FROM HIPPOCRATES TO GALEN.*

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For thousands of years medicine was an undigested collection of experimental notions, vaguely described, disfigured by tradition, and often made useless by superstition and ignorance. The earlier medical history is entirely legendary, and to Greek writers must be given the credit of compiling and systematizing the most interesting and most significant remains of the history of medicine of antiquity.

In the description of medicine as pictured in the Homeric Poems, we find that Chiron, the Centaur, introduced the art of medicine among the Greeks, and educated Æsculapius, a Thes-

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salian king, whose great learning and success in the art of medicine acquired for him such a celebrity that in later years divine honors were paid to him in the form of a system of religious rites and observances offered up to Æsculapius as the god of the healing art. This cult spread very widely among the Greeks; it had great civil importance, and lasted even into Christian times; but there is no reason to attribute to it any special connection with the development of the science or profession of medicine. It may be safe to say as an historical fact that Æsculapius was nothing more than an excellent physician of human origin, the founder of a system of medicine, Methodism, the followers of which, perhaps for their purposes, ascribed divinity to their master. The statue of Æsculapius at Epidaurus, formed of gold and ivory by Thrasymedes, represented the god as seated on a throne and holding in one hand a staff with a snake coiled around it, the other hand resting on the head of a snake. To this may be traced the custom, which is often followed at the present, of using the figure of a serpent wound around a staff as an emblem of the medical profession.

According to Homer, Æsculapius left two sons, Machaon and Podalirius, who commanded a certain number of troops at the siege of Troy. They were both most excellent physicians, and rendered much service to the Grecian army by their skill in their medical capacity. The act of venesection was performed by Podalirius upon the daughter of the King of Caria, upon whose shores the physician was cast by a raging tempest on the voyage home after the ruin of Priam's kingdom. Æsculapius was also represented as having three daughters, whose names were Hygieia, Panacea and Ægle. Preventive medicine is indebted to Hygeia for a proper name, "hygiene," and the people afflicted with imaginary diseases are frequently dosed with a "panacea," thanks to the second daughter of Æsculapius, who donated her name to the so-called "pseudo cure-alls."

From the sons and daughters of Æsculapius descended the race of the Asclepiadæ, who were the priests and doctors claiming to be the followers of Æsculapius. The temples, over two hundred in number, in which these Asclepiadæ practiced the art of medicine usually stood without the cities in healthy situations, on hillsides and near fountains and springs. The priest-doctors prescribed venesections, purgatives, emetics, frictions, sea baths and mineral waters, as they seemed to be indicated. The imagination of the patient was continually stimulated, and at the same

time controlled. Before interrogating the oracles they were required to purify themselves by means of abstinence, prayer and sacrifice. There is little wonder that the Asclepiadæ cured a majority of their patients by such common-sense treatment, which even to-day receives the sanction of our most eminent practitioners. Patients that were cured of their ailments offered a cock or a goat to the god, and hung up a tablet in the temple recording the name of the patient, the disease and the manner of cure. Many of these votive tablets are still to be found in our museums, and a similar custom of keeping a record of medical practice prevailed among the Egyptians. This custom, a most useful one, may be considered the forerunner of the modern medical journal or the record of clinical cases kept by every educated physician.

From the time of Æsculapius to that of Hippocrates, Pythagoras, Democritus and Heraclitus may be regarded as the men who kept alive an interest in the art of medicine among the Greeks. These men lived about 600-400 B. C., and were Greek philosophers, very illustrious and learned in their day. It was only from such non-medical writers that anything is known of the history of medicine in Greece before the age of Hippocrates. These Greek philosophers studied everything, and travelled all over the East, the most civilized part of the then known world. They acquired their chemical knowledge from the Egyptians, but added nothing to it. It is also doubtful whether they added anything to any of the branches of medicine, but by studying the medical science as then known to the ancients of the East and by bringing this knowledge to the Greeks they in that way did much to foster the science of medicine and, therefore, deserve the honor of being called the connecting link between primitive medicine and the Hippocratic system of medicine.

Pythagoras was born at Samos in the last half of the Sixth Century B. C., and commenced in that part of southern Italy settled by the Greek colonies, a new philosophical movement. He travelled extensively in Egypt, in Babylonia, and even in India. Few names in the history of Greek philosophy are given more prominence than that of Pythagoras, and few philosophers have been so variously interpreted. He is claimed by mystic, mathematician and theurgist equally as their own. He was a worker of miracles, and was regarded as descended from the gods. His miracles, like those the prophets of all ages propose for their dupes, were "seen, heard, attested, everything *but true*." The many wonders related of him, the fear in which he was held, the supreme

devotion of his followers, his great political power, and the arcadian plan of his school with its initiates and neophytes, all go to prove that Pythagoras was an enthusiastic imitator of the East for his own purposes. The rôle which Pythagoras fills in the history of medicine is a very important one, because to him must be accorded the honor of having introduced the custom of visiting patients in their homes, and his followers went from house to house in the performance of this duty. On this account they were called periodic or ambulatory physicians, in opposition to the Asclepiadæ, who prescribed for their patients in the temples.

Democritus was born at Abdera in the middle of the fifth century before Christ. His early education was supervised by Magians and Chaldeans, and he visited Persia, India, Ethiopia and Egypt. Democritus was a shrewd thinker and observer, and commanded attention at once by calling notice to some truths: the importance of temperance, uprightness and noble actions, easy enough of comprehension when observed, but seldom enough observed. Democritus may be considered the originator of the atomic theory, which is substantially the modern theory of chemistry. He assumed as the ultimate elementary ground of nature an infinite multitude of indivisible corporal particles, atoms, and attributed to these a primary motion derived from no higher principle. This motion brings the atoms into contact with each other, and from the multitudinous combinations that they form springs that vast and varying aggregate called Nature which is presented to our eyes.

Heraclitus was born at Ephesus, in Asia Minor, and flourished about 500 B. C. From the obscurity of his writings he was nicknamed "The Dark." He was noted as a Greek philosopher and a great traveler. It is reasonable to infer from the readings of history that Heraclitus was either mentally or physically abnormal. He was then what we would now call a crank, but he was a very learned man, and simple and abstemious in his habits. He did much good by his hygienic teachings. His philosophy had a strong influence on later thinkers, and Stoicism is based on its teachings.

A most important part of the course of medicine as adopted by the Greeks prior to the time of Hippocrates was the system of gymnastic exercises taught in the gymnasia, which became schools for mental as well as bodily education, and their hygienic as well as military importance was fully recognized. The value of exercise as a developer of the powers of the human body was thus early established. The teachers in the gymnasia were also phy-

sicians who directed the pharmaceutical treatment of the sick and, by means of anointing with ointments and oils, by bleeding, by dressing wounds and ulcers, etc., healed the afflicted.

The medical art as we now practice it, the character of the physician as we now understand it, both date for us from Hippocrates, the most celebrated physician of antiquity. His doctrines were received by his contemporaries and by posterity with a veneration akin to worship, and from the time of Hippocrates the history of medicine becomes less mythological and, therefore, less obscure. Hippocrates was the son of Heraclides, who was also a physician and belonged to the family of Asclepiadæ, he being the seventeenth in descent from Æsculapius. Phaenarate, said to be a descendant of Hercules, was the mother of Hippocrates, who was born on the island of Cos, probably about the year 460 B. C. History says of him that he was instructed in medicine by his father and by Herodicus, and in philosophy by Gorgias of Leontini, the celebrated Sophist, and by Democritus of Abdera. After spending some time in traveling through different parts of Greece, Hippocrates settled down and practiced his profession at Cos, where he established a medical school, which soon gained a very high reputation. Hippocrates died at the age of 104 years, according to Clinton, the historian, at Larissa, in Thessaly, after having gained the highest esteem of the then known world as a physician, as an author and as a teacher.

Hippocrates was worthy to figure in the most brilliant period in the history of Greece—we might also add, the most brilliant of all ages—in literature, philosophy, poetry and the fine arts. Using the word contemporary in the large sense of living in the same period of history, if not precisely in the same years, we may say of Hippocrates that he had for his contemporaries Pericles, the famous statesman; the poets Æschylus, Sophocles, Euripides, Aristophanes and Pindar; the philosopher Socrates, with his distinguished disciples Plato and Xenophon; the venerable father of History, Herodotus, and his young rival Thucydides; and many other distinguished names which have conferred immortal honor on the age in which they lived.

Hippocrates was not only a keen and patient observer of diseases, but he was also one of their describers, his descriptions of diseases being based as well on his own observations as on his having deeply reflected on the writings of his predecessors. He was probably the greatest compiler of medical literature that ever lived. Among the distinguished traits of Hippocrates were an

exalted idea of medicine, its extent, its aim and its difficulties; a great regard for medical dignity, and a lively feeling of the duties and obligations of his profession; a deep aversion against those who in any way compromised it, either by quackery or immorality; and, in fine, his unceasing solicitude for the cure, or, failing in this, the relief of the sick. That Hippocrates was a remarkably close observer of diseases, their course and their treatment, his writings amply prove; in fact, they almost make one think that close observation is one of the lost arts, being open only to the objection that too much weight was attached to insignificant external appearances, speculation on which detracted from consideration of the serious feature of the case. To the careful scrutiny of facial appearances, the position of the body and other marks about the patient he attributed very great importance. So positive was he about these matters that he embodied them into aphorisms, which, however, soon lost their authority and much of their value on account of the numerous exceptions made later by Hippocrates himself.

The writings of Hippocrates, termed "The Hippocratic Collection on Medicine," are more than sixty in number. They may be divided into three classes:

First, works certainly written by Hippocrates, viz.: "The Prognostics," "The Aphorisms," "The Epidemics," "On Regimen in Acute Diseases," "On Airs, Waters and Places," "On the Articulations," "On Fractures," and "The Mochlic," a work on the instruments of reduction.

Second, works that were supposed to have been written by Hippocrates, such as "The Hippocratic Oath," "The Physician's Office," etc.

Third, works that were wilful forgeries, given out by other writers who depended on the reputation of Hippocrates to gain temporary advantage.

The most philosophical of the works of Hippocrates, that which evinces extended observation, travel and study, is "On Airs, Waters and Places." In it Hippocrates inquires into the effects of the seasons, winds and various kinds of water, localities, nature of the soil and modes of life and exercise upon health, and the necessity of a physician making himself acquainted with all these matters. He next points out the influences of climates, and the diseases depending on differences in them. So renowned did Hippocrates become through the influence of this work that he was invited by Artaxerxes, King of Persia, to exercise his skill

in abating the ravages of the plague with which Persia was then afflicted. By his advice and counsel, Hippocrates performed an important part in staying the great plague at Athens, and subsequently his services were put in requisition by the Athenians on the occasion of another outbreak of the plague.

Hippocrates gathered his medical knowledge from all available sources, and digested it so well that, probably for the first time in the course of human events, medicine took on the aspect of a science. In anatomy and physiology, however, little advance had been made by the ancients, and so of pathology, in the sense of an explanation of morbid processes or knowledge of diseased structures, there could be but very little. Respect for the dead was a religious observance in all Greece, and was, therefore, an insurmountable obstacle to the dissection of the human body. Consequently, the knowledge of anatomy possessed by Hippocrates must have been meager. It being impossible to study physiology without an anatomical basis, the knowledge of physiology evinced in the writings of Hippocrates was very crude and incorrect. Arteries and veins were confounded, and nerves, tendons, ligaments and membranes were represented as analogous or interchangeable tissues. With so little knowledge of physiology and pathology as the ancients had, it is not strange that they ascribed undue importance to external appearance. The ancients had some accurate knowledge of osteology, but of the structure of the human body in general their ideas were at once superficial and erroneous. Indeed, the anatomy of the ancient school of medicine is not only erroneous, but fanciful and imaginary, in often substituting mere supposition and assertion for what ought to have been a matter of fact.

The medical subjects which Hippocrates described covered the whole range of the then known medical science. He even wrote a work on equine disorders and, therefore, might justly be called the "father of veterinary science." To his writings may be traced the classification of diseases into *internal* or *medical,* and *external* or *surgical,* and to him we are indebted for the classification of *sporadic, epidemic* and *endemic* forms, as well as for the division of disease into *acute* and *chronic.* The causes of disease he divided into two principal classes: *First,* the influence of the seasons, climates, water, situation, etc.; and *second,* personal causes, such as food, environment, habitation, and habits of the patient. He ascribed to the influence of climate both the confirmation of the body and the disposition of the mind. The principal theory

as to diseases by Hippocrates, a theory which even to this day has its influence on the medical mind, was that the four fluids of the body (blood, phlegm, yellow bile and black bile) were considered as the primary seats of disease. Health was the result of the due combination of these, and illness was the consequence of a disturbance of this crasis. When a disease was proceeding favorably these humors underwent a certain change (coction), which was the sign of returning health, as preparing the way for the expulsion of morbid matter, or crisis, these crises having a tendency to occur at definite periods, which hence were called "critical days." Concerning prognosis, Hippocrates writes: "The best physician is one who is able to establish a prognosis, penetrating and exposing first of all at the bedside the present, the past and the future of his patients, and adding what they omit in their statements. He gains their confidence, and being convinced of his superiority of knowledge, they do not hesitate to commit themselves entirely into his hands. He can treat, also, so much better their present condition in proportion as he shall be able from it to foresee the future."

In his treatment Hippocrates was cautious, and what we term expectant; his treatment consisted chiefly and often solely in attention to diet and regimen, and he was sometimes reproached with letting his patients die by doing nothing to keep them alive. He, undoubtedly, understood the wonderful resources of nature, and knew that most diseases generally get well without any kind of treatment, they being self-limited. In such cases Hippocrates relied on diet, hygienic rules and good nursing.Two thousand years—including even the much-vaunted last twenty years of medical progress—have not added one jot to this scientific treatment of those diseases that we call self-limited.

To Hippocrates belongs the credit of combining medicine and surgery more closely, for it was his firm conviction that the surgeon can only judge safely and correctly of the state of his patient when he is at the same time a physician. Surgery in all countries is as old as human needs. A certain skill in stanching of blood, the extraction of arrows, the binding up of wounds, the supporting of broken limbs by means of splints and the like, together with an instinctive reliance on the healing powers of nature over the tissues, has been common to men everywhere. Hippocratic surgery bears the evidence of finish and elaboration. The two treatises on fractures and dislocations are hardly surpassed even in modern surgery. Wounds and injuries of the head were fully

described, and trephining seems to be an ancient operation. The saying that in wounds of the head, no matter how trifling, serious results may be expected, and recovery possible from those most serious, may be traced to the writings of Hippocrates, although Sir Astley Cooper has been frequently credited with the dictum This theorem, based altogether on experience and observation, may not be fully understood for another thousand years. The ancient Greeks performed amputations, but the amputation of a limb was in ancient times generally attended with great danger of the patient's dying during the operation, as surgeons had no efficient means of restraining hemorrhage from the severed blood-vessels. They rarely ventured to remove a large portion of a limb, and when they did so, they cut in the gangrened parts, where they knew the vessel would not bleed; the smaller limbs they chopped off with malete and chisel; and in both cases they had hot irons at hand with which to sear the raw surfaces, also boiling oil in which to dip the stump, and various resins, mosses and fungi, supposed to possess the power of arresting hemorrhage. From ancient history we learn of insensibility or indifference to pain being obtained by means of Indian hemp (cannabis indica) either inhaled or taken by the stomach. The Greeks and Romans used mandragora for a similar purpose (poison anesthesia); and as late as the thirteenth century A. D. the vapor from a sponge filled with mandragora, opium and other sedatives was used. The mandragora, however, occasionally induced convulsions, with other alarming symptoms, and for this reason it was used in only exceptional cases.

Hippocrates has left in his writings a description of the application and uses of massage, observing that it loosens stiff joints and gives tone and strength to those which are relaxed; further, that it must be applied with soft hands, and in all cases delicately. He was also acquainted with the ordinary means of counter-irritation, as issues, a kind of moxa, and the actual cautery. He seems to have performed the capital operations with boldness and success; he reduced dislocations and set fractures, but clumsily and cruelly; extracted the fetus with forceps when necessary, and both used and abused the trepan. Ruptures, piles, polypi, fistula in ano, and prolapsus ani were among the conditions treated. Empyema was understood, and treated by incision in the intercostal space, and many other operations were performed. Hippocrates did not perform lithotomy, the practice of which seems at that time to have been well known, but to have been confined

to a few who made it their exclusive study, similar to the practice followed by our modern abdominal surgeons.

"*Κατ' ἰητρεῖον*" written by Hippocrates, contains a description of the surgeon's room, its lighting, the instruments and appliances necessary, the duties of the assistants, the accommodation of the patients, the position of the operator, the use of the hands, of water, of bandages, of sounds made of tin or lead, etc. A full account of wounds and their treatment is given, hemorrhage being arrested by cold, compression and styptics, the wounds themselves healed by primary union or through suppuration. Cataplasms, cold and warm plasters, etc., are also described in this connection. Hippocrates was certainly entitled to his titles of "The Great Physician" and "The Father of Medicine."

The influence which the name of Hippocrates had on medicine was so great that no attempts were made for some centuries to improve upon his views and precepts. His sons, Thessalus and Draco, and his son-in-law Polybus, are regarded as the founders of the medical sect which was called the Hippocratean or Dogmatic School, "because it professed to set out with certain theoretical principles which were derived from the generalization of facts and observations, and to make these principles the basis of practice." The *Dogmatists,* or, as they were sometimes styled, the *Rationalists,* were early distinguished from the *Empiricists* and the *Methodists.* They may be considered the forerunners of our "regular medicine." They asserted that before attempting to treat any disease we ought to make ourselves fully acquainted with the nature and functions of the body generally, with the operations of medical agents upon it, and with the changes which it undergoes when under the operation of any morbid cause. At this period of time, and for several centuries subsequent to it, all physicians were included in one or the other of the sects, the Dogmatists, the Empiricists and the Methodists, and apparently the numbers in each school were about equal.

Among the ancient Greeks an Empiric was one of a school of physicians who maintained that experiment was the one requisite; hence, in modern medicine an unscientific physician who merely experiments, a quack. By an "empiric" in medicine is now understood a man who, from want of theoretical knowledge, prescribes remedies by guess according to the name of the disease, or to individual symptoms, without thinking of the constitution of the patient or other modifying symptoms, and without thinking of the fact that thousands of years have passed by during which

everything that he now tries has been tried before and without avail, because always done in a haphazard way. What are called specifics, then as now, were administered on this principle, or rather want of principle.

The ancient Empirics contended that the sole guide in the practice of medicine must be experience, and that if we step beyond this, either as learned from our own observations or that of others on whose testimony we can rely, we are always liable to fall into dangerous, and often fatal, errors. They laid great stress on the unprejudiced observation of nature, and thought that by a careful collection of observed facts from history the coincidence of many observations would lead to unalterable prescriptions for certain diseases. The later adherents of the school during Roman history excluded all theoretical study, even that of anatomy, and were guided solely by tradition and their individual experience. The ancient Empirics prevailed till near the time of Galen. Among their most eminent members, after Philinus and Serapion, were Apollonius, Glaucias, Bacchius of Tanagra, and Zeuxis (both disciples of Herophilus), Heraclides of Tarentum, Cleophantus, Menodotus of Nicomedia, and Theudas of Laodicea. They occupied themselves chiefly with discovering the properties of drugs, and in this manner rendered important service to medicine.

The oldest system of medicine known to us, and which has already received mention in this paper, has been termed Methodism (medically and literally speaking), and which recognized as its founders Æsculapius and Themison. The believers in this doctrine attempted to apply the atomic theory of Democritus and Epicurus to the theory and practice of medicine. Atoms of various sizes were supposed to pass and repass without cessation through cavities and pores in the human body. So long as the atoms and pores maintained relationship of size and proportion, health was maintained, but it was deranged as soon as the exactness of these relations was destroyed or interfered with—a theory that may not unplausibly be said to have been prophetic of our modern "germ theory."

Aristotle was born in the Grecian colonial town of Stageira in the year 384 B. C. He belonged to a family in which the practice of physic was hereditary. His father, Nikomachus, was the friend and physician of Amyntas, King of Macedonia, father of Philip II and grandfather of Alexander the Great, whose preceptor Aristotle afterwards became. Aristotle lost both parents

while he was quite young, and was brought up under the care of Proxemus. It is to be conjectured that his education, such as it was, would take the distinction of preparing him for the medical profession, and that whatever knowledge and power of manipulation attached to the practice of physic of the time would rank among his early acquisitions. He, however, early abandoned the intention of following physic as a profession, and aspired to that cultivation of universal knowledge for its own sake in which he attained a distinction without parallel in the history of the human race.

Aristotle is said to have been the first man to collect a library, among the books being a copy of every then known medical work. He may also deserve the kind attention of the anti-vivisectionists for being the first man of whom history relates who occupied his idle hours by dissecting living animals of every species, and thereby he became acquainted with their vital phenomena. He noted the varieties of size and shape of hearts and lungs of various animals and birds, and also made observations of their other comparative anatomy; thus he created a comparative anatomy and physiology, and the plan that he traced was so complete that two thousand years later the great French naturalist, Cuvier, followed it quite closely. His history of animals is a storehouse of knowledge, and his disciples cultivated with zeal the anatomy, physiology and natural history as it was taught at their time.

Aristotle was furnished by his royal master and pupil, Alexander the Great, with sufficient funds to form the first known museum in natural history, a collection of rare objects of every sort, transmitted, many of them, by the royal hands from the remote depths of Asia, and it may be taken for granted that the museum became the repository of many of the surgical and medical specimens and curiosities of the day.

Praxagoras, who was a native, and probably a resident, of the island of Cos, opposite the coast of Asia Minor, lived between 300 and 400 years before Christ. He was a man of great eminence in his time, well known throughout the Grecian world, and of high reputation in both scientific and practical medicine. Celsus enumerates him in the same category with Hippocrates, Diocles and Chrysippus, and as among those who had exercised the greatest influence on medical art. His original works have long since disappeared, but they are known through quotations or references by Pliny, Rufus Ephesius, Galen and Cælius Aurelianus, all writers of the first two centuries after Christ. He

seems to have made a special study of the fluids of the body, both in health and disease, considering their alteration or perversion as the cause of many morbid affections. Some of his doctrines in regard to diagnosis and treatment, if correctly reported, were very striking. According to Cælius Aurelianus, he regarded stercoraceous vomiting as the sign of acute tumor (obstruction) of the intestine, and for its relief when other manipulations failed he advised opening the abdomen and dividing the intestine to remove the obstruction, after which the intestine was to be reunited by means of sutures. If this recommendation were the result of his own experience, it would imply that the modern surgery of the abdominal cavity was not altogether unknown in ancient times.

By nearly all the writers on the history of medicine the origin of the distinction between veins and arteries is attributed to Praxagoras, as he was the first to observe that pulsation, previously regarded as a common attribute of arteries and veins, really belonged only to arteries. Praxagoras was the preceptor of Herophilus, one of the most eminent of the Alexandrian anatomists, and he, no doubt, furnished the basis for much of the doctrine developed by his pupil.

The next step in the study of the history of medicine is the consideration of the Alexandrian School of Medicine. History tells us that Alexandria was founded by Alexander the Great in the year 332 B. C., and that it became the Greek capital of Egypt during the succeeding dynasties. The Alexandrian School of Medicine may, therefore, be considered a continuation of the system of medicine established in Greece by Hippocrates and his followers, it being but natural to suppose that the best physicians of the world came to Alexandria, possibly at the invitation of the rulers. Ptolemy I, the successor of Alexander the Great, governed his kingdom with an enlightened and vigorous policy, and so laid the foundation of that posterity which Egypt enjoyed for many succeeding generations. He fostered literature, science and art, and not only founded the famous library and museum of Alexandria, but also upheld it with money and influence. The reign of his son, Ptolemy II, was remarkable rather for the successful cultivation of the arts of peace than of the practice of war. Under his reign and that of his son Ptolemy III, learned men were patronized and encouraged to study the arts and sciences in such a way that the influence of the Alexandrian School of Medicine was felt for all time to come. In fact, it became the leading school of the kind in the then known world for nearly

five centuries. The principal reasons for its eminence in medical instruction was that the practice of dissecting the human bodies in order to study anatomy was sanctioned by the Ptolemys, who, in order to encourage the study of anatomy, took part in the anatomical study of the cadaver. By these means the science of medicine received an extraordinary impulse. The Ptolemys, besides taking part in dissections of the human cadaver, were well versed in medical learning of all kinds. It is said of Cleopatra, one of the leading members of the Ptolemy family, and of international renown for her beauty and her ability to fascinate and hold in her absolute sway the man who ruled the Romans for many a year with an iron hand, that she was a physician of great learning, especially versed in the diseases of women and children, and that her writings on these branches of medical knowledge were copied for many centuries afterwards.

The great leaders of the Alexandrian School of Medicine were Herophilus, Erasistratus and Aretæus, who were practitioners of medicine at the capital of Alexandria, and who taught and studied at Alexandria during their lifetime. Herophilus, one of the greatest physicians of antiquity, was born at Chalcedon, in Bithynia, and flourished in the fourth and third centuries B. C. He settled at Alexandria, and distinguished himself in particular by his devotion to anatomy. He was supposed to be the first to undertake the systematic dissection of the human body. The so-called "torcular Herophili," or common meeting-place of the sinuses at the occiput, named after him, gives evidence of his influence upon the study of anatomy. He described the membranes of the brain and its vessels, the choroid plexus, the ventricles of the brain, the tunics of the eye, the intestinal canal, and certain portions of the vascular system, and gave a more accurate description of the genitalia than any previous writer. The accusation that Herophilus dissected the living body of condemned criminals is, no doubt, a myth, especially as the same accusation has been brought against almost every celebrated anatomist of every age by the ignorant.

Erasistratus flourished in the third century B. C., and is supposed to have been born at the island of Cos. Afterwards, Erasistratus lived for some time at Alexandria, where, giving up practice, he devoted himself with great energy and success to his anatomical studies. He founded a medical school at Alexandria, and wrote extensively on all kinds of medical subjects, creating several works on anatomy, pharmacy and practical medi-

cine. He wrote successfully on fevers, hygiene, paralyses, therapeutics, etc. He regarded most diseases due to over-indulgence in food which is not digested, and consequently putrifies. Plethora was for him the prevailing disease, against which he employed not only venesection, but also fasting and bandaging of the extremities. He discovered the lymphatic vessels, and described the valves of the heart more fully and accurately than any of his predecessors. The great mistake of his life was that he concluded that the arteries contained air, hence their name, arteries. Had he known, or even suspected, that the arteries contained blood, he would have been the discoverer of the circulation.

Between the Hippocratic era and the founding of the Alexandrian School there is nothing of surgical progress recorded in history. The surgeons of the Alexandrian School were all distinguished by the nicety and complexity of their dressings and bandages, of which they invented a great variety. Lithotomy was performed by them, and it is related of Ammonius, an Alexandrian physician, that he crushed the stone in the bladder when it was too large to remove whole.

The influence of the work of the Alexandrian School of Medicine was of great and permanent good, on account of its systematic study of anatomy. The inability of the knowledge of function (physiology) to keep pace with the knowledge of structure (anatomy) was the cause of the retrogradation of the science of medicine from this time on until the revival of learning only a few centuries ago. The general conception of the physician's aim and task remained the same from the time of Hippocrates through all the ages of medicine up to our present time, though, as knowledge changed hands, there was much divergence both in theory and practice. Insensibly, the most valuable part of the Hippocratic system, the practical and clinical, on which we depend so much in this day and generation, was neglected, whilst the least valuable part of it, the theoretical, was fostered with exceeding care by many learned doctors, who at times bordered on the ridiculous with their theories of medicine. However, a continuous thread of learning and practice, though varying in degree, unites the whole history of medicine, and though age after age of medicine records the death of theories and practices, which became obsolete because they had no real merit, medicine as an art and a science gradually assumed form, thanks to the great physicians who have left their imprints on the sands of time.

For many centuries the then civilized world sent its young men

to Alexandria to study medicine, and the mere fact that one had studied at Alexandria gave the doctor a prestige in any country in which he had a mind to practice. Among the men who shone in medical science in the Alexandrian School was Aretæus, who ranks next to Hippocrates in the ancient history of medicine. Aretæus was born at Cappadocia, studied at the schools of Pergamus, and practiced his profession at Alexandria as a physician of great skill in the treatment of diseases until the day of his death, which occurred in the year 110 A. D. Aretæus may be said to have more fully combined the medical knowledge of the oriental nations than any other previous author, not even excepting Hippocrates. To the clinical experiences of the Greek physicians he added the treatment of diseases by the Egyptians, and also their more advanced anatomical knowledge.

The value of the influence of Aretæus on the science of medicine is inestimable. It must be remembered that the writings on medicine by any one man are but rarely original, being rather compilations of what the author has learned from many sources, has digested, and either adds to or presents in a new form when he puts his medical learning on paper. Once in a while there is a new discovery made, and that, of course, marks an epoch in the history of the science. Once in every few centuries there is a great man born into the medical profession who, by his very presence, seems to regenerate the science and to give it new life. Such a man was Aretæus. He belonged to no distinct sect of doctors, but was noted for his total want of professional bigotry, and hence never committed himself to any particular set of opinions. In his accuracy in detail of symptoms, in his diagnosis of disease and his treatment of the sick, Aretæus is superior to most of the ancient physicians of whom we know anything. He wrote a medical work which was divided into two parts, of eight books each. The first part treated of the cause and symptoms of acute and chronic diseases, and the second part, the treatment of the same. An English translation (London, 1837) by T. F Reynolds is still to be had, giving the work of Aretæus in a state of complete preservation.

Aretæus was by no means a blind follower of the practice of "The Father of Medicine" in the treatment of diseases, for he did not have the faith in nature which dominated the mind of Hippocrates, but believed in vigorous treatment, if he thought it desirable. He frequently administered copious doses of active purgatives and active emetics; he employed narcotics when he thought

they were indicated; sweating of the patient by means of improvised steam baths was used in his practice; and bleeding, both at the basilic vein and at the temporal artery, was found necessary in desperate cases in the practice of Aretæus.

Very little is known to us of the medical school of Pergamus, but it must have been the seat of considerable learning to be able to turn out such men as Aretæus and Galen, who was also a student at the medical school of Pergamus. The city of Pergamus, as the focus of all the great military and commercial routes of Asia Minor, was of considerable prominence. Its library was second only to that of Alexandria. Here is where the finest parchment was made for writing material. That the city of Pergamus, the capital of Mysia, was a great city we may judge from the splendor and magnificence of its ruins, which embrace temples, palaces, aqueducts, gymnasia, amphitheaters and city walls. History tells us that there was a magnificent temple at Pergamus dedicated to Æsculapius, the god of medicine in mythology. It is also known that a great medical school existed at Pergamus, of which little remains to us except the works of some of its great pupils, the greatest of them all being Claudius Galen, whose life and labors will be described under Roman history. It is safe to say, basing our judgment on the lives of Aretæus, Galen and others, that Pergamus had probably the greatest school of medicine of ancient history. It was, no doubt, the centre of Methodism, for in Pergamus, Æsculapius and his followers reigned supreme.

A very ancient system of philosophy founded by Parmenides and Pyrrho not only flourished during the period we have just considered, but also had great influence on the medical leaders of both Pergamus and Alexandria. They called themselves the Sceptics, to indicate that they were always in search of truth without flattering themselves that they had found it. They believed in the natural development of the bodies in their endless reproduction and change, and concluded that wisdom consisted in remaining in doubt; in other words, they were the agnostics of that time. According to Parmenides, the phenomena of nature are only apparent and due to man's error: they only seem to exist, but have no real existence. Apparently, Parmenides made no attempt to grapple with the inevitable contradiction between the doctrine of being and that of seeming.

Pedanus Dioscorides, a Greek physician, was a native of Anazarba, in Cilicia, and flourished in the first century of our era. It is plausible to suppose that he, too, was a student of the schools

of Pergamus and Alexandria. Like many of the physicians of his time, he went to Rome to seek his fortune, where he could most easily find it—just as now the most eminent medical men drift to New York. Dioscorides accompanied the Roman armies as physician through many countries, and collected a great store of information and personal knowledge on medicinal plants of these places. Later in his career Dioscorides made use of his collection to write his great work, "De Materia Medica," in which he treats of all the then known medicinal substances and their properties, real and reputed. During fifteen centuries Dioscorides maintained undisputed authority in botany and materia medica as the greatest authority known to man. This authority he still holds among the Turks and Moors. Dioscorides, undoubtedly, deserves to be called "The Father of Materia Medica."

We have now to consider Roman medical history. Whilst the Alexadrian school was a direct descendant of the Greek school, it may be said that the Roman school was made up of both schools. The most eminent of the Greek physicians at Rome was Asclepiades, the friend of Cicero. He was the founder of the system of a new school of Methodism, which lasted for several centuries as a successful rival of the Hippocratic tradition. This new system of methodology in medicine offered nothing of any permanent value to the science of medicine and surgery and, being without any real merit, the system died a natural death, as do all theoretical systems of medicine which are not based on facts and science. Asclepiades was born in Prusa, in Bithynia, and seemed to have wandered about considerably before he settled at Rome. He was opposed to the principles of Hippocrates in medicine, and it is said that he was very popular with the Romans on account of his pleasant and simple cures. Pliny, who professes very little respect for him, reduces his remedial remedies to five: abstinence from flesh, abstinence from wine, friction, walking, and carriage exercise. The main principles of his system of treatment were that it was useless to consider the causes of a disease, or even the organ affected by the disease, and that it was sufficient to know what was common to all diseases, namely, their common qualities. Other systems of medicine arose through the influence of the Methodists, to become finally combined under the name of the Eclectics.

Under eclecticism we understand the combination of various elements derived from diverse systems of opinion or practice in any science or art; it is an eclectic method or system especially in

medicine. Soranus, Rufus and Archigenes were the most prominent of this ancient school of Eclecticism. Ancient Eclectics were a sect of physicians who professed to choose from other sects all the opinions which appeared to them the best founded. Aganthinus, of Sparta, master of Archigenes of Apamasa, in Syria, was the reputed founder of ancient Eclecticism. It must be remembered that every judicious physician is more or less an empiric and an eclectic when it comes to the applying of remedies for the cure of disease.

The early Romans of all ranks held surgeons in abhorrence and trusted for cures, even in cases of fractures and dislocations, to spells and incantations. The first regular surgeon who settled down in Rome was Archagatus, born 200 B. C., a student of the Alexandrian school who, having ventured to settle in Rome, soon gained a high reputation, but for some reason was banished from the Roman capital.

The same respect which the Jews paid to their dead was imparted to them by the Romans. Influenced by the belief that the soul, when released from its material envelope, was compelled to roam along the shores of the Styx until the body was consigned to the earth or was consumed by fire, no consideration whatever could have induced the former to abstain from the performance of that pious duty and permit the dissection of such bodies for scientific purposes. Hence, the Greek and Roman physicians and philosophers were compelled to seek such notions of the structure of the body as they desired to obtain apart from man. For this reason, many of the most celebrated physicians of antiquity, Hippocrates among the number, did not seek a knowledge of anatomy in the dissection of the human body, but rather through means of the examination of lower animals.

Antonius Musa, physician to Augustus, cured the Emperor of a disease of the liver, probably a congestion, by means of hydropathy, using water internally and externally, but caused the death of the heir to the throne, Marcellus, by a similar course of treatment, illustrating thus most forcibly the dangers of the empirical employment of a remedy in persons of different constitutions and powers of endurance and reaction, not to speak of the different and contrasted pathological states at the time.

Public baths and the use of mineral waters were popular among the ancient Romans, but the strangest vagaries in thermal or balneatory practices were indulged in by them. Watering-places, many in number, were recommended for certain troubles and dis-

eases, but then, as now, had the reputation of being fashionable resorts for the rich and dissolute. The Romans carried the use of baths and perfumes to excess, as they did every luxurious enjoyment. Their baths were perfumed, as were their theatres, their chambers and their beds.

There existed at Rome a class of women called sagæ, who were sorcerers, perfumers and procuresses. All that related to love in its physical aspects and to debauchery came within the functions of the sagæ, and there is no doubt that they were also abortionists of the worst type. Depilation was carried on by the sagæ to a great extent in the luxurious and degenerate period of Rome. All parts of the body were, for various reasons, subjected to the operation, the face, forehead, armpits, arms, hands and legs; but it was most practiced in the region of the genital organs. It seemed that the Romans having reached the front rank of earthly power and civilization of their time did everything they possibly could to destroy themselves.

Pliny, the Roman historian, was not a physician, but he wrote several medical works which were mere compilations, and consisted principally of collections of prescriptions for the treatment of diseases. In his great work, "Natural History," Pliny describes many medical and surgical events, some of which are still of interest. For instance, he alludes to Cæsarean section (Book VII, Chap. IX), saying that Cæsar was so named from being taken out of the womb of his mother. In Cæsar's case the mother must have survived the operation, as Aurelia, the mother of Cæsar, was alive at the time her son invaded Britain. By whom the operation was performed, and whether it was a native surgeon or one of foreign birth, or whether it was performed by a midwife, Pliny does not state in his report of the case.

Although no important system or doctrine of medicine was originated by the Romans, the greatest medical historian of the first century was a Roman, Aulus Cornelius Celsus. He was the first Roman physician of any worth or any note that we find in history, flourishing, probably, during the reign of Augustus. He seems to be a mere compiler of the writings of his predecessors, especially of Hippocrates. So well did he study the Hippocratic system of medicine that his commentary upon the writings of Hippocrates gave him the well-deserved title of "The Roman Hippocrates." Celsus was not an original thinker nor observer, nor did he discover anything of note but he, undoubtedly, was the most celebrated author on medicine for many years. He wrote

not only on medicine, but also on rhetoric, history, philosophy, the art of war, and agriculture. His style was succinct and clear. The only great work of his which survives is the "De Medicina," which is divided into eight books. The portions relating to surgery are exceedingly interesting and valuable, because Celsus has there given an account of the opinion and observations of the Alexandrian physicians and surgeons. As a practitioner of surgery, Celsus was well and favorably known. He performed the operation of lithotomy a number of times, and gives a good description of the operation in his works. Celsus also speaks of the art of "autoplasty," an operation of renewing a portion of the body torn away, by reinforcement from other parts; thus, a nose may be built up by means of strips cut from the arm or elsewhere. The art was practiced in India ages ago. Celsus speaks of autoplasty with reference to the nose and lips. Celsus was the first native-born Roman surgeon who practiced with success, and his writings contain an exact representation of surgical knowledge up to that time. He had, however, but little use for any other medical knowledge except that left to the scientific world by Hippocrates and his followers, and rejected as absurd much of the medical teachings of the eclectic school which was now beginning to flourish in the Roman Empire, in keeping with the degenerate days of the later period of Roman history.

In the seventh book of his "De Medicina," Celsus speaks of the qualifications of the perfect surgeon in the following manner, a description of the surgeon possibly more often quoted than any other: "The surgeon should be young. or at least little advanced in age, with a hand nimble and firm, and never trembling; equally dextrous with both hands; vision sharp and distinct; bold and unmerciful, so that as he wishes to cure his patient he may not be moved by his cries to hasten too much, or to cut less than necessary. In the same way let him do everything as if he were not affected by the cries of the patient on whom he is operating."

Plutarch was born at Chæronea in Bœotia, about the year 50 A. D., and became renowned not only during his days, but also for all time to come, as a biographer and moralist. His works are now classical in literature. There are some things in the precepts about health which Plutarch gathered that the most up-to-date practitioner need not disavow. He writes: "Idleness does not conduce to health;" and there is certainly good sense in his statement that "a man should learn by experience his bodily capabilities, without always consulting a physician." And, again:

"Better than purges or emetics is a temperate diet, which induces the bodily functions to act for themselves."

We have now reached the period of the history of medicine when we have to consider the career of Claudius Galenus, who was born at Pergamus, Mysia, 130 A. D., and whose labors in behalf of medicine mark him as one of the leaders of medicine in thought, in knowledge, and in experience of both its principles and practice. Galen studied medicine at Pergamus, and afterwards visited Smyrna, Corinth and Alexandria to gain wider experience and greater knowledge. In his thirty-fourth year he went to Rome, where he remained the greater part of his life, practicing medicine most successfully.

Galen was the most skilful and learned student of the Hippocratic dogmatism that the world ever produced. He is supposed to have lived to the age of 71 years, and to have died about 201 A. D. Galen found the medical profession of the time in which he lived and practiced split up into a number of sects, and he became aware of the fact that the social status and the moral integrity of the medical profession was very much degraded, so much so that it was looked upon with contempt even by such a man as Pliny, the elder. Galen appears to have made it his object to reform these evils, to reconcile scientific acquirements and practical skill, to bring back the unity of medicine as it had been understood by Hippocrates, and at the same time to raise the dignity of the medical profession. Before Galen's time, the medical profession was divided into several sects who were always disputing with one another about the theory of medicine, but the bulk of the practicing physicians followed more or less by instinct the empirical method in practice. For many centuries they continued to seek in experience a refuge from the incessant variations of dogmatism and the sterile incertitude of the Sceptics. The Methodists agreed with the Empirics in their contempt of anatomy and of much study. One of their champions, Thessalus of Tralles, a half-educated, boastful pretender, promised his followers to teach them the whole of the theory and practice of medicine in six months, and claimed that he was the superior of all living and bygone physicians. How like the osteopaths and other like pretenders of the present day—"You can learn all you need in fourteen days by correspondence, and at once gain a large practice."

It is not one of the smallest of the services which Galen rendered to posterity that he demolished the sophistry of the Methodists and the Empirics, demonstrated the insufficiency of their

practice, and brought to bear upon them the wittiest satire on account of their lack of literature and medical instruction. Galen strove as hard as one in his position might, by precept and example, to awaken in his contemporaries a desire for accurate anatomical knowledge, but could not overcome their indifference. After Galen's time the practice of dissection appears to have been lost, either from redoubled prejudices of the superstitious who opposed it, or as the result of the apathetic ignorance or the ignorant apathy of the physicians. A symptom of "dry rot" seemed to have attacked the medical profession, and but for Galen and a few other prominent physicians, who did all they could to arouse their medical brethren to renewed activity, the great system of medicine founded by Hippocrates would have been lost to posterity.

Galen wrote works on anatomy and physiology, works on dietetics and hygiene, works on pathology, works on diagnosis, works on pharmacy and materia medica, works on therapeutics, works on surgery, works on semiology, and commentaries on the writings of Hippocrates. His anatomical and physiological works are the most valuable, and contain undoubted evidence of his familiarity with practical anatomy. His pathology was very speculative and imperfect. In his diagnosis and prognosis he laid great stress on the pulse, on which subject he may be considered as the first and the greatest authority, for all subsequent writers adopt his system. He was also a firm believer in critical days, a theory propounded by Hippocrates. Galen's practice was based on two fundamental principles: *First*, that disease is something contrary to nature, and which is to be overcome by that which is contrary to the disease itself; *second*, that nature is to be preserved by that which has relation to nature. Hence arise two general indications for treatment: the one taken from the affection contrary to nature, which affection requires to be overcome; the other from the strength and natural constitution of the body, which requires to be preserved.

All the medical knowledge of the period of time during which Galen lived was based on the teachings of Æsculapius and Hippocrates, which could not at first be carried any further for lack of knowledge of anatomy and of physiology. Whatever addition was made to the medical science by Galen and the other great pupils of Alexandria and Pergamus came through their studies of anatomy by means of dissections of the bodies of animals, and such human bodies as they could get under their control by stealth

or through accident. Galen dissected apes, as being most like human subjects, though he occasionally obtained bodies of children exposed in the fields, or of persons found murdered, which, however, he was obliged to dissect in secret. Dissection of the human body was at that time forbidden under heavy penalties. Nevertheless, Galen studied anatomy in despite of all difficulties, and wrote on anatomy so successfully that for more than a thousand years every surgeon of any note depended on Galen for his anatomical knowledge with a reverence that smacked of idolatry.

From Galen's writings we learn that he came near being the discoverer of the circulation of the blood, the lack of knowledge of which retarded the whole profession for centuries. He made the observation that when an artery was wounded blood gushes out, but stopped there, probably having too much reverence for ancient lore and not enough reliance on his own observations. Galen considered the heart as the common source of the arteries and veins. He also stated that the nerves came from the brain and spinal marrow, and divided the nerves into two kinds, those of sensation, which he thought proceeded from the brain, and those of motion, which he considered to originate in the spinal marrow. He also had some notion of the sympathetic system of nerves, but sadly confused the anatomy of all nerves. To Galen we owe the division of the body into cranial, thoracic and abdominal cavities. He also speaks of the heart as having the appearance of a muscle.

Galen seems to have had some idea of legal medicine, for we find in his works remarks on abortion, on legitimacy, the relative fatality of wounds, etc.; also, writings on "feigned diseases," and on the lungs of the fetus and the adult. Suits for malpractice were little known during the time of Galen, for surgery was purely a mechanical art in the hands of bathers, barbers and gymnasts, and so was handed down by tradition. Indeed, Galen describes surgery as "the manual interference, by means of instruments or otherwise, in cases of bodily injury or external diseases, as distinguished from the practice of medicine, which denotes the treatment of diseases by means of drugs." Bleeding was adopted as a treatment applicable to a great number of complaints. Galen made the following reservation: not to bleed children under four years of age, and rarely to bleed old people. The ancients practiced phlebotomy with various instruments; generally a spear-pointed fleam, called *fossorium*, was thrust into the vein. Galen

employed a cutting instrument, which he described under the name of *phlebotomon*.

In every respect the name of Galen stands preëminent in the history of medicine. He is the central figure, representing at once the culmination of medical science and art in the old world, and their preservation for further development under a new civilization. He lived at a time when the Roman Empire had reached its highest point of prosperity, without yet showing the signs of its deterioration. A Greek by birth and education, he practiced his profession at Rome, where he was the medical adviser of the imperial family, and the most eminent among his colleagues in public estimation. He was, therefore, for some years the leading physician in the first city of the world. He had no successor who could be called a rival. His age was followed by the disintegration of the Roman Empire and the disappearance of learning in the middle ages; and for a long time, many centuries, his works were the principal depository of medical knowledge to which other writers resorted for their supply of materials. In the thirteenth century the recognized text-books for instruction in the School of Salernum were the authentic works of Hippocrates and Galen. So late as the sixteenth century, the lectures of the professors in the Faculty of Medicine at Paris consisted mainly of commentaries on the same authors, and at that time the authority of Galen in anatomy was still so great that it was considered presumptuous to question the accuracy of his descriptions, even from the evidence of actual dissection. In such esteem were the writings of Galen held by the medical profession of many ages that it was considered almost sacrilege to doubt any of his assertions. The records of the London College of Physicians afford a striking illustration of this fact, in so far as England was concerned. In 1559, Dr. Geynes "was cited before the college for impugning the infallibility of Galen. On his acknowledgement of his error and humble recantation, signed with his own hand, he was received back into the college."

This extraordinary supremacy, which lasted for over fourteen centuries, was due partly, but not entirely, to the ignorance of the middle ages, which made it impossible for them to compete with the best writers of antiquity. As a matter of fact, Galen was the medical teacher of Europe during the period of its intellectual pupilage; but his reputation had been established beforehand, from the real superiority of his talent, the extent of his knowledge, and the value of his discoveries and investigations. To Galen must

be given the credit of having revived the great system of medicine established by "The Father of Medicine," Hippocrates, and by giving it new life Galen deserves the everlasting gratitude of the modern physician.

The history of medicine after Galen affords little evidence of anything but a gradual decline, both in theory and practice. But one physician and author of any prominence appeared as a Roman medical writer after Galen, and his works are valuable only because they are an evidence of the state of the medical practice in his time. An abridgement of one of his writings or works, with the title of "Aurelianus," became the most popular of all Latin medical works, and was especially esteemed later by the Benedictine monks for the study of medicine during what is frequently called the "Dark Ages of Medicine." Outside of the writings of Aurelianus, little else was produced in these times but compilations of the most meagre kind, chiefly of the nature of the herbals or domestic receipt books. From Hippocrates to Galen was a very important part of the history of medicine, and both men are equally to be considered by the men who are now following in their footsteps, namely, you and I.