

**Lectures upon the historic literature of the pathology of the heart and great vessels : part 1 From the earliest authentic records to the close of the Arabian epoch.**

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LECTURES  
UPON  
THE HISTORIC LITERATURE  
OF THE  
PATHOLOGY OF THE HEART  
AND  
GREAT VESSELS.

BY  
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Part I.

FROM THE EARLIEST AUTHENTIC RECORDS TO THE CLOSE  
OF THE ARABIAN EPOCH.

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LACTURES

THE EPIC LITERATURE

PATHOLOGY OF THE HEART

GREAT VESSELS

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THE UNIVERSITY OF CAMBRIDGE

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# THE HISTORIC LITERATURE,

ETC.

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## LECTURE I.

GENTLEMEN,—I propose, during a portion of the present session, to deliver to you a course of Lectures upon the Diseases of the Heart. The subject matter naturally admits of a triple division.

- I. History and Literature.
- II. General Symptoms, Ætiology, Morbid Anatomy, Physical Diagnosis, Prognosis, and Therapeutics.
- III. The Special Pathology of the Organ.

With respect to the historical part, I need not, I think, labour to awaken your sympathy. It seems so natural with us all to feel spontaneously a lively interest in the past. The spell by history cast around our boyhood days still holds the manlier intellect in thrall. But, apart from its mere interest, the knowledge of the past asserts its higher rights and claims a loftier privilege. It is the standard whereby to estimate the present, and constitutes, as it were, a sibyl's book wherein to read the future. It is, moreover, one of the indispensable conditions for entering successfully the field of research. Indeed, without such knowledge, how often is our ignorance rebuked, or, with the purest intentions, how often are we prevented dealing full open-handed justice to those who have preceded us on the



road we are journeying. Well might Cicero exclaim:—"Nescire quid antea quàm natus sis, acciderit, id est semper esse puerum."

The historical portion of our subject may be comprised under two heads: the first extending from the earliest times to the Harveian era; the second, from this era to the discovery of auscultation by Laennec. I must, however, ere we begin our journey, beg of you not to believe that I shall either exhaust the subject, or lay before you such a critical digest of the elder literature, as to pass unchallenged. An abler scholar and more laborious compiler would, I entertain no doubt, make both a larger and a more valuable contribution to the treasury of science. I only hope to be able to place before you such a connected outline as may enable you to form a sufficiently practical estimate of the history and progress of the science of the diseases of the heart.

The first links of the chain in the history of medicine lie hid in the unfathomable abysses of the past. No plummet line of ours finds bottom there. We must needs rest contented with the assumption, that its home and birth-place was the east. Were we to believe all the Chinese historians tell us, their historic records are almost coetaneous with the world's creation. The earlier history of this hitherto singular and unchanging people is shrouded in mystery and myth. One fact seems clear, that for now nearly four thousand years they have preserved the same religion, literature, and customs, untainted by any communication with surrounding nations. Even authentic records are supposed to date 2357 A.C.

Medicine is said by them to have originated from one of their emperors, Hoam Ti, the third of the first dynasty. The presumed period of his reign is 2687 years A.C.; that is to say, many ages before the deluge! However this may be, this Hoam Ti is the accredited author of the famous work *Nuy Kim*, the still infallible organon of Chinese physic. In this work, the theory of the pulse is given with a most wonderful



and perplexing subtleness. From this examination of the pulse, they not only recognise the seat of the malady, but judge of its duration and gravity. The method even of feeling the pulse is most complicated. With the first three fingers applied to the wrist, they alternately elevate and depress the finger like a performer on an organ. While proceeding thus, they regard with particular attention the respiratory movements, being persuaded that some intimate relation subsists between them and the arterial pulse. In this way, they arrive at the diagnosis and prognosis. It has even been hinted that the Chinese taught the circulation of the blood; but if so, they certainly entertain singular ideas of the rate of movement. They suppose that the circuit was completed in twenty-four hours; that is to say, it commenced at the lung at three o'clock A.M., and traversed the body by the return of the same hour of the following morning. Such is the summary of the doctrine of the pulse and circulation contained in that wonderful repository of Chinese medicine, the *Nuy Kim*. It is now, however, believed by those competent to the investigation of the matter, that this work is of a very much later date than that attributed to it by the Chinese, either in their ignorance or ridiculous pride. From the resemblance of their doctrine of the pulse to the tenets of the school of Erasistratus, it is probable that the disciples of the great physicians settled in Bactria communicated their theory to the Chinese doctors. (Renouard, *Histoire de Médecine*, vol. i, p. 49.)

We abandon without regret this treacherous path of medical history for that land of wonder and magnificence, ancient Egypt. For it is here we descry the earliest trustworthy historic indications of the existence of medicine. The patriarch Abraham, who lived 1921 years A.C., declared that physicians had existed in Egypt four hundred years before his time; and we read in the fiftieth chapter of Genesis, that Joseph commanded his physicians to embalm the body of his father Jacob. Herodotus also, who visited Egypt in his travels, informs us



that the land was full of physicians who practised specially; that is, restricted their vocation to the maladies of individual organs. Thus one treated diseases of the eye, another the diseases of the ear, another those of the chest; so that "specialities" are not altogether a growth of modern civilisation. These facts leave no doubt as to the high antiquity of physic among this highly gifted people. Their writings have not descended to us with further minuteness, owing possibly to the mystic mode of registering their records. We have seen how early and how universal was the custom of embalming the bodies of the dead of all gradations. It is consequently difficult to conceive that the paraschists, or persons employed in this process, should not have gained some knowledge of anatomy, however rude. Clemens Alexandrinus distinctly states that even in these early times state examinations were instituted in anatomy. This much further is recorded, that they not only were familiar with a connection between the nerves of the heart and hand, but also with the fact that the heart gradually increased in weight until the fiftieth year. (Wotton, *Reflections upon Ancient and Modern Learning*.) I am not quite sure whether this statement applies to the older embalmers or to the far later Alexandrian school.

But we must leave for a time this hallowed ground, and follow the thread of history on to Greece. Here, about 450 years A.C., Hippocrates was born; and soon now, under the influence of favouring skies, the germs of genius attained their full fruition. From the date of Hippocrates, medicine began to expand into actual science.

I shall not fatigue your patience by any quotations from the book *De Corde*, which treats of the anatomy of the heart, or that *De Morbo Sacro*, which asserts that this organ, by virtue of its dense tissue, cannot suffer from disease, because the ablest critics have unanimously pronounced them spurious. Of the famous book *De Corde*, it would, as Le Clerc (*Histoire de la Médecine*, p. 125) observes, be the best to convey a grand



idea of the anatomy of Hippocrates, and of its exactitude. It is not, however, among those cited either by Erotian or Galen. Littré (*Œuvres de Hippocrate*, tome i, p. 383) also remarks, that it is evident that the treatise upon the Heart is an ancient work, consulted and even copied by Galen, but the composition of which it is impossible to attribute to Hippocrates. Dr. Adams (*Genuine Works of Hippocrates*, vol. i, p. 115) bears similar testimony. Lastly, Sprengel (*Histoire de Médecine*, tome i, p. 303) is also of opinion that Hippocrates had no knowledge of anatomy. He pointedly states, "As to the knowledge of Hippocrates of the structure of the human body, I do not think that it was acquired by regular dissections. It is true that Galen attributes to him the invention of scientific anatomy, and alleges that the Asclepiads were already skilled in this art to some extent; but I shall presently have occasion to narrate facts to show how little his testimony merits our confidence in this respect. Besides, during the age of Hippocrates, the prejudice still prevailed of interring the bodies of the dead with the utmost celerity. It is consequently very probable that this great physician contented himself with the dissection of animals, like Empedocles, Alcmaeon, and Democritus. Such of his writings as bear the impress of authenticity show indeed that, with the exception of a tolerably accurate osteology, he was completely ignorant of anatomy, or, at least, possessed but a very vague and superficial acquaintance with the human organisation."

With regard to the cardiac physiology of Hippocrates, it may be said that he appears to have had some idea of a circulation, it being foreshadowed in various parts of his writings. Perhaps one of the most striking passages is the following:—"The nourishment comes from the internal parts even to the hairs, nails, and the external surface. The same nourishment also passes from the external to the internal parts . . . ." Again: "The veins are distributed over all the body, and carry the spirit and the movement. They are all branches of a



common vein. I confess I know not where it begins or ends ; but, supposing a circle, there is no beginning."

Now these extracts are, I am aware, from writings regarded as somewhat apocryphal. They are supposed by many critics to belong to a later period. It would be vain and misplaced to inquire into the tests of the validity of the Hippocratic writings ; the only doubt is, whether such tests have not been at times too subtle. The only point now is to examine the internal evidence afforded by the pathology of such writings as all commentators have unanimously agreed in attributing to Hippocrates.

First, with reference to the circulation, as evidenced by the pulse or the art of sphygmology, Galen observes : " The ancients designated as pulse all the movements of the arteries, but they limited the term to such movements as were violent and sensible to the patient. Hippocrates has, first of all that we are acquainted with, used the term pulse,\* and was not ignorant of the means of turning it to account ; but he has not generally cultivated this department of art." Some of the most important passages in his works are the following, and which perhaps generally justify the criticism of Galen.

"The veins present pulsations round the umbilicus. In acute fevers, the pulsations are the most frequent and strong. The veins of the temple pulsate. Pure wine, taken in larger quantity than usual, occasions pulsation of the veins, heaviness of the head, and thirst. Two veins which traverse the temples pulsate. Feverish patients, who have injected face, severe headache, and throbbing of the veins, are most frequently seized with hæmorrhage."

The above extracts are from Littré (*Op. cit.*), who adds : "There is one passage in the second book of the *Prorrhethics*,

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\* Ægimius of Elis is elsewhere cited by Galen as the first who wrote upon the pulse ; *Περι Παλμος*, on palpitations. But the age in which Ægimius lived is not known with accuracy, and is said by some historians to be anterior to that of Hippocrates.



which, assuming it not to be spurious, makes exception to Galen's remark: 'One is less liable to err in feeling the abdomen and the veins than in omitting such examination.'

Again, in one of the most genuine, and perhaps greatest, works of Hippocrates—the *Aphorisms*—in the forty-first aphorism of the second section, he states: "They who, without obvious cause, faint often and violently, die suddenly." And, in the eighteenth aphorism of the sixth section: "Wounds of the heart are mortal." Again, in the sixty-fifth aphorism of the fourth section, he states that "excessive heat of the belly in fevers, and pain at the pit of the stomach, are of bad omen."

Now, I am particularly desirous, once for all, of drawing your attention to the meaning of the term "pain at the pit of the stomach". Its Greek synonyms are *καρδιαλγία* and *καρδιωγμος*. The ancients called the pit of the stomach *καρδια*, because pain originating here at once affected the heart. Foes (*Œconomia Hippocratis*), than whom none knew the subject better, gives many illustrations of the use of the term. So that, in hearing the terms "pain at the pit of the stomach", or "cardialgia", you know the ancients equally alluded to some affection of the heart. Such use of the term is well exemplified in the narration of the case, in the *Epidemics*, of the wife of Hermoptolemus. "Whenever she drank, it was with so much difficulty, that she got up and said that she had a great uneasiness at her heart or pit of her stomach." The treatise upon the epidemics also contains many cases of great interest in respect to our more immediate subject. Hippocrates speaks of the boy of Ertolaus as having, after exercise or mental emotion, a greater palpitation than is ever felt and obvious to any one placing the hand between the umbilicus and cartilage. Another instructive case is the following (*Epidemics*, Lib. vii, Case 30.)

"Polemarchus's wife had a swelling about the windpipe, from quinsey, in the winter, and was very feverish. Upon being bled, the strangling in the throat disappeared, but the



ever continued. About the fifth day, her left knee was painful and swollen; something seemed to be gathered about her heart; and she breathed as a man does after being kept under water. Such a sound came from the breast as those impostors make who, in prophesying events, speak from the abdomen, and are thence called *ἐγγαστριμυθοί*. About the eighth or ninth day, a purging came on, and her stools were many, liquid, tumultuous, and foetid. Her speech failed, and she died."

The history of this case is deeply interesting. The affection was obviously acute. The swelling and pain of the knee, fever, dyspnoea, peculiar voice, bear strongly the impress of acute rheumatism, associated with pericarditis.

A third most important case of what we should have little difficulty in recognising as acute pericarditis, supervening upon some abdominal affection induced probably by malaria, is detailed as follows:—

"Chartacles had a burning fever, with great bilious vomiting, purging, tumefaction of the spleen, and want of sleep. The third day, he rose early, being troubled with borborygmi, but without pain. He passed a very large quantity of blood from the bowels. After a short respite, lumps of clotted blood again came away. He now began to complain of præcordial anxiety; slight, though general perspiration, succeeded, with a moderate degree of fever. At first, he appeared quite rational; but, as the day advanced, his anxiety and restlessness increased; his breathing slightly quickened; his speech and conduct, by turns, excited and natural, according to circumstances. There was a tendency to syncope, which was not removed by any nourishment administered. Towards night, his breathing became exceedingly difficult. He tossed about the bed, first on one side and then on the other, without being able to obtain one moment's rest. His feet were cold; the head and temples rather hot. Slight perspiration broke out as death approached. Fluids swallowed gave rise to sound about the breast and



stomach, and no worse sign could occur; and, while saying that something wanted to pass downwards, he fixed his eyes and expired."

It will, I think, be obvious from this partial analysis of the writings of Hippocrates, that although, with reference to cases of disease referrible to disorders of the circulation, he has most carefully noted the symptoms which presented themselves, and described them in most concise and graphic terms, so that we can most readily recognise the picture, he has not himself stated the proximate cause of such symptoms; that is, given them "a local habitation and a name". This omission is most readily explained on the assumption that the superstition of his time prevented his obtaining an acquaintance with either healthy or morbid human anatomy.

Thus far respecting the presumed pathology of Hippocrates. It would, however, be most unjust towards the Father of Medicine if we passed over his wondrous sagacity in the department of physical diagnosis. This point is one, moreover, of cardinal importance, as showing at how early a period the germs of auscultation appeared, to yield their full bearing only after so many centuries. Speaking possibly of pneumothorax, Hippocrates observes: "The patient having been placed upon a firmly fixed seat, his extended hands are to be supported by an assistant. He is then to be shaken by the shoulder, in order to ascertain upon which side the sound will be developed by disease."

According to another very distinguished French physiologist, it is also possible that Hippocrates even employed auscultation with respect to the heart. The following are the remarks of the author alluded to:—"It is probable that the existence of the cardiac sound was known to Hippocrates; for it is attested that this physician occasionally had recourse to the auscultation of the chest." (Milne-Edwards, *Leçons sur la Physiologie*, tome 4ième, p. 33.)

Another remarkable passage occurs in the work *On Ancient*



*Medicine*:—"The air existing and moving in the interior of the body naturally engenders sound and murmur in hollow spacious organs, such as the chest and abdomen; for, when such air does not distend them so as to lie motionless, but permits space for change and motion, then, as a matter of necessity, sounds and murmurs become audible." (Littré, tome i, p. 631.)

The current of history is now deflected to Egypt; but we re-examine this country under far more instructive circumstances. We left it in difficulty and doubt, without the torch of trustworthy history to light up the treasures of its ancient learning. The dawning era of its greatest Medical splendour now bursts upon the view. The impulse given to science by Alexander the Great, at the instigation of Aristotle, lost none of its force under the Ptolemies. Their generous patronage of science made Alexandria the great seat of medical learning throughout the world, and history has rewarded them by linking their names imperishably with the glory of the school they fostered. By their influence and example, the emotions of superstitious horror, awakened at the bare idea of the mutilation of the dead body, were stilled. Such was their ardour in the cause of human anatomy that they descended from their own high office, and, as Pliny relates:—"Ab regibus quoque corpora mortuorum ad scrutandos morbos insécabantur." No wonder that under such banners, volunteers soon crowded, and that the right of anatomy to rank as an independent science was fully vindicated. The value of this acquisition to pathology was incalculable, and well, indeed, have the Ptolemies merited the immortality they have gained.

Foremost in the vanguard of discovery appear Herophilus and Erasistratus; and although the bulk of their writings is lost, perhaps burned at the destruction of the Bruchium Library, still, Galen and Cœlius Aurelianus have left us sufficient data whereby to judge the powers of these ancient fathers of anatomy. We, of course, have only to do with that part of their knowledge



which relates to the heart and vessels ; but in this department, even, we shall find more than enough to excite our admiration. They have been introduced to our notice, as you may remember, by Celsus, under a most repulsive aspect, "qui nocentes homines, a regibus ex carcere acceptos, vivos incidierint". But we would willingly believe with many, that Celsus was in error in charging such men with so foul a crime, and one so libellous on our common nature. Herophilus, the elder of the two, was born either in Chalcedonia or Carthage, but resided in Alexandria, under the rule of Ptolemy Soter. If we may believe Galen, he carried human anatomy to the highest pitch of perfection. And, indeed, Gabriel Fallopius, a great anatomical discoverer of much more recent time, declared that he should almost as soon think of contradicting the gospel, as the authority of Herophilus. Among the contributions of Herophilus to cardiac anatomy and pathology, I may remark that he first pointed out the fact, that the pulmonary artery discharged as it were the functions of a vein in carrying black blood to the lungs, and that the veins, on the contrary, performed the office of arteries in carrying red blood to the left auricle. He also first devoted especial attention to the pulse, and saw that the heart was the cause of its beat. He also pointed out the relation of the pulse and the respiratory movement. He distinctly recognised the jerking pulse (*Galen de Pulsibus*). Lastly, Herophilus pointed out the very important pathological fact, that sudden death resulted from paralysis of the heart (*Cælius Aurelianus*, p. 348).

Erasistratus, born in Ceos, lived subsequently at Alexandria, probably part of the time with Herophilus. He had already acquired high renown by the famous cure of Antiochus, the secret cause of whose illness he discerned to be caused by his passion for his mother-in-law Stratonice.

His anatomical discoveries shed brilliant light. "There are," said he, "certain membranes inserted at the orifices of the heart, through the intermediation of which the heart



acts, both for the retention and expulsion of the matters attaining either ingress or egress". He also described the tricuspid or venous valve, pointing out its three curtains, and showed that the valve on the left or arterial side had but two curtains. The upper orifices, viz., those of the arterial veins and the grand artery, have also each three membranes or valves, shaped like the Greek letter sigma, hence called sigmoid. These valves, continues Erasistratus, perform offices with regard to the heart. Those attached to the vessels allowing the ingress of matters, look from without inwards, in order that they may be depressed when pressed upon by the force of the substances entering, and thus rendering the orifices patent, for it is not to be supposed that these matters enter as into some inanimate receptacle, but that the heart attracts them during its diastole, as blacksmiths' bellows suck in air; and it is in this manner the heart becomes filled. The membranes, valves, vessels, which serve for the egress of matters, are turned in the contrary direction, that is to say, they look from within outwards in such a manner that, being rapidly opened by the fluids passing, they render the orifices patent at the time that the heart expels its contents. These valves accurately close the orifices, and permit no reflux, just in the same manner that the membranes of the vessels serving to introduce matters close the orifice during the systole of the heart, permitting no backward passage of that which has once entered. He taught, also, that the great artery was the reservoir of the pneuma or subtle spirit, while the great vein was the reservoir of the blood. These reservoirs divided and subdivided into canals of inconceivable minuteness (capillaries). Erasistratus had embraced the opinion of Aristotle; for he had stated, in the first book of his treatises on fevers, that the heart is the origin at once of both veins and arteries. In another place he says, the veins originate there, where the arteries, being distributed over all the body, have their commencement, and empty themselves



into the sanguineous (right) ventricle of the heart. The artery, on its part, begins where the veins begin, and empties itself into the pneumatic (left) ventricle of the heart. Thus Erasistratus came very near the circulation of the blood anatomically, and very far from it physiologically ; since if, on the one hand, he admitted that the veins began where the arteries began, on the other hand he believed that the arteries simply contained air (Littré, *Op. cit.*, p. 221). Erasistratus deduces from his anatomy certain pathological inferences. He admits that the contents of the veins never, in health, mingle with those of the arteries ; but when any cause perturbs the system, then the blood passes into the arteries, and fever and inflammation result. This extract is the more remarkable, inasmuch as Borhaave, in comparatively our own times, made such *error loci* of the blood the basis of his famous theory of inflammation. Even now, obstruction of the capillaries plays a leading part in the phenomena of inflammation and sympathetic fever. As Le Clerc observes justly : “ It is most strange, that with anatomical knowledge so accurate, Erasistratus should have been so much under the influence of prejudice as to imagine that the heart and arteries contained air, and even when challenged by his senses, evaded the evidence by this subterfuge, that when the arteries were opened the air or pneuma escaped unseen, the blood instantly taking its place.” This perverse view of so preeminent an anatomist justifies, perhaps, the hope before expressed, that Celsus had scandalised both himself and his great contemporary. Had Erasistratus dissected living men, is it possible that he could have fallen into such an error ? He who could not conceive the fact that the veins and arteries contained the same fluid, would he have entertained the slightest doubt, had he really cut up men alive ? Could he have contested the existence of blood in the arteries, would he have maintained that while the vena cava was distended with blood, the aorta only contained the spirit or air



that it received from the lungs by means of respiration?\* The charge made against Erasistratus and Herophilus is about on a par with the fable of Medea, who was supposed to have boiled men alive in her cauldron, because she was the first who resorted to the use of the warm bath. In the same manner, that great restorer of anatomy among the moderns, Carpi, was charged with having dissected two Spaniards alive, and condemned to exile. His whole crime consisted in his having dissected the bodies of two persons, dead of smallpox, in order to investigate the cause and effect of the disease, at that time new in Europe (Eloy, *Dictionnaire Historique*, etc., vol. ii, p. 147). Did not, also, the immortal Vesalius share a similar fate, on suspicion of having opened a Spanish gentleman alive? I dare say you know the tale, and will spare me further digression.

There are a few disciples of the school of Alexandria to whom I must briefly allude to in connexion with my subject. The first is Demetrius, of Apamea. Cœlius Aurelianus (*op. cit.*) testifies to the success with which he cultivated general pathology. He divided hæmorrhages into two classes; the one resulting from laceration or decomposition of the vascular walls, the other depending upon extreme tenuity or atony of them. This view has also served as the basis for the theory of a celebrated master in pathology, Gaubius (*Morb. Chron.*, p. 390). Bacchius, also, of Tanagra, acquired celebrity by his theory of hæmorrhage. To the above-mentioned causes, he added a fourth, actual transudation through the capillaries; and it is a question whether at the present moment any other solution could be

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\* The views of Erasistratus respecting the mechanism of the chest movement during the respiratory act, are too important to omit. "The thorax," he states, "expanding, induces, as a consequence, the expansion of the lungs, which, at the same time, fill with air. This air passes to the extreme divisions of the bronchi, and from these termini into those of the anastomosing arteries of the lungs, from whence the heart in its dilatation attracts it to carry it through all parts of the body by means of the great artery [aorta]." (Galên, *De Locis Affectis*; also, quoted by Portal, *Histoire de l'Anatomie et de la Chirurgie*, tome i, p. 48.)



given of such condition (Sprengel, *Op. cit.*). Bacchius, too, was the first who had sufficient originality and energy to disabuse himself of the old and fatal error, and to maintain that the pulse should be manifested at the same time in all parts of the body, because the arteries are constantly filled with blood (Galen, *De Diff. Puls.*, lib. 4, p. 47). For this supposed heresy, he incurred severe animadversion from the other disciples of Herophilus. Xenophon, of Cos, another follower of Erasistratus, first showed that hæmorrhage from an artery might be arrested by the application of the ligature. Lastly, the justly celebrated Cassius Iatrosophista attributed asphyxia to exhaustion of the pneuma in the arteries, and fever to increased heat augmenting the mobility of the pneuma, and thus quickening the pulsation of the arteries. This looks very much like the modern theories of fever and inflammation being caused by increased oxydation of the blood elements.

There is nothing more relative to the famous school of Alexandria in the way of cardiac pathology that requires any arrest of our attention. We now pass on to the state of this science as evidenced in the writings of the physicians of Rome. Fortunate, indeed, must have been the condition of this remarkable people if there is any truth in the assertion of Pliny, "that the Romans existed more than five centuries without physicians". And even when physic became necessary to the growing refinements of the people, it was of imported, and not of indigenous growth. The first great writer whose works have descended in all their purity to posterity is Cornelius Celsus. Some historic doubt invests the history of this accomplished man. It appears probable, however, that he flourished at the commencement of the first century of our own era, and composed his work *De Re Medicâ* during the reign of Tiberius Cæsar. With what Ciceronian elegance he wrote, and how extensive his knowledge in all departments of ancient philosophy and science (for it was encyclopædiac) it is unnecessary to make mention, farther than to prove that he would have best reflected the spirit



of the past as well as his own time. Although, perhaps, the greater portion of his work is devoted to surgery, the first books treat of medicine. It is here that he describes the cardiac passion in the following terms:—" \* \* \* This is nothing else than excessive weakness of the body, the stomach being languid, and this is known to exist when the pulsation of the arteries is small and weak, and when sweat bursts forth profusely, both as regards quantity and duration, over the entire chest and neck, even to the head, the legs and feet remaining cold. This is the acute form of the disease. \* \* \* " The first thing to be done in the way of treatment is to apply a cataplasm over the precordia (by this term, Celsus clearly means the part immediately above the diaphragm). He subsequently directs treatment to the weak stomach, and eventually expresses a fear "that even when the patient appears out of danger, there is ground for apprehension lest he relapse into the same state of debility". It is difficult to comprehend what Celsus meant by this last sentence: in all probability, more was involved here than a mere weak stomach would imply. In the second book he discusses wounds of the heart, *de corde percusso*, in the following terms:—

"When the heart is wounded, much blood is lost, the circulation becomes languid, the surface most pallid, cold perspiration breaks out, of peculiar odour, the extremities grow cold, and, finally, death ensues."

This very obscure and imperfect description of the affections of the heart clearly proves to my mind that, until a later period than that of Celsus, we have not the slightest evidence of the existence of any scientific pathology of the heart. To that period we must now hasten.

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## LECTURE II.

THE period adverted to at the close of the last lecture is inaugurated by the teaching of that transcendently great genius, Claudius Galen, beyond all doubt one of the most illustrious physicians of antiquity after Hippocrates. He was born, A.D. 131, at Pergamos, a city of Lesser Asia, where he afterwards became the physician to the gladiators. He eventually, after long and varied travel, settled permanently at Rome, and became physician to Marcus Aurelius, Lucius Verus, and Commodus, successively, and is supposed to have died during the reign of Severus.\* The studies of Claudius Galen were as brilliantly sustained as they were diversified. History, archæology, philosophy, geography, physics, mathematics, grammar, jurisprudence, and the plastic arts, formed parts of the circle. Each science seemed to spread its choicest stores before its gifted child.

But it is in our own department that we have more immediately to estimate the talent and influence of the man. As a comparative anatomist and physiologist, he rivalled Aristotle; as a pathologist, he far outdistanced all his competitors; as a theorist, he was as unrivalled for inventive genius as he was for crystal clearness in unity and coherence; his greatest fault lay in not verifying his theories by actual experiment. As a practitioner, his daring was only equalled by his success.† The

\* Portal (*Histoire de l'Anatomie*) asserts that from conviction of the truth of the Christian miracles, Galen died on a journey to Judea.

† Allusion is here intended to the well known case in which he trepanned the carious sternum, and saw the naked heart beating, despoiled of its pericardium.



medical historian might dwell long and wisely upon the character and writings of this great physician. I have only to address myself to a given portion of the latter; I cannot, however, avoid lingering one instant over the surpassing moral excellence of the man. Comparative anatomy was with him, as it were, ancillary to religion—one “eternal hymn to Deity”. Throughout his works there breathes a spirit of the sublimest character. He suffers no opportunity to escape without indicating the agency of the Deity in Creation. If ever feelings of regret were awakened at the dominance of the superstitions of the age over the moral liberty of the man—an age that while it sacrificed its hundreds to the brutal pleasure of the arena, dared not yield even one dead body to the cause of science—it must be in the case of Galen. Had his great intellect but been permitted to enter the domain of human pathological anatomy, how great the light this science might have diffused! what acquisitions have been transmitted to future ages! As it is, we cannot but wonder at the mental attributes of the man who subjugated the entire medical world for nearly a thousand years.

Galen was a polyhistorian in the strictest sense. His writings were immense, numbering nearly four hundred, and some of great extent. According to Wunderlich (*Geschichte der Medicin*, p. 34), upwards of one hundred, now lost, treated of philosophy, mathematics, grammar, and jurisprudence. There are many editions of such of his medical works as have been transmitted. One consists of five folio volumes; another, in twenty-two volumes, was edited by Kühn. An admirable edition in French is now in course of publication by Dr. Daremberg; the first two volumes of which are already in print.

I purposely pretermit the general descriptive anatomy of the heart by Galen; inasmuch as such description is in all probability either derived from the writings of Aristotle, Herophilus, and Erasistratus, or from his own examination of animals. Indeed, the famous *Manual of Dissections* is for the greater



part a mere manual of zootomy. Still there are some residual points connected with the anatomy of the foetal heart which are of sterling excellence, and possibly the result of actual dissection of the human foetus.

In the foetus, says Galen, the vena cava communicates with the arterial (pulmonary) vein; that is, regarding the sinuses as the *embouchures* of their respective veins. So likewise the venous (pulmonary) artery and the great artery (aorta) are connected by a third vessel, which Nature has formed expressly for such union. And as the first two vessels—the cava and the arterial (pulmonary) vein—are in juxtaposition, Nature has formed a foramen or aperture common to the two, to which is applied a membrane yielding to the current passing from the cava to the arterial (pulmonary) vein, but opposing, on the contrary, the return of the blood from the arterial (pulmonary) vein into the cava. After indicating these wonderful adaptations, he clearly indicates a change more wondrous still. In a few days after birth, the opening betwixt the auricles is closed; and the canal (ductus arteriosus) between the venous (pulmonary) artery is obliterated, so that in later times no trace remains. Many hundred years subsequently, one of the greatest anatomists of any age, Vesalius, the rediscoverer of the foramen ovale, spoke in unqualified terms of praise of the clearness of Galen's description. (Flourens, *Histoire de la Découverte de la Circulation*. Senac, *Traité de la Structure du Cœur*, tome i, p. 151.) He also pointed out that the apex of the heart was formed exclusively by the left ventricle, and that the apex was at times bifid; and mentions an example in the heart of a cock sacrificed to the gods.

But it is in the cardiac physiology and pathology of Galen that we shall find a wider theme for admiration; in the first department, ideas replete with wonderful sagacity; in the second, the first deep foundation laid for the systematic study of the diseases of the heart and its membranous envelope. The name of Galen stands out in bold relief on the page of our history, as



the first vivisector who especially examined the heart's movements; and, although his views fell short of truth, the step was nevertheless far in advance both of his predecessors and of his cotemporaries.

In studying the movements of the heart, which he laid bare by removing a portion of the sternum of the living animal, or which he removed all palpitating from the chest, he believed that the contraction of the organ was attended by its elongation, and thought that he could explain this phenomenon on the hypothesis that the longitudinal fibres of the ventricles were in a state of relaxation during systole, while the transverse and oblique fibres were in the opposite state of contraction. To this doctrine even Vesalius subscribed. (Milne-Edwards, *Leçons sur la Physiologie et l'Anatomie*, etc., tome quatrième, p. 19.) Galen furthermore pointed out upon the living heart the acts of systole and diastole, and the period of repose. He also investigated by actual experiment the effects of section of the pneumogastric nerves upon the rhythmic beating of the heart. (*De Locis Affectis*, lib. i, cap. vi; Milne-Edwards, *op. cit.*, vol. iv, pp. 135, 552.) His physiological observations also upon the relative quickness of the pulse in the fœtal, adult, and senile condition, are full of deep interest.

His views respecting the function of the auricular appendages are both original and striking. After describing their structure, he proceeds to state that these appendages were not created without an object. It is, in truth, of the highest importance that no injury should be sustained either by the artery (pulmonary vein) distributed in the lung, or by the vena cava. And it is beyond question that the auricles essentially subserve the requirements of animals. These two vessels, without entering into other details, have their walls; the one, because it is essentially a vein; the other, as we have before shown, because the organism of the lung rendered necessary that the artery should be venous in structure. But if a vessel with thin and soft walls, by virtue of its organisa-



tion, be more disposed to contract easily, so is it from this structure more liable to rupture from over distension. Thus the two vessels entering the heart, possessing walls so thin and soft, might sustain rupture, had not Nature adopted the expedient of the reservoir apparatus of the auricles. The function of these appendages not only averts such danger, but assists further the prompt repletion of the heart. Soft structures contract more rapidly than dense ones. The heart naturally fills in proportion to this speed. But unaided, and unprovided with adjacent reservoirs, the veins would not always have been able to disengage themselves of their contents, and would consequently have been liable to injury; but, with the assistance of the auricles, they stand aloof from injury. For the same reason, I believe the tissue of the auricles is thin and fibrous. Their tenuity assists their contraction; whilst the power of resistance of their tissues saves them from injury, for the fibrous tissue is very resisting. (*De Usu Partium*, cap. vi.)

I have now to detail the views of Galen respecting the function of the arteries as derived from direct experimental physiology.\*

If, said he, an artery is opened, blood escapes; consequently, one of two things happens. It must be either naturally contained therein, or it comes from elsewhere; but if it comes from elsewhere, and if the artery only contained air, the air ought to escape before the blood. But this is not the case. The arteries consequently only contain blood. Take another experiment. "Let a portion of an artery be intercepted between two ligatures; then open it midway, and you will only find blood. Thus, again, it is shown that arteries contain blood, and blood only. But, cry the followers of Erasistratus, how happens it that, if the arteries contain only blood, the air inspired passes into the body? It does not, contends Galen;

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\* In the preceding lecture, I have stated, on the authority of Sprengel, that Bacchius, of Tanagra, first advanced this doctrine in opposition to the teaching of Erasistratus, that the arteries only contained air.



the inspired air is again rejected. It assists the respiration by its temperature, not by its substance. It cools the blood; and that is the function of respiration." (Flourens, *op. cit.*)

The next great distinction made by Galen concerning the blood, is that of the two different kinds of blood—the spirituous blood, or that of the arteries and the left side of the heart; and the venous blood, or that of the veins and right side of the heart. Here, again (although an anatomical error is involved, for Galen considered that the veins, like the arteries, conveyed blood to the organs), was another great advance in science—the recognition of two different kinds of blood, so familiar at the present day—red blood and black blood, or arterial blood and venous blood.

Of three principal errors with regard to the circulation, Galen at any rate did away with one. He showed experimentally that the arteries contained blood, and not air. But he was not altogether happy with regard to the other two. He believed, first, that the ventricular septum was perforated; and secondly, that the veins originated in the liver, and conveyed blood to the organs.\* This double error descended even to the moderns; the latter one being opposed to all idea of a circulation. Still, while firmly believing in the perforation of the septum, Galen was well aware that the blood of the right ventricle passed, at least in part, by the pulmonary artery into the lungs; for he definitely states, "Atqui orificia omnia sunt

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\* Although Galen placed the seat of sanguification in the liver, there is no doubt but that he seized upon some fragment of a truth. C. Hoffman also, in his *Commentary*, page 124, is most explicit:—"Si bene habet comparatio, ut habet: utique dicere etiam licet! Quod hepar est venis, id cor est arteriis. Ut enim ventriculus præparat materiam, quam venæ deinde elaborare debent; et venæ præparant materiam, quam arteriæ denique ad ultimam perfectionem deducere debent: ita hepar præparat materiam, cui cor imponit ultimam manum. Jam igitur cadit hoc, quod Galenus alicubi tantopere negat, hepar non laborare pro corde. Nempe non distinguit publicas actiones a privatis." Even modern anatomists of eminence—for example, Kölliker—have maintained that this organ is in some way concerned in the process.



numero quatuor, duo in utroque ventriculo ; in sinistro unum quod spiritum de pulmone immittet, alterum quod educit ; reliqua duo in dextro, alterum quod in pulmonem sanguinem emittet, alterum quod e jecore admittet." (Flourens.) He was equally well aware of the anastomosis between the arteries and veins at the periphery of the body.

There is only one other point that I can find time to mention respecting the physiology of Galen. He states that certain vessels have a double circulation (*Œuvres de Galien*, par C. Daremberg, tome i, p. 437); and this fact is not without its significance, when we remember Claude Bernard's statement respecting a double current in certain veins, bearing in mind that Galen's view is now seventeen hundred years old.

The cardiac pathology of Galen is characterised by the same comprehensiveness and depth. He first indicates the mode in which the action of the heart may be arrested, and even death occasioned by the voluntary suppression of the respiration.\* His views also respecting the mode in which asphyxia is produced, in consequence of that necessary interdependence of the heart and breathing movement, are fraught with interest. He observes, that those who believe that the thorax does not subserve the function of respiration, cannot discover the cause why, in severe apoplexy, the patients die indirectly, in consequence of the simple injury of the cerebral function. You will, he adds, experience no difficulty, being firmly persuaded that the chest is expanded by the muscles supplied by the nerves connected with the spinal marrow, which muscles are, under such circumstances, deprived of the motor power derived from the brain. Death results in consequence of the heart being deprived of the function of respiration.

The doctrine concerning the pulse is most elaborated. It would be impossible, within my prescribed limit, to attempt an

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\* The modern researches of E. Weber tend greatly to confirm the possibility of this view. (Milne-Edwards, *op. cit.*)



analysis of the subject. This particular treatise abounds with most valuable facts, and must always remain a monument to the sagacity of this physician. With reference to the division of the pulse, I content myself with the following summary. He distinguishes absolute differences of the pulse dependent upon—

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| <p>1. The nature of the increase of the individual pulse-wave :</p> <p style="padding-left: 2em;">Pulsus celer,<br/>           " moderatus,<br/>           " tardus,</p> <p>2. The calibre of the arteries during the period of diastole :</p> <p style="padding-left: 2em;">a. Length of the pulse-wave :</p> <p style="padding-left: 4em;">Pulsus longus,<br/>           " moderatus,<br/>           " brevis.</p> <p style="padding-left: 2em;">b. Breadth of the wave :</p> <p style="padding-left: 4em;">Pulsus latus,<br/>           " moderatus,<br/>           " angustus.      *</p> | <p>c. Depth of the wave :</p> <p style="padding-left: 2em;">Pulsus altus,<br/>           " moderatus,<br/>           " humilis.</p> <p>3. Strength :</p> <p style="padding-left: 2em;">Pulsus validus,<br/>           " moderatus,<br/>           " imbecillus.</p> <p>4. Physical properties of the arterial coat :</p> <p style="padding-left: 2em;">Pulsus durus,<br/>           " moderatus,<br/>           " mollis.</p> <p>5. Pause :</p> <p style="padding-left: 2em;">Pulsus rarus,<br/>           " moderatus,<br/>           " creber.</p> |
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Galen further distinguishes the relative difference of the pulsations; that is, of a single beat with respect to another, such as the rhythmic and unrhythmic, the equal and unequal, the regular and irregular, with numerous modifications.

The first great distinction established by Galen respecting the actual affections of the heart is into those of organic, and of inorganic or sympathetic origin. All cardiac affections attended with pain modify the respiratory act, rendering it painful and small (superficial). He furthermore shows how frequently death results from organic disease, inasmuch as all organs sooner or later become involved in the disturbance. The action of the heart is essential to the well-being of the

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\* For detailed views of the famous Archigenes and others respecting the doctrine of the pulse, consult Galen, *De Diff. Puls.* Opera omnia. Liber quartus, pp. 62-7. Venetiis: 1652.



economy. Other organs may with greater or less impunity have their functions temporarily suspended; but if the heart ceases to act, death speedily follows. Diseases of the heart are frequently induced either by some peculiar cachexia (change of the blood) or by inflammation, either simple or of erysipelatous type; and such diseases frequently prove fatal at an early stage.

The affection known as cardiac syncope is produced by actual disease of the heart, just in the same way that it may be induced by some derangement of the stomach. These affections of the heart induce characteristic alterations in the state of the pulse (*De Pulsibus*).

Palpitation of the heart is observed in many young persons, as well as in those of more advanced age. The paroxysms may suddenly come on, unattended by any other symptom, while in the enjoyment apparently of perfect health. These cases were in the young relieved by bleeding, and many permanently cured by being submitted, after the bleeding, to low diet, and taking the proper medicines. Others had a relapse, and were relieved by the same treatment. "I knew a man," says Galen, "who in the spring of each year was subject to palpitation. During a period of three years he was relieved by bleeding in the attack; the fourth year he prevented the attack by being bled beforehand. This man, notwithstanding, died before old age had fairly set in. The age, generally speaking, for such serious attacks is between forty and fifty, and they are often fatal by syncope."

As a type of actual organic disease of the heart and valves (possibly atheroma of the latter at the mitral orifice) I shall quote Galen's narration of the case of Antipater, a physician of some eminence practising at Rome:—"When between fifty and sixty years of age, Antipater was attacked by the ephemeral fever, on the cessation of which he examined his own pulse, with the view to further treatment. Detecting great irregularity in the movement of the arteries, he became at first



greatly alarmed; but soon afterwards, feeling that the fever had entirely left him, he quickly took a bath; his physical power being exhausted by work and want of rest. He next adopted a guarded regimen, till the end of the third day, reckoning from the accession of the fever. Having experienced no relapse, he resumed his ordinary occupation; but he was greatly surprised, on feeling subsequently the same irregularity of the radial pulse. Meeting him one day, he held out his hand, and, laughing, asked me to feel his pulse. I, also smiling, replied, 'What enigma are you propounding?' He again, laughing once more, begged me to feel his pulse. I found great irregularity in the pulse, not only in that totality of the pulsations named systematic, but also in each single dilatation of the artery. Astonished to see him alive with such a pulse, I asked him if he felt the slightest difficulty in breathing. He answered, 'None whatever.' I watched each change that occurred, constantly feeling the artery of the wrist, during a period of six months. As he asked me at the commencement of what diathesis I supposed him affected, and how such condition could cause a similar pulse without fever, I replied, that in my *Treatise upon the Pulse* I had adverted to a similar irregularity. Indeed, I am of opinion that it results from an obstruction of the great arteries of the lung (mitral valve?). 'But,' said I to him, 'the obstruction could not become the cause of the inflammation of the viscus within you, for you would have fever. We must only suppose that the obstruction caused by thick and viscid humours on the formation of a crude tubercle, has produced in you a like diathesis.' 'But, then,' interrupted Antipater, 'I should have an asthmatic orthopnœa.' 'What you state,' I replied, 'is probable, but still not exact, for such an orthopnœa would very well be produced by the accumulation of this thick and viscid humour, not in the smooth arteries, but in the trachea.' I ordered him to adopt a regimen similar to that recommended in asthmatic cases, and to take medicines having the same properties as



those used in such cases. After an interval of six months, he experienced slight dyspnœa and palpitation of the heart; at the onset, only once, then three, four, or even more attacks, the dyspnœa progressively augmenting to about the fifteenth day, then suddenly the breathing became extremely laborious, his powers failed, and he died quickly, in a similar way to other individuals suffering from disease of the heart."\*

Galen was, as I have before mentioned, the physician of the amphitheatre, and must in that capacity have had presented to him an almost boundless experience. He states, that gladiators suffering under well-marked traumatic inflammation of the heart die in a similar manner to those who have suffered from idiopathic disease. Should the wound penetrate one of the cavities of the heart, especially the left, death immediately follows, from the effusion of blood. But, on the other hand, if the wound does not enter the cavity, but is limited to its wall, the subject of the injury may not only survive the day on which the wound was received, but even the following night. Death eventually follows, as a consequence of the inflammation.

Lastly, with regard to the affections of the pericardium, Galen states, that there is nothing astonishing in the notion that effusion may take place into the sac sufficient in amount to embarrass the action of the heart, and prevent its perfect dilatation. This is inferrible from numerous dissections of animals, in whose pericardium an abundant collection of fluid was found. The following cases are given in illustration:—"A monkey was kept for dissection; but my engagements prevented my fulfilling, for a time, such purpose. It daily emaciated; after death, all the organs were healthy, with the exception of the pericardium. This tunic contained a cyst filled with fluid,

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\* In the opinion of Macoppe (*De Aortæ Polypo*), Antipater died from dilated aorta.

See particularly Stokes, *Diseases of the Heart*; Latency of Valvular Disease, p. 146 *et seq.*



resembling hydatids. In a cock, instead of fluid we found within the pericardium a scirrhus tumour, resembling many thick membranes superposed (false membranes). It is, therefore, probable that in the human subject similar productions may occur." Galen further states, that uncomplicated inflammations of the pericardium, as well as other similar membranes covering other viscera, do not, as a rule, place life in jeopardy. I have elsewhere adverted to the fact, that the statistics by Bamberger of these affections fully justify the opinion of Galen.

It would scarcely come within the field of investigation, or I might cite in conclusion the interesting observations of Galen upon Aneurism of the peripheral vessels. (*De Tumoribus Part. Natur.*)

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## LECTURE III.

NEAR about the period of Galen, possibly even cotemporaneously with him, lived another mighty master of our art—Aretæus of Cappadocia. His history is involved in so much obscurity, that any attempt to investigate it critically would be beyond the purpose of lectures devoted simply to the history and progress of the pathology of the heart and great vessels. The portion of his writings, however, which has descended to us, proves that while dealing with facts of observation, he stood in the strong “fortress of his power”. If less brilliant than his accomplished rival in the theories that seduce, he was, at least, as solid in the teaching that persuades. His clinical pictures retain all their pristine brightness unsullied, as if from the immediate hand of the artist, for they are most exquisitely elaborated sketches of Nature’s own workings. To this rare fidelity of detail is superadded, so judges say, the charm of polished style. The excellent edition of the extant works of Aretæus, by Dr. Adams, makes labor light; and I borrow almost exclusively from so trustworthy a source. As one proof of the value of the text he edits, Dr. Adams says in his preface:—“I may mention that Hippocrates and Aretæus are almost the only authorities in whose works Laennec detects any anticipations of his own system of diagnosis in diseases of the chest.”

Aretæus is fully alive to the paramount importance of the function of the heart in the human economy. He says:—“It is the heart which attracts. If, therefore, the heart primarily suffer, death is not far off. . . . The flow of blood from the chest



and viscera below is called a bringing up. It is truly of a fatal nature if it proceed from any of the vital parts which are ruptured—either the vena cava in the heart which conveys the blood from the liver, or from the large vein which lies along the spine. For from hæmorrhage, as from slaughtering or impeded respiration, death is very speedy. The modes (in which hæmorrhage occurs) are three: for it is brought up either from rupture of a vessel, or from erosion, or from rarefaction. Rupture then takes place suddenly, either from a blow, straining at a load, lifting a weight upward, a leap from a height, from bawling aloud, from violent passion, or some other similar cause. But if it proceed from erosion, the patient is to be interrogated if he ever had a cough before, or was affected with dyspnœa, and whether nausea or vomiting afflicted him previously. For from such chronic affections the vessels are corroded by a continued, copious, and acrid defluxion. When, therefore, the containing vessels, having been long wasted and attenuated, at length give way, they pour forth blood. In the mode by rarefaction, the discharge is neither copious nor sudden, nor does it consist of thick blood; the thin portion is only excreted. . . . And there is a difference of the discharge, whether it be brought up from an artery or a vein. For it is black, thick, and readily coagulates, if from a vein; it is less dangerous, and is more speedily stopped; but if from an artery, it is of a bright yellow (?) colour and thin, does not readily coagulate; the danger is more imminent, and to stop it is not so easy; for the pulsations of the artery provoke the hæmorrhage, and the lips of the wound do not coalesce from frequent movements of the vessel.”

The third chapter treats on syncope. “It is, indeed, the name of a very acute malady; and what other name more appropriate for the designation of this matter? what other organ more important than the heart for life or for death? Neither is it to be doubted that syncope is a disease of the heart, or that it is an injury of the vital powers thereof, such is the



rapidity, and such the mode of the destruction. . . . But such persons as regard it to be an affection of the stomach, because by means of food and wine, and, in certain cases, by cold substances, the powers have been restored, and the mischief expelled; these, it would seem to me, ought to hold phrenitis to be a disease of the hair and skin of the head, since the phrenitics are relieved by the shaving and wetting thereof. . . . But the stomach is neither the original nor seat of life; and yet one would be injured by atomy thereof; for food which proves injurious to the heart does not hurt the stomach itself, but by it the heart, since those dying in such cases have symptoms of heart affections—namely, pulse small and feeble, *bruit* of the heart, with violent palpitation, vertigo, fainting, torpor, loss or tone in their limbs, sweating copious, and unrestrainable, coldness of the whole body, insensibility, loss of utterance. How should the stomach endure such symptoms? . . . These, then, are the powers not of the stomach, but of the heart.”

One of the most important chapters is the eighth, of the second book, headed “On the Acute disease of the Vena Cava,” a chapter the more important, as it possibly includes the pathology of aortic aneurism. Commencing with the descriptive anatomy of the vein, Aretæus thus proceeds:—“This vein, then, as I think, is all diseased in acute and strong affections, for it is altogether one vein. But other physicians fancy that only the part along the spine is affected, because there are no manifest symptoms in regard to the portion about the heart; for it is extended through the chest, having no adhesions, but floating in the chest, until, from the diaphragm, it adheres to the heart. If, then, any of the great ailments seize this vein, they are concealed by the thorax surrounding it. Wherefore *kedmata* (aneurismal varix) also form about this vein when a hæmorrhage, bursting forth quickly, proves fatal, the blood being discharged by the lungs and the arteria aspera, if it burst in the chest; but if at its origin, the blood is poured into the



lower belly, so that the bowels float in it, then the patients die before the blood makes its appearance, the belly being filled with blood.

“Inflammation likewise forms about the vein, and it also proves fatal, if it be great; for there is an acrid and pungent heat enclosed in the cavities of both, but little surpassing what is natural, so that to the touch the heat appears to be slight; but the patient fancies himself burning hot. Pulse small, very frequent, so as to appear compressed and forcibly accelerated; coldness of the extremities; intense thirst; dryness of the mouth; redness of countenance, along with paleness; he is reddish over the whole body; hypochondriac region hard, and retracted upwards; pain principally on the right side, and palpitation therein, extending to the flanks; and in certain cases, also, of the artery, along the spine, provided the pulsation displays itself in the other hypochondriac region; for lying, as it does, on the left side, it sympathises with the other; the exhalation in the general system affording no relief, and not even making the skin soft, for it is dry, shrivelled, and rough; and more especially in the regions of the body where the bones are prominent, such as the back part of the elbow, the knees, or the knuckles. Sleep disturbed; the bowels, in certain cases, discharging nothing, and in others the discharges small, acrid, bilious; urine a bright yellow, and pungent; not disordered, indeed, in mind, but they are torpid and wasted. Hence, those who have seen this constitution of disease, have called it *causus*, for the present symptoms are those of a species of *causus*; and in autumn there is a tendency to malignity, both in adults and the young, in whom the habit of body is slender from bad diet and hard labour. These, for the most part, die on the fourteenth day; but when the disease is protracted, they die in double that period. But those who either originally have a slight inflammation, or when a great inflammation is gradually resolved, escape the disease indeed, but never get rid of the mischief; for they labour under



causus a long time. But the dangerous symptoms cease—namely, the pains, distension of the hypochondria, the bad pulse, and torpor of the intellect; but still they have nausea, are ill at ease, with distress of mind; and, moreover, these are attended with an accession of causus and thirst, dryness of the tongue and mouth; they inspire largely, drawing in a long and copious breath, as if wishing to draw in the whole atmosphere for the purpose of refrigeration. And if they drink a large draught of cold water, they are relieved, indeed, for a short time; but then, again, the thirst is kindled up, and again they drink copiously. And this is the successive course of the malady.”

In the third chapter, of the second book of *Therapeutics of Acute Diseases*, Aretæus treats of the cure of cardiac affections. To this chapter my limited space compels me to refer the reader desirous of information concerning the practice of the olden time.

Dr. Adams, in a note to the eighth chapter on the term “kedmata,” gives reference to Testa’s well known work. I can only enforce the recommendation. Testa’s notes, in his *Delle Malattie del Cuore*, per cura di MM. Sormani: vol. sec.; Napoli, 1841, pages 28-37, are fraught with critical interest, like everything else penned by this distinguished cardiac pathologist.\*

It is highly probable that a break now occurs in our history, in point of time, inasmuch as Cælius Aurelianus, the Numidian, the great upholder of the methodic sect, although supposed by some to have flourished about the time of Galen, is by other writers of authority (Haller, *Bibliographica Medica*), in consequence of the unusual harshness of his style, located in the fifth century. However this may be, he has, at all events, bequeathed to posterity a work (*De Morbis*

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\* It is ever to be deplored that a premature death prevented the completion of his classical work—a work I hope at a later period, to bestow that consideration upon it so preeminently merits.



*Acutis et Chronicis*) which has ever been regarded as most valuable. Some even, as Grainger (*Sprengel, op. cit.*) prefer him to Galen and Aretæus. It is also averred, that the monks of the middle ages selected him by preference as their guide. Such confidence was not misplaced; for his accuracy in diagnosis is, by general consent, admitted to be extremely correct. The volume of Cælius Aurelianus, however, must, at least so far as bears reference to our subject matter, be regarded rather as a repertory for the opinions of others, than as a vehicle of independent observation. It is true that he treats somewhat diffusely of the cardiac passion (syncope); but his pages are rather an embodiment of the views of Hippocrates, Herophilus, Erasistratus, Praxagoras, Heraclides of Tarentum, Asclepiades, and Themison. Ten chapters of his second book on acute diseases treat *De Cardiacis*. From these we again learn that both Erasistratus and Herophilus had, many centuries before either Galen or Aretæus, regarded cardiac syncope as a primary affection of the heart. "Siquidem putant principaliter cordis esse ægritudinem." Such opinion was formed from the impulse, palpitation, and sense of oppression in the left breast. They saw, moreover, how great the danger was in such cases to life. His idol Soranus also thought "cardiacam passionem esse solutionem celerem atque acutam". In the same section, speaking of the etiology of the affection, he states that the disease is more common in men than in women; and that various influences may produce it, as error in regimen, mental anxiety. Lastly, "Emergit autem frequentius quintâ vel sextâ die in febribus continuis, vel ardentibus, atque flammatis." In section thirty-fourth, he shows how some, in opposition to Erasistratus, thought that in these cases it was not the heart that was chiefly affected, but "membranam quæ cor circumtegit"; others, that it was an affection of the diaphragm, "hoc est, membrana quæ a visceribus (cor et pulmones) discernit intestina"; others, again, considered that either the lung or liver was the principal seat of the malady.



The thirty-fifth section, "Quomodo discernimus cardiacos ab his qui stomacho patiente sudaverint," comprises the most original and perhaps valuable of the series. The diagnostic signs of each malady are well stated. In the succeeding chapter, he shows that fever is not essential to certain cardiac affections. The concluding chapters consider the therapeutics of these disorders. According to Soranus, bloodletting, cupping, sudorifics (on which the greatest stress is laid), enemata, and evacuants, were freely used; and subsequently tonics, sulphur fumigations, according to the several indications.

Alexander of Tralles, in Lydia, who lived about the sixth century, or latest Roman period, was, notwithstanding a little tincture of the superstition so common to his age, a most admirable and original physician, occupying one of the highest places in the literature of medicine: indeed, according to Freind (*History of Physic*, 1725), he was "one of the best practical writers among the ancients, and well worth the perusal of any modern". His skill in diagnosis gave him a then world-wide reputation. Although so distinguished as a clinical observer and therapist, his published knowledge of cardiac pathology must be regarded as most unsatisfactory and imperfect, immeasurably behind the science of his great predecessors, Galen and Aretæus. A few short details are all that we can refer to. In his work (*Medici Libri Duodecim*, edited by Guintier; Basilæ, 1685), he proceeds literally *a vertice ad calcem*. In course of description, there are two chapters, *De Affectu Cardiaco*, and *De Cardialgiâ, quasi dicas cordis dolore*. In the first chapter, he states unreservedly that the cardiac affection is "vitium stomachi"; and in the second, the pathology is the same, and the treatment corresponding. He teaches, moreover, with all the bias of the helminthologist (and he was assuredly the greatest of his age), that sudden death, in some of these cases, is caused by worms. "Nam hæ bestiæ adeo repentinam mortem et syncopas non minùs quàm perniciosi humores inferunt." Lastly, in the twelfth book, page



710, when treating of the "signs of obstruction" in these cases, he has the following remarks:—"Obstructions of this kind, combined with other irregularities of the circulation, are chiefly those discoverable from the increase or decrease, strength or weakness, of the pulse; as also its fluttering and indistinct character. There are cases also where, from great obstruction, the pulse becomes intermitting." Such are the principal remarks of Alexander—styled, *par excellence*, "the Physician"—bearing upon the diseases of the heart. They justify, I conceive, the criticism passed.

In the writings of Aetius and Paulus Ægineta, almost the last of their school, there is but little of original matter even in a general point of view, much less in our restricted one. Their writings are chiefly valuable as an exposition of the teaching of Galen and others. Paulus Ægineta, of later date than Aetius, about the beginning of the seventh century, was a most distinguished surgeon and accoucheur. He deserves mention for his extension of the views of Galen on the subject of aneurism, considered in its surgical sense. After concurring with him in the general view that an aneurism is an arterial tumour caused by extravasated blood, he establishes a further distinction between anastomosis and rupture (true and false aneurism). He maintains that the latter is more oblong in form, and, on pressure with the fingers, develops a "strepitus"; the former variety is, on the contrary, of rounder form, and imparting, on pressure, no such sensation as before named. His directions for the surgical treatment are concisely stated. (*Aneurismatum Dignotio*, p. 593; *Pauli Æginetæ Opera*, cur. Guintier.)

The next writer worthy of mention is Actuarius, the son of Zachary, of somewhat uncertain date; by some, even placed later than the Arabian school. He practised in Constantinople, at the court of the emperor. Actuarius certainly appears to have contributed much more to the science of cardiac pathology than the writers last treated of. Although a compiler from the Greek physicians, he is deserving of record as the most original



author upon the subject of functional palpitation of the heart, which subject is, perhaps, better treated by him than by his predecessors. (Eloy, *op. cit.*) Freind also (*op. cit.*) speaks highly of him, and states that "we may find several things in him not to be met with anywhere else". The complete edition of his works, from which the subsequent extracts are made, bears date Paris: 1556. He makes an excellent practical division as to the causes of palpitation. The first cause assigned is plethora; the second, vapours (hysteria and hypochondriasis). In the plethoric or obstructed diseases of the heart, he points to the information communicated by the pulse:—"Sic cordis affectus vitalibus facultatibus quas ζωωδεις appellat ac pulsum differentiis distinguuntur." (Page 14, *Meth. Medend.* The entire chapter is worth perusal.) He shows also that, occasionally, inequality and intermission of the pulse is not only a forerunner of syncope, but even of sudden death. These signs are not necessarily connected with the second or vaporous class of affections. With regard to treatment in the plethoric class, he recommends bleeding and purging; in cardiac syncope, wine and other stimulants. In the vaporous affections, on the other hand, he prescribes musk, opiates, with antispasmodics and roborants. Finally, in his work *De Prævid. ex Urinis*, he has a chapter on this secretion, as diagnostic of the affections of the heart. (*Op. cit.*, p. 376.)

Like the general lull in medical science which occurred between the Trojan war and that of the Peloponnesus, so cardiac pathology had its pause between the last of the Greek classical physicians and the commencement of the Arabian medicoliterary history. The Saracen invaders of Egypt, under Omar, A.D. 642, commenced their career by an act of that superstitious and wanton barbarity so common in the then unsettled state of society—the destruction of the world-renowned Alexandrian Library, the spoil of which supplied four thousand public *bagnios* with fuel for a period of six months. Thus was lost at "one fell swoop" all that the Ptolemies, Cleopatra, and successive



rulers, had spared neither toil nor expense to amass. We can, perhaps, never appreciate the actual loss. Fortunately, however, some invaluable literary relics escaped this monstrous conflagration, to be subsequently translated and commented upon by the great Arabian physicians. With respect to these, although we cannot regard either the *Continens* of Rhazes or the *Canon* of Avicenna with that fervid admiration which characterised succeeding ages, still, on the other hand, we must not, like Haller (*Bib. Med. Pract.*), rank them as mere servile copyists, nor hate the Arabian school so thoroughly as Gui Patin (*Lettres*, edit. par Reveille-Parise). Although interpolators of the original text, they beyond doubt added much sound and original clinical observation, honestly gained in the large hospitals founded by the munificence of Almanzúr, Al Raschid, Almamon, and other princes of the Abbasside dynasty—princes who endeavoured to make ample amends for the injury inflicted by their forefathers on the republic of letters. (*Vide* Freind, *op. cit.*) A comparison, indeed, may be drawn between this era and that of the Ptolemies; the Caliph Mostanser again assisting in the public medical teaching. It must not be thought, however, that the Arabs were ever entirely barbarous, in a rigorous sense.\* Their very physical geography, favouring a glowing and ardent imagination, compelled them to seek perfection in their social institutions. I shall hope, in a brief analysis of their contributions to cardiac pathology, to be able to claim for them the merit of originality, and consequently fully to vindicate them from the charge of being mere plagiarists, at all events, in this part of science. The names which here stand most conspicuously are those of Rhazes, Avicenna, and Avenzoar. Of all it

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\* Literature was zealously cultivated by the ancient Arabs; they were enthusiastically attached to eloquence and poetry, for both of which their rich harmonious language affords peculiar facilities. A meeting of the tribes was held annually, at which the poets recited their compositions, and those which were judged the best, were preserved in the public treasury. (Taylor, *Manual of Modern History*, page 34.)



may be said, that their clinical opportunities were great, and their judgment matured by the severity and extent of their prior studies. Rhazes of Irak was director of the hospitals of Bagdad and Ray, also a professor in the school. In that most prolix work, the *Elchavi* or *Continens* (about which there is much doubt as to whether it came or not from his hands as published), he treats in the first book of palpitation, pain, syncope, together with ulceration and suppuration of the heart. Many and diverse are the exciting causes he assigns of such conditions—extremes or sudden changes of temperature, prolonged heat or cold, drought or wet; in short, any agency which either over-excites or unduly depresses the action of the organ. He also (*De Mirab. Cur.*) narrates a case of violent palpitation with visible collapse of the arteries, and describes how he effected its cure.

Avicenna, who lived in the tenth and eleventh centuries, despite the opinion of Haller (*op. cit.*), enjoyed, like Galen, an immense share of popularity, living and posthumous. His works, translated, enlarged, or epitomised, held sway six hundred years. The famous *Canon*, or book of his medical creed and experience, contains some passages of value connected with the pathology of the heart. He shows how important is the function of the organ.\* “Cor non tolerat nocumentum dolorem neque apostema.” He also treats of the inflammation of the parenchyma of the organ, and of those affections which

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\* See also the observations of that admirable critic and commentator on the “Canon” of Avicenna, J. B. Montanus, commonly known by the pseudonym of the “second Galen”—“Neque enim cerebrum est cerebrum, neque hepar est hepar; nisi spiritus influant à corde. Cor est tanquam Rex in medio, qui omnibus dat, quod debet; et vitam præbet. Ad hæc videmus quod, ubi patiantur hepar et cerebrum, non plane omnia membra patiuntur. Sed, si patiat cor, statim patiuntur omnia membra. Insuper, cerebrum et hepar possunt pati abscessus; at cor non potest. (In Primi Lib. *Canonis Avicennæ Primam Fen. Profund. Comment.*, p. 574 cur. Matth. Venet., 1557.)

Hear, also, Avenzoar: “Et jam scis quod cor est princeps et dominator in toto corpore: et virtutes ejus sunt potentes: et operationes ejus sunt manifeste apparentes.” (*Tract. xii de Egrit. Cord. in General.*, lib. prim.)



are situated "in panniculo ejus, aut continuantur ei ex membris vicinis communicantibus"; and he describes them as associated with fever, palpitation, delirium, and jactitation. So skilled was Avicenna, likewise, in the science of sphygmology, that the Arabic writers tell this story of his sagacity—"that he found out by the pulse the distemper the nephew of Cabous laboured under, which was love." (Freind, *op. cit.*)

I have now only to refer to the writings of Avenzoar, a physician of the eleventh or twelfth century, the last great name in our list of Saracenic physicians. He practised at Seville, in Andalusia, the seat of the Caliphate. His chief work, called *Thaïsser*, contains most valuable matter immediately connected with the diseases of the heart. Indeed, no physician before him had written so systematically and correctly upon certain portions of this subject. His twelfth treatise, *De Ægritudinibus Cordis*, contains seven chapters, headed in the following order:—De ægritudinibus cordis in generali; 2. De tremore cordis qui Arabicè dicitur "altadeg";\* 3. De cardiacâ; 4. De aquâ, quæ congregatur in marsupio cordis;+ 5. De pelliculis, quæ fiunt in marsupio cordis;† 6. De ethica cordis; 7. De apostemate quod fit in marsupio cordis.

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\* Ille vero tremor qui est in corde accidit propter multam repletionem quæ est in eo: et ab ipsa provenit motus ille extraneus et horribilis qui dicitur altadeg. Et cura hujus est phlebotomia cum multa extractione sanguinis.

+ " Ut generatur aliquando in marsupio cordis humiditas aquosa quæ assimilat urine: et accidit ex hoc infirmo consumptio et diminutio carnis paulatim: sicut fit in phthisi. Sed ego nunquam vidi hanc ægritudinem: nec curavi ipsam nec inveni quod Galenus de ejus cura aliquam fecerit mentionem.

† " Generantur siquidem in quibusdam additiones in marsupio cordis quæ sunt admodum cartilaginum et pellicularum adinvicem mixtæ: sed nullus ante nos locutus fuit de hac cura.

" Hæc ægritudo cum accidit in marsupio cordis non fit nisi ex causa calida: sed si medicus fuerit studiosus et sollicitus valde ad hanc ægritudinem removendam, poterit in brevi curari; et hoc fit flebotomando eum citissime.

" Et si negligens fuerit medicus aut tardus in hac cura morietur infirmus in brevi, eo quod marsupium est circundans cor quod est membrum tam



The fifth chapter of the twelfth treatise is headed, "De apostematibus quæ fiunt in panniculo, quod dividit pectus in longitudine in duo." All these chapters contain important matter. In considering the etiology of cardiac disease, he divides causes into extrinsic and intrinsic. In the former are included the "pathemata animi," anger, fear, revenge, intense longing, suspense, sympathetic disturbance of the stomach. Among intrinsic causes, he mentions specially changes in the standard composition of the blood. A most important section is that which treats of the formation of false membranes in the pericardium, which are further stated occasionally to undergo cartilaginous transformation. This observation, as Testa (*op. cit.*) observes, unequivocally shows that Avenzoar had availed himself of his hospital opportunities for *post mortem* examinations. In truth, he confirms, in the human body, the fact of those changes Galen had already described in the pericardium of the lower animals. In his seventh chapter he describes the occasional formation of pus in the pericardium as a direct result of inflammation, and, after insisting upon the danger accruing from such a condition, he strongly advises bleeding, as the sole remedy capable of averting the peril, adding, moreover, that "should the physician be either negligent with respect to this remedy, or backward in the use of it, death speedily occurs." Avenzoar concludes his chapter with the narrative of the case of one of his own patients, of irritable temperament, highly impatient, and addicted to study, who was suffering from cardiac disease. This patient, directly contrary to his advice, insisted upon taking a hot bath; and by this act, he lost his life. Avenzoar was also the first to describe, in graphic terms, the symptoms and pathology of anterior mediastinitis. For confirmation, the reader is again referred to the oft-quoted work of Dr. Freind.

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nobilissimum et principalissimum sicut scis. Hæc autem quæ scripsi de corde sunt etiam sententiam predecessorum nostrorum medicorum. (Avenzoar, *Oper. Collig.* Averroes, 1531.)



This first description of pericarditis occurring in the human subject, with honor crowns the close of the Arabian epoch of cardiac pathology—a worthy offering of Avenzoar at the shrine of Claudius Galen.