that it can be an art that is based upon the truths of science. The Hippocratic physicians had established dispassionate observation as the first rule of clinical medicine; Galen now applied it to research. That the rule was ignored after his death is perhaps the greatest of the Galenic paradoxes, in the sense that it was precisely because of his enduring posthumous influence over medical matters that free thinking and experimentation were inhibited for almost fifteen hundred years. When research was resuscitated in the sixteenth and seventeenth centuries, it was by those who forgot from whose gospel it had come.

The system that Galen developed was founded on the basis of dissections in anatomy, experiments in physiology, and clinical observation of patients. When he went wrong, he did so because he was a man of his time—a Greek to whom philosophical speculations and the application of logic were just as valid as unbiased observation. A scientist who believes that all structure and function are predetermined by a Supreme Intellect will not feel that he prejudices his conclusions by assuming a teleology—that is, by interpreting his observations as proof of a grand design in Nature. He does not consider himself inconsistent when he fills in the gaps between things which are known with things which are not, provided that the outcome reveals the reasoned plan of God. Nevertheless, paying homage to that plan, which Galen thought to be his great strength, proved to be his great weakness.

Galen was simply unable to recognize that when it came to explicating the structure and function of the human body, his reasoning powers were no replacement for his sense organs. To him, hypothesis was as valid as hard fact, conjecture as convincing as experiment. What he could not see, he imagined, and then wove his imaginings around the thesis of the superlative work of the Craftsman, whose every creation is perfect and whose creatures are endowed with life by the entrance of pneuma into their bodies.

Perhaps we should not criticize Galen too harshly for relying so heavily on speculation. Speculation is part of all science, particularly

that endlessly fascinating compound of science and art we call medicine, in which our need to treat is often in advance of our ability to see. In modern research, we dignify speculation by calling it theory. In justice to our scientific colleagues, we should hasten to add that their theories are constructed on strong evidence, but that is only because eighteen hundred years have passed since Galen's day, and today's investigators have better ways of getting their evidence and more people to search for it. Viewed as theories based on the few facts that were then known, Galen's speculations become more forgivable. That does not, however, excuse such a gifted experimenter for wasting so much potential research effort by philosophizing. It is here that Galen and modern science take divergent paths. The investigator of today is in the main an experimenter and observer; a theory must force itself on him by an abundance of data. Galen was primarily a theoretician, whose scientific method erred in two ways. First, he approached his observations teleologically—that is, he invoked on them a sense that they fulfilled some grand purpose. Secondly, by making good observations but not enough of them, he often drifted off course, veering from the direction in which more experiments might have taken him. His process is comparable to attempting to draw a graph with too few proven points scattered diffusely along it, and with the further handicap of having decided beforehand what the graph is to look like. Galen's greatness lay in the beautifully designed experiments that provided the data for each point; his failure lay in the scarcity of the points, the ways he joined them, and the ways he extrapolated from them.

Stated another way, the modern scientist is fascinated by the minute details of his daily research findings, which eventually form a pattern that directs him inexorably toward a theory that he has reason to believe can be proved true. Galen, on the other hand, proceeded from a certainty that he already knew the final Truth—his research, no matter how objectively each experiment was devised, was carried out in the service of that Truth, and its results were interpreted to confirm it.

Galen's work had another great weakness, but this was one of which he was to some extent aware—his anatomy was the anatomy of animals. Galen never saw a human dissection. On one occasion he came upon the corpse of a robber by the side of the road, most of the flesh stripped away by birds. Another time, he found a moldering body thrown up on a riverbank after a flood. The unsatisfactory viewing of those rotting remains taught him nothing. Of course, he did know a great deal about the human skeleton from his days in Alexandria, but beyond this, everything he learned came from his careful