The FitzPatrick Lectures

ON

GREEK MEDICINE IN ROME.

DELIVERED AT THE ROYAL COLLEGE OF PHYSICIANS
OF LONDON,

BY

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LECTURE II.

PRESIDENT AND FELLOWS,—My last lecture* ended with an allusion to the poison lore of the ancients, a literature in itself; with an allusion therefore I had to be content, for time presses, and we must turn to other and less sinister subjects. And none in this period is of greater historical interest than the pulse doctrines.

Pulse Doctrines.—Broadbent, in the introductory chapter of his treatise on the pulse, set forth the Galenic doctrines sufficiently for his own purpose; but on this occasion we may fitly endeavour to trace more fully and particularly the researches on the circulation of the blood from more ancient times, from Praxagoras of Cos, in the succession of Diocles, through Athenaeus down to Galen, to whom we are chiefly indebted for what we know of the subject. That to feel the pulse was a common practice we note incidentally in such comparatively early passages:

Tange, miser, venas,
... nil calet hic.

(Pers., Sat. IV.)

and *Et peragit soliti vena tenoris iter* (Ovid in Letter X. to Flaccus, speaking of cold and languor without fever). Galen wrote many essays on the pulse, and from his fourth, fifth, eighth, ninth, and nineteenth books, in which he gives a summary and a criticism of the various pulse doctrines from Herophilus to Archigenes, especially in the *Περὶ τῶν σφυγμῶν* and the *Περὶ διαφορᾶς τῶν σφυγμῶν* (IVth Book); and from some other sources, as in a certain pseudo-Galenic pneumatist treatise, from a pseudo-Soranic tract published by Rose (*Anecdota Gr. II*), and especially from the treatise on the pulse usually attributed to Rufus of Ephesus, a fairly definite reconstruction of the pulse-lore of the ancients has been attained. Galen's main source was a lost treatise—*Περὶ σφυγμῶν*—of Archigenes,† some fragments of which he quotes; though the first treatise on the pulse (*Περὶ παλμῶν*) was written by Aegimius of Elis, of the period of Hippocrates. But I may take Praxagoras as the first physician to give the pulse its due place in diagnosis and therapeutics. Unluckily Praxagoras taught that the arteries were air channels only, a dogma which provoked grievous dissensions, errors, and abuses through later ages. It would seem that Chrysippus also had emphasized the value of the pulse as a criterion of fever.

In the next place, we come to Erasistratus, who described the valves of the heart, the chordae tendineae, and the several regions of the arteries and veins in heart and liver more accurately than Herophilus, whose attention was directed rather to the anatomy of the brain. Erasistratus showed by experiments that the arteries contained blood, and he recognized the function of the heart as the prime mover of the circulation. This great master got very near the truth of the circulation—to a point of view too soon to be perverted by pneumatist and other notions for which he himself was not altogether without responsibility; or indeed to be lost sight of in that empirical indifference to anatomy to which I have referred. This insight of Erasistratus (c. 340–324 B.C.) is of much historical importance; for, as we have seen in respect of Praxagoras, before his time the arteries during life were supposed to contain air only—thin air, breath,

vapour, spirit, pneuma. It is well, therefore, to quote the very words attributed by Galen (V, 552) to Erasistratus, which are as follows: ἅμα μὲν ἀρχὴν καὶ ἀρτηρίων καὶ φλεβῶν εἶναι τὴν καρδίαν, ἅμα δὲ τοῖς ἐξωθεν ἔσω ρεῖοντας ὑμένας ἐπὶ τοῖς εἰσάγουσι τὰς ὕλας ἀγγείαις ἐπιπεφυκέναι, φάσκοντος. This Galen repudiated, for how, said he, could the veins originate in the heart when the blood for them is made in the liver? The remarkable hypothesis by which Erasistratus endeavoured to reconcile the new and the old notions of the arterial contents was that at certain undefined places in the circulatory tree there were communications—anastomoses—between the veins and the arteries: channels which under ordinary circumstances he seems to have assumed to be closed or but sparingly permeable, but in case of lesion or disease opened, so that the blood streamed into the arteries (παρέμπτωσης) and became one of the causes of fever. To this hypothesis in respect to haemorrhage we shall return, for certain therapeutical means were founded upon it.

Yet strangely enough, both as regards the physiology of the circulation, and in medicine also, the Erasistrateans paid less attention to the pulse than did the Herophileans, perhaps because of their reluctance to bleed. In their clinical appreciations Herophilus and his immediate disciples seem to have been properly content with four excellent indications of the pulse—namely, size, strength, rate, and rhythm; but the later disciples of his school too sedulously and fancifully overargued its signs, splitting them into a multitude of unreal categories. Archigenes, of whose elaborate treatise, under the title of *Περὶ σφυγμῶν*, Rufus gives some account, and of which some excerpts have survived, in his recognition of eight categories only “as generally known,” was economical. However, his modest eight, it would seem, we must make into ten; for on turning to Daremberg's Rufus, we find that “hard and soft,” as qualities of “systasis and dialysis,” are to be distinguished from “strong and weak,” as qualities of tone. These eight, or ten, categories (λόγοι) Galen appears, from his two works on the pulse and a certain pseudo-Galenic chapter, to have adopted (Wellmann). These and other minutiae, such as pulses hot or cold, dry or moist, etc., if in themselves idle or absurd, are nevertheless serviceable as clues to traditions and authenticities.

When from such records as remain we endeavour to reconstruct the pulse and respiration doctrine of the Pneumatists in the time of Athenaeus—say in the reign of Claudius—they seem to have been after this form. The pneuma, divine energy, or world-soul, permeated the body as πνεῦμα ζωτικόν; but, as Erasistratus taught, it reached the heart by respiration through the lungs as πνεῦμα ζωτικόν and πνεῦμα ψυχικόν; whence the πνεῦμα ζωτικόν “sped like a bird” through the arteries and the body, while the πνεῦμα ψυχικόν was delivered to the brain (Chrysippus). Now as the pneuma reached the heart it met with the blood, both in the arteries, which had their roots in heart, and in the ventricles; but in the ventricles crasser blood was in excess, in the arteries pneuma. “The arterial blood was thinner, purer, and redder.” It seems at this time to have been generally held, in spite of Erasistratus, that the veins had their roots in the liver.† The movements of the circulation, systole and diastole, were kept up by the innate heat, identified by the pneumatists with the pneuma, as a single entity; and the harmonious rhythm of these motions was a sign of health. Thus the Praxagorean notion, that the arteries contained pneuma only, appears for the time to have been definitely set aside; though in comparing these records we are often perplexed by equivocal terms. Aristotle seems to have been unaware of the distinctions of Praxagoras between arteries and veins, except in respect of the aorta and venae cavae; and he supposed the heart to consist of but three chambers. Especially in this respect we are perplexed in Aristotle, and elsewhere, by the uncertain meaning of the word φλέξς, or vena, although Herophilus and Erasistratus clearly distinguished arteries from veins, and the left from the right heart. Celsus, whose testimony in respect of Alexandria is very important, uses vena to signify blood vessels (including arteries); yet he uses the word

* Lecture I was published in the BRITISH MEDICAL JOURNAL of November 5th, 1910, p. 1393.

† For these paragraphs I am again indebted to Wellmann in his *Pneumatists* and in Sussemlhi; to Daremberg's *Rufus*; to Celsus himself; to the relics of Archigenes, etc.; and to various commentators on Aristotle and the later sources.

† It is worth notice that the Chinese to this day, I am told, think that the right pulse tells the state of the liver, the left the state of the heart.

"arteriae" also, on the whole with a definite meaning, a n anatomically in our sense—as, for example, "itemque arteriae quas καρώτιδες vocant" (IV, 2); though we observe that with them he classes that main pneumatic channel the *aspera arteria*, or windpipe. And here I may conveniently anticipate matters so far as to say that Galen must have accepted the truth that the arteries contained a redder and more ethereal blood; for, as we all know, he assumed the existence of pores in the ventricular septum. He was also aware that the heart was the centre and source of the pulsations, and showed experimentally that if an artery were ligatured—the femoral, for instance—pulsation continued between the ligature and the heart, but ceased beyond it; an observation, however, which, if taken alone, would not have satisfied those pneumatists who attributed pulsation to the throbbing of the *pneuma* only, an idea which may now occupy our closer attention. With Galen the difficulty was to understand how Nature, "which does nothing in vain," came to make two different kinds of vessel for the carriage of the blood.

It seems to me, then, rather difficult in the obscurity of the traditions to discriminate between the great Alexandrians as concerns their anatomical and physiological views respectively, or, indeed, to compare them with precision, though it is clear that in the clinical observation of the pulse the Herophileans were distinctly in advance; but it is probable that not Herophilus only, but also the contemporary Alexandrian school generally, attributed the energy of the arterial pulsation to the heart as the chief seat of the animal *pneuma*, or innate heat. Moreover, herein they certainly established the important conception of the heart and blood vessels as an integer, or functional unity, a conception in later times too often forgotten. The pulsation itself they divided into four periods—a contraction, an expansion, and two pauses. Whether both these motions or only one of them used energy seems to have been a point of some disagreement, though as the distinction between cardiac and arterial systole is often obscure, and is not always made quite clear even by Wellmann, it is not quite easy to be sure of the grounds of this dissent. However, to start with, we ascertain from a passage in the 8th volume of Galen (755) that, although in the Herophilean opinion (Susemihl) the systole only used energy, the diastole being mere recoil, according to the later (Roman) school of Athenaeus energy was expended both in systole and in the diastole. The passage being very important one I quote it in the original: "οὐ δ' ἀπ' Ἀθηναίου πάντες, ὡς εἴρηται, τὰς κινήσεις ἀμφοτέρως ἐνεργείας ἡγοῦνται, τὴν τε ἐν τῷ διαστέλλεσθαι γινομένην καὶ τὴν ἐν τῷ συντέλλεσθαι.

Now in some sentences it appears to me that, contrary to our customary use, by systole was intended the lift of the artery, whereas in others, as where it is disputed whether the systole of the pulse can be felt or not, clearly the arterial fall was intended. Moreover, it has been pointed out I think already, on a suggestion of the late Professor Magnus, that many of these writers, at any rate, supposed the heart and the arteries to swell and collapse together; this I had myself observed and illustrated by the following passage: "διογκῶσις καὶ συνίξσις αἰσθητὴ καρδίας καὶ τῶν ὁμοιοπαθούτων αὐτῇ." Dicroty, as we gather from Galen, was regarded as a second weaker beat; an explanation which he accepts, comparing it to the second tap of the hammer on the anvil, the anvil being the σκληρότης (inertia) of the arterial wall (σῶμα).

The Roman pneumatists, even of the ability of Archigenes, hampered as in part they were by the methodist abstractions of *strictum* and *laxum*, lost sight of some invaluable clinical inferences from qualities of the pulse, which had been perceived by the Alexandrians, and which Galen restored. For instance, these later pneumatists—as we find in Athenaeus, Agathinus, Herodotus, and Archigenes—got entangled in argument between blood content and *pneuma* content; and between tone (τόνος) as *pneuma*, and tone as a quality of the arterial wall (κατὰ τὸ σῶμα τῆς ἀρτηρίας). In such fragments of Archigenes as we possess (Wellmann) we find this confusion between blood content, *pneuma* content, and arterial wall. And I may note here, a little before due time, that, so far as I know, Galen was the first to point out that the arterial wall is liable to sclerotic

degeneration. So, if we try to get behind these confusions, we shall apprehend that the Alexandrians, nurtured in a more scientific school, had, in respect of the circulation, perceived certain most important truths afterwards obscured, and that to these forerunners Galen owed not a little, how much we cannot now tell. I may add further this notable instance, that in respect of plethora the difference was then discerned between a long (or sustained) and a short beat as definitely contrasted with degrees of frequency of beat; and again between the "broad" (πλατὺς) pulse—as of a relaxed artery with large output—and an ill-filled pulse. The high pulse (*celer*) of the former case was also described by them; so that they regarded the big pulse (μέγας) in three dimensions.

In systole the pneumatists considered that air (*pneuma*) was drawn in, and in diastole the fuliginous excrement expelled; thus they forwarded the scientific conception of diseases as perversions of the normal. It was especially true of Erasistratus that he fully grasped this idea, only too soon to be vitiated, that disease is a perversion of health, of the normal processes; not a condition contrary or foreign to biological nature. To take a very interesting example: to those of my readers who are conversant with music the name of Aristoxenus of Tarentum, a pupil of Aristotle, is not unfamiliar, as of one who conceived, or on behalf of his musical tutor recorded, a masterly contribution to the theory of music. Now, Aristoxenus flourished in the fourth century just before Herophilus; and it is interesting to find that in his description of the rhythm and arrhythms of the heart Herophilus used the terms of Aristoxenus. For example, in illustration of the idea of morbid as but deviations from normal processes, Herophilus distinguished certain cardiac rhythms as characteristic of periods of life. The rhythm of infancy, he said, was a pyrrhic (U U); of adolescence a trochee (- U); of middle life a spondee (- -); of age an iambus (U -). I am not now concerned to justify these descriptions precisely, but to present them as patterns of method, and of a sound kind of pathology. After him Archigenes likewise described and compared taxic and ataxic pulses—gallop rhythms, palpitations ("spasms") of the pulse and the like—as various degrees of deflexion from the normal into the abnormal. This fruitful conception of the nature of disease unfortunately became distorted by demonology with its magical cures; and also by the kindred if more spectral hunt of the metaphysicians after "morbid entities," a cry which finds an echo in the words of some eminent physicians even of to-day.

After the pulse lore of these schools, I would make some reference to their doctrines on *sexual generation*; for herein also we reverse the memory of our immortal Harvey. And when, in comparing his results in this field with those on the physiology of the circulation, we dare to reflect that, as in the times of which we are speaking, even supreme genius cannot penetrate far beyond the limits of contemporary knowledge and means of research, we cast no shadow on that great memory. The problem of generation, as it presented itself to the ancients, is too difficult to put succinctly without a renunciation of much of its detail and of the history of many tides of opinion. Moreover, to make the argument comprehensible, I cannot quite confine myself to the pneumatists; I must make some more general reflections upon its phases from Hippocrates through Aristotle to Galen, that I may indicate the stage where the pneumatists came in. Our sources in this respect are, however, very scanty, and turn chiefly upon what is recorded in Galen's *Περὶ σπέρματος* (IV, 593).

Concerning the respective virtues of male and female in the generation and development of the embryo, the opinion of Hippocrates is clear—that the ovaries corresponded to the testes, and that male and female both contributed seed. The superb anatomy of Vesalius left this physiological notion of the matter unaltered until the seventeenth century, when it was undermined by the labour of Highmore, Stenson, and de Graaf. After Hippocrates we come to the opinions of Aristotle, which are too well known to need a careful description here. Suffice it to say that this great sage firmly and consistently denied that the female contributed seed; the semen, the finest concoction of the male blood, as a dynamic element (τὸ ἄρρεν ποιητικόν) quickened the

* We know that Galen wrote an essay entitled *Εἰ κατὰ φύσιν ἐν ἀρτηρίαις αἷμα περιεχέται*.

passive but plastic female element (τὸ θῆλυ παθητικόν)*; enduing it with "form." He saw no difficulty in the resemblance to the mother; for did not plants vary with the soils in which they might be planted? He admitted that in the catamenia the female contributed some kind of generative substance (γόνυ), but contrasting it with σπέρμα, held that it was but of a rudimentary kind. His objection against the seminal contribution of the female—that she could be impregnated without orgasm, and even unconsciously—was less adequate; and how often are we tempted to think how happily we could have jogged the elbow of a great scientific father and supplied him with just the notion he needed. For Aristotle had a good knowledge of the egg, and how well the ovum would have fulfilled his argument,† as Fabricius and Harvey perceived and von Baer finally proved. Straton, so far as we can tell, seems not to have followed Aristotle's footsteps closely; he dwells more, as did some other authors, on prepotency, and assumes that in particular cases the prepotency might have lain with the male or the female. Next we come to Alexandria and to Herophilus, who described the ovaries (διδυμοί), and the tubes (σπερματοκὶ πόροι); but this more accurate anatomy did not reveal more physiology. So far as it went, indeed, it seemed in favour of seed in both sexes; but the Aristotelians, magnifying the content of the σπέρμα, fancied that these female parts were but a "structural harmony," after the kind of the male mamma. It is notable that Falloppius, himself a master in this field of anatomy, and pursuing the same positive methods as Herophilus, scrutinized the ovaries and vesicles minutely in search of a seminal element, and, finding none, also denied seed to the female. And we may suppose that Harvey, in holding the same opinion and denying that the ovaries, to which he attributed a rather fantastic function, were an equivalent of the testes, followed Falloppius. But to come to the pneumatists: Athenaeus, and Archigenes who followed him, seem to have been the last physicians of the period to rely upon Aristotle; they denied seed to the female, and Athenaeus seems to me to be even more dogmatic about it than Aristotle himself. Galen, however, definitely did attribute dynamic seed to both female and male. The old demur that the progeny were as prone to resemble the mother as the father, for Galen held no difficulty; he assumed that each sex afforded a seed endowed with both virtue and substance (δύναμις and ὕλη); and yet he betrays a curious uneasiness about it, for how is it, he candidly asks himself, that the female never conceives alone? As to the preparation of semen as a perfected product of the blood, in this respect Aristotle seems to have followed Democritus, Hippocrates, and Praxagoras in a speculation which reminds us of Darwin's idea of pangenesis; in the pneumatico-stoic opinion, however, the semen was sublimated from the hegemonic spirit in the heart.

INFLUENCE OF PNEUMATISM ON MEDICINE.

Of this kind, then, so far as these limits permit me to unfold it, was the doctrine of the pneuma, a metaphysical idea foreshadowing vital combustion. And pneuma, whether under this name or in refluxant waves of aboriginal ideas under such names as the vegetable and animal souls, of the Archæus, of van Helmont's vital principles of the animal spirits of Descartes, of the motor nervous fluid of Stensen, of the animism which in the early eighteenth century sprang from chemistry, of the vitalism again which

sprang from the doctrine of irritability, or of the transcendent vital quality beyond physico-chemical virtues entertained by some leading physiologists to-day—πολλῶν ὁνομάτων μὴ μία—must, in so far as it is an imported entity, make a free pathology and an inductive therapeutics almost impossible. And meanwhile the humoral pathology had to be counted with, even by the pneumatists. If the pneuma might become hot and dry as in fever, cold and moist as in dropsy, too dense or too light with many consequences; or again, too quick or too sluggish: if it might be pent up, as in epilepsy and constipation, or, as in hysteria, imprisoned in the womb, so again the humours also might be crossed, or crossing, in one or more of the many possible permutations of dyscrasia. The Hippocratean doctrine was that health and disease depended upon the crases of qualities. That health consisted in a eucrasia was, it is said, an axiom of that spectral sage Alcmaeon of Croton; and the conception of diseases as modes of the many possible dyscrasias survived down to Galen, and, by him regenerated, flourished as we know in a crude form through the Middle Ages; and in a sublimated form has yet a great part to play in pathology. These humoral doctrines the pneumatists did not abolish, but made their intricacies still more complicated, coiling them into a mesh which at present we have no leisure to unravel; curious as is the study of an intense mental hunger, with but a scanty harvest of knowledge, feeding upon itself. And not only in the first and second century A.D. in medicine, in Neoplatonism, and in the Christian Fathers, but again in the thirteenth century, and in the ingenious literature of the sixteenth and seventeenth century against which Sydenham led so masterly a revolt, we see history thus in principle repeating herself. It was well, therefore, that the empirical reaction initiated in the earlier Alexandria by Philinus the Coan and Serapion, narrow and ungenial as they seemed, and, more fruitfully and scientifically, the admirable surgery of the age curbed the extravagance of the pneumatic and other metaphysical opinions; and this protest it was which made the pneumatist sect strictly so-called, although backed by the Stoics, but a transient phase.‡ Indeed, its own greater men, almost from the first, had begun to hedge by a prudent eclecticism. And it is true that their central doctrine of the pneuma was less prejudicial to surgical progress, which they forwarded upon Alexandrian anatomy, than were their unbridled expatiations, a wasted or even a mischievous energy, in the field of inner medicine. That the pneumatist emphasized the dynamic side of physiology is true also; and that, like the methodist, he recalled attention to the solids of the body; yet, by personifying the pneuma as an indwelling and creative entity, he provoked a reduction of the functions of growth, work, and excretion to a passive machinery worked by a demiurgical finger: thus the whole framework of digestion, for example, became for him a mere gizzard, a mill for mechanical contrition of food; and therapeutics became a magical checkmate of the malignant. Now the methodist, or at any rate the Lucretian stomist, before the formalist Themison, while animated no less by the dynamic idea, had regarded energy more truly as one aspect of a quick matter than as the demonic master and manipulator of an engine. And the sceptics of the day, on narrower if surer ground, were teaching, almost with the decision of Locke, that thought can only be built upon the functions of the senses. Even for Diogenes of Apollonia§ phenomena, the pneuma having condensed into them, were but phenomena, not outside realities; and concepts therefore were fashioned wholly of the products of our senses. The defect of these critical schools, at any rate of the empirics who did not realize that we see what we are trained to see, was, as I have explained, an intolerance even of the chaster Hippocratean reasoning on causes, and a repudiation of anatomy which reminds us of Sydenham's aversion from pathology. Difficult as it is, then, to define our distinctions between the later Herophileans and Erasistrateans, or even to contrast the persons and doctrines of the two great leaders, yet it would seem from the course of events, and from Galen's testimony, that on the whole

* It is usually supposed that Aristotle took the σπέρμα to imply the body of the fetus; he seems to have given too much content to the σπέρμα, but "form" is far from signifying structure. As we gather from the Eumenides, concerning the appeal for the acquittal of Orestes, the idea of deposit of the embryo by the male to be nourished by the female, as in a nest, was far older than Aristotle, and contains far more than "form." But we must remember that in early times the differentiation of notions to which we are accustomed had not been accomplished.

† See the eighteenth chapter of the *De Generatione Animalium*; and also the *De Anima*. After these lines were written I read in the BRITISH MEDICAL JOURNAL (August 13th, 1910) a very able and interesting article, signed "J. W. B.," on Dante's knowledge of Aristotle's *De Generatione*, and noted that in Dante's words we might observe a strong infusion of the pneumatic doctrine. I venture, however, with great respect to question if Dante's account of the accretion or superposition of the animal upon the plant soul can be interpreted as a "flash of insight" into our modern idea of the embryo "climbing up its own genealogical tree." His phrases seem to me to contain no more than we meet with not infrequently in ancient and medieval speculation, and we must beware of importing into them concepts of our own.

‡ I venture to repeat that Gomperz has liberally insisted that, whatsoever the inconsistencies within the faculty itself, this service for a more positive method and influence was one for which ancient philosophers were indebted above all to Medicine.

§ Cf. Krause, loc. cit.

Herophilus had more of the utilitarian bent, while Erasistratus was of a more speculative temper; for Galen accuses him and his followers of scoffing at the clinical school of Hippocrates in a manner which Galen regarded as unmannerly and cavilling. But probably, as I remarked last year, Erasistratus also scoffed not so much at Moses as at the Mosaic dogmatics; while for Herophilus Haeser vindicates some balance of observation and reasoning, some use of theoretical explanations. Celsus, in his invaluable preface, while attributing to Erasistratus also some measure of the empirical temper, says again of this point of view that, although basing its practice upon the more manifest of them—upon the *causas evidentes*—it did not refuse to consider obscure and remote causes: *causis obscuris omnibus, non a cogitatione artificis, sed ab ipsa arte rejectis*. So Jack Wilkes "was never a Wilkite." It would appear notwithstanding that the concentration of Herophilus upon present symptoms—such as the pulse for instance, on immediate or a; any rate proximate causes, and, in common with his great contemporary, upon anatomy both normal and morbid, established a pragmatic bent which in the practice of his disciples, if not in his own, led to over-busy interference, to much drugging, and to excess of venesection; while the Erasistrateans, as reflected in their disciple Asclepiades, reasoning upon wider and remoter causes also, and becoming sceptical of therapeutical prowess, pursued a more expectant method. That accordingly Herophilus abode in the four humours, while Erasistratus discarded or neglected them, if in part it explains the antagonism of Galen to the Erasistrateans, still carries with it more history than this. For if the humoral doctrine involved its disciples in a mess of pharmacy from which the Erasistrateans won their freedom, yet on the other hand it would seem it was this inclination from the juices towards a dynamic or pneumatist conception which gave countenance to the opinion of Praxagoras, conveyed by Straton, that the arteries contained air rather than blood—an error of momentous consequence. What Galen did afterwards was to force both empirics and methodists back to study anatomy, to scrutinize causation only too meticulously, and to restore and develop the elemento-humoral tradition; while in his physiology, under the guises of the psychical soul and of a divine teleology, he perpetuated some pneumatism. Thus, while phlegm was interpreted as moist, yellow bile as hot, black bile as earthy, upon these were worked in the three entities of the soul, the animal soul having its primary reception in the pulmonary veins. A great part of our difficulty in distributing these sources and phases of opinions lies in what was Galen's own misfortune likewise—that, rich as by tradition may have been his physiological and clinical inheritance, he, like ourselves, was deprived of historical sources; for even in his day the destruction of manuscripts—as, for one instance, in the siege of Alexandria by Cæsar—had been already disastrous. We know that in the time of Galen, and probably of Celsus also, the works of Erasistratus had perished; and still more unhappily certain histories of medicine under the names of Hermippus of Smyrna (*Περὶ ἐνδόξων ἱατρῶν*), Andreas of Karystus, and of Histomachus were lost (Haeser). No insubstantial deliverance of medical tradition was notwithstanding handed down to the third century, if in a more impalpable form than of parchment, through Asclepiades, Themison, Archigenes, and many others over whom oblivion has cast her poppy;* and above all things the Hippocratic series of manuscripts had been preserved in other libraries.†

The brilliant progress of Alexandrian anatomy would in itself suggest that in morbid anatomy also advance was not wanting; although, in the early destruction of the records, and under the overgrowth of the later metaphysical cobwebs, much of it fell into oblivion. But that necropsies were then made for the investigation of disease

is well known. For instance, a statement of Erasistratus has survived that in some cases of dropsy the liver was condensed, and as hard as a stone. In Alexandria pathological dissections were probably obtained without difficulty; in Rome the current prejudice against them was prohibitive, and so persisted even into the fifteenth century, when the Florentine, Antony Benivieni—the friend of Ficino and Poliziano—made it yield to his ardent importunities.

HYGIENE.

The hygienic and therapeutical doctrines of the pneumatists, and of the eclectic or "episynthetic" physicians who assimilated the more effective results of methodist, empirical, and other schools of the period, were of considerable interest and importance. The surgery of the school especially was excellent, and it is a matter of grave regret that of its records but little is extant. If in the light of recent researches our standard histories of the surgery of this period need revision on some points, yet on the whole it has been set forth almost as fully as the materials permit, so that I will not now dwell upon it. I will turn rather to the hygiene of the period, as of peculiar interest to us who at this moment are occupied with the medical aspect of education, to note the close attention this branch of the public service had received from the Greek physicians in Rome. Celsus, from the point of view of a Roman gentleman, gave some excellent hints on this subject; and the following interesting fragment of Athenæus is preserved in Oribasius (III, 164): "*χρήσιμον δὲ ἢ μᾶλλον ἀναγκαῖον πᾶσιν ἀνθρώποις ἀπὸ ταύτης τῆς ἡλικίας ἅμα τοῖς ἄλλοις μαθήμασι συμπαραλαμβάνειν καὶ τὴν ἱατρικὴν, καὶ κατακοῦναι τὸν ταύτης λόγον, ἵνα καλοὶ καὶ ἀγαθοὶ σύμβουλοι γενῶνται πολλὰκις ἑαυτοῖς τῶν εἰς σωτηρίαν χρησιμῶν.*" For Athenæus indeed medicine was even more than this, it was an integral part of a liberal education.

On airs—as of day and night, of hills and valleys, lunar and solar seasons, and of various climates—the pneumatists, as we should anticipate, laid great stress. Accordingly we find such airs described as moist or dry, hot or cold, dense or thin. Night air was cold and thick, and consequently apt to cause rheumatism, fever, and inflammation. I need not stay to interpret the warning that, of seasons, the air of autumn was the most dangerous; and that during these months one should never sleep out of doors. The air of towns was warm and thick, so that natives of towns were fat, and were sluggish in their secretions. The air of enclosed valleys was bad; and likewise the air of river flats and of marshy places. Inland air was said to be more wholesome than that of the seaside, an opinion derived perhaps from the malarious infection of estuaries, and of harbours, such as Ostia. Drinking water was to be filtered through porous stone or earth, but particularly to remove dirt and leeches.

Diels draws attention also to their careful adaptation of hygienic rules to the periods of the individual life. Still depending chiefly upon the reports of Oribasius and Aetius, which as regards Athenæus, Agathinus, and Herodotus,‡ are fortunately copious, we find that the pneumatists regarded its course as of four stages—of infancy, of adolescence, of middle age, and of old age. We shall note with particular interest that they discouraged all serious school work before the age of 6 or 7; then the child was to be taken in hand by a mild and kindly master, who would discipline the child by changes of work and play, carefully avoiding prolonged stress of either but encouraging him by emulation, finding for him a delight in learning, and remembering that severity or satiety engenders an aversion which in after-life may never be overcome. From the age of 12, however, the work was made tougher, and the pupil led to feel his powers, and to put them forth in such studies as grammar. The master was to be well versed not only in intellectual matters but also in dietetics, in the wide range of exercises known as gymnastic, in the use of the bath, and particularly in the apportionment of the hours of sleep. Thus, as the boy grew up, bodily and mental development went hand in hand; and in adolescence, in order that every man should understand the conditions and promotions of a normal life, medicine and philosophy were introduced into the

* The reader will remember that the treatise of Celsus was either little known to the physicians of Rome in later generations, or was disregarded by them as the compilation of a Roman layman.

† As on Aristotle and Plato in philosophy, so in medicine transcripts and commentaries on "Hippocrates" formed the backbone of the tradition. Cicero refers to the writings of Hippocrates as well known. Galen, besides his other reverential services to the father of medicine, wrote, or proposed to write, a critical essay on the genuine and false treatises of the collection. If it was ever completed it is lost; but Mewaldt in an essay in *Hermes* (1909) studies some relics of it. The greater empirics, such as Xeuxis and Heracleides of Tarentum, were loyally devoted to the great master.

‡ As, for instance, Orih, III, 107, "*ἐκ τοῦ ἀθηναίου.*" For the ready reference to these passages and comments upon them I am indebted again to Wellmann (loc. cit.).

curriculum. Concupiscence was subdued in youth by gymnastics, and by the general discipline of mind and body. In maturity the generative function was to be approached with due sense of responsibility, and directions were given for the *παρασκευὴ πρὸς τὸ παιδοποιεῖν*. The sage counsel was given not to forget even in youth the prospect of old age, and, as years wore on, to economize the efforts of body and mind, and to cut down the quantities of food; indeed, at all ages the food was to be reduced in warm weather. And with the exquisite Greek sense of balance, even in physiology, and of the unity of bodily and spiritual function, they reminded us—for are not these lessons for all time?—that in a healthy old age we should seek to be wholesome not in body only, but gentle of soul also, high-minded, never tiresome, in sympathy and fellowship lifting up the young with the fullness of sweet lessons from the past. In the education of women, while a wholesome interest in political affairs was not denied to them, they were advised to concentrate themselves upon the arts of the home and family. Such, when divested of their necessarily crude biological hypotheses, was the ripe wisdom and sagacity of these great physicians, so near us and yet so far away.

THERAPEUTICS.

The remedial therapeutics of the Roman physicians between Celsus and Galen have not, in their fuller details, at any rate, the same practical interest for us as their hygienic teaching. We may glance somewhat cursorily at a few of the means. In their eclectic and expectant methods, in the development of physical means of cure, and in some use of wine, we note that influence of Erasistratus and Asclepiades upon the pneumatico-eclectic schools to which I have repeatedly invited your attention; but it is with less satisfaction that we turn to note the influence of the Herophileans in that increasing use of drugs, and of violent means such as emetics, clysters, purgatives, and venesection, which gave a certain grossness to the therapeutics even of Galen himself, and under his influence degraded medicine more and more till the days of Molière. Herophilus and his fellows revered Hippocrates in lip-service, and, indeed, did much to preserve and elucidate his writings; but they never obeyed the spirit of his therapeutics, which were founded upon prognosis and upon respect for the functions of Nature.

Asclepiades had, as we remember, carried physical therapeutics to lengths almost, or quite, absurd; as in his swings, successions, and jolts. Therapeutical gymnastics had been admirably developed from the Hippocratic schools through Diocles and Praxagoras of Cos; but it is to be observed that not only by Asclepiades and Celsus but also before them, indeed from Hippocratic times, and more especially in the Coan than in the Cnidean School, the intemperate pursuit or profession of gymnastics was deprecated, not only as injurious to the health, but also as illiberal (*κακοτεχνία*, Galen). Thus by the more sagacious physicians there was a continual mistrust of the gymnastic schools.*

At present, however, I will speak only of the passive movements, of the massage of the period which seems to have been elaborate and refined. By four or six performers the entire body seems, often at any rate, to have been massaged at once—two performers manipulating the arms, hands, and fingers, two the trunk, two the legs and feet. The first stages were slow and gentle, the later became gradually quicker and severer. We may note with interest that gentle massage was practised in fevers, so long as there was no acute focal lesion; the tolerance of the patient of its degrees and durations being carefully watched. The amelioration which by this means they professed to obtain was attributed in part to refrigeration by the induction of sweat. It seems to me, Sir, that in some measure this practice is not unworthy of the consideration of this College. The fever lore of these ancients was, as we all know, enormous; as Wellmann says, and as W. S. H. Jones has exhaustively proved, it was a literature in itself.

And we are all well aware also that the cult of water springs and the bath literature of early times, before as

well as after Epidaurus, was no less prodigious.† The ancient magic of wells, which developed into the Epidaurian combination of theurgic and therapeutic ritual, had in the times of which we are speaking become a separate resource. The Roman physicians seem to have ignored the Tiber Island. But we read of pure water baths, of saline baths ("which warmed the body"), of oil baths for cramps, pains, and retention of urine, of sand baths, and of sun baths.‡ Asclepiades, and after him the pneumatists, argued against the abuse of warm baths, which, however appropriate in their degrees for debilitated persons, were not bracing enough in fevers, or even for use in health. Here we call to mind Musa's reputed cold-water cure of his august patient. Nurses were lectured for "boiling their children"; and bathers were warned against letting water into the ears, "which damages them." Mineral waters, of course, had their many natural virtues. Archigenes gives us the first rational classification of mineral waters which is extant; he divided them into the alkaline (soda), saline, aluminous, sulphurous, ferrous, cuprous, and bituminous; and elaborately explains their effects on the humoral hypothesis.

Wine.—The place of wine as a remedy is a curious story; in my Harveian Oration (1900) I touched upon it, but there especially as regards its outward application, even from the days of the Good Samaritan. Asclepiades wrote an essay *Περὶ οἴνου δόσεως*, an epoch-making work in its way, the contents of which may be gathered from Pliny§ and Dioscorides,|| amid paragraphs deriving from such recipe compilations as that of Sextius Niger. As I stated in my lectures of last year, Asclepiades, who was nicknamed "*οἰνοδόρῃς*," taught the therapeutical value of wine, and discussed the virtues of its various kinds—the Greek, the Roman, and so on; but the advocacy of Athenaeus seems, from negative evidence, as from the lack of certain details in Pliny and Dioscorides, to have been inspired not directly by or from Asclepiades but to have been influenced by the tradition of Diocles, Praxagoras, and Mnesitheos; authors to whom those compilers do not allude. Athenaeus says that wine when carefully used—used with attention to proper rules of symptoms, of doses, of dilutions, of hours—arouses the pneuma from its torpor, and, as Archigenes repeated afterwards, is especially useful in syncope. Now syncope was then said to consist in a loss of tone (*τόνος*), a vital quality to which the pneumatists attached much importance, and the state of which for the whole body they were wont to infer from the tone of the pulse. From a persistent acceleration of the pulse in fever, for instance, they inferred correctly that the remedy should be withdrawn.

Venesection.—But I need not say that of all the therapeutical means practised and discussed in those days the most ascendant was venesection; and concerning it the controversies of the schools were the most stubborn and acrimonious. In my lectures last year I noted the reserve of Asclepiades in respect of venesection; a means which, for good reasons, he did not withhold, but kept in hand for critical moments. Now the close attention of Athenaeus and the pneumatist school to the pulse gave no little importance to their teaching concerning this remedy. But the protest against the practice of venesection as a potent and a vulgar ally against disease in general carries us back into a much dimmer past. Not to detain you by a long retrospect on the sacredness of the blood—no unfamiliar subject in the Old Testament for instance—I may curtly remind you of this superstition in the semi-Oriental mysticism of Pythagoras; and so onward in medicine it influenced Empedocles and the Sicilian School, Philistion of Locroi, the Cnidians, and Chrysippus. If we may rely upon certain passages in the eleventh book of Galen (150, 197, and 252), Chrysippus stood prominently forth as an

* On this subject the reader is referred to the admirable study by Juthner of Philostratus *Ueber Gymnastik*, Leipzig, 1903. (Philostratus lived soon after Galen.)

† The Alexandrian Greeks owed but little to the Pharaonic Egyptians, who were, however, as we gather from Herodotus (I, 193, 198, and II, 35-37), at least hygienists. They had a State health service, and practised many ablutions of person and clothing, as did the Babylonians also. The honour of filth in person and clothing was left for medieval times. The Egyptians also vigilantly and ceremoniously protected their water courses.

‡ The reader who desires to know more of this history may be referred to the Second Book of Oribasius, chiefly compiled from the works of the distinguished pneumatist physician Herodotus, pupil of Agathinus.

§ N. H., xxiii, 31.

|| V., 7.

opponent of bleeding, and his deprecation was heeded more especially, so it was said, by one Medius, an uncle of Erasistratus, and by Erasistratus himself and his disciples. This forbearance was a little more remarkable in that the Erasistrateans, and indeed Chrysippus himself, clearly perceived the perils of plethora, but these they combated by diet. The objection to bleeding was formulated as an opening for the escape of the animal spirit (*πνεῦμα ζωτικόν*). Apollonius, a pneumatist of whom we know little, although indisposed to bleeding as a routine, contributed the interesting demur, that in plethora the permeation of the periphery by the *πνεῦμα φυσικόν* was retarded. As reasonable persons, therefore, they accepted no formula, but, before using the remedy, estimated the general conditions of the malady, the state of the patient as to strength and nutrition and so forth, and especially as to age and sex. Archigenes, however, advised that bleeding in some form was not inappropriate in plethora; and many of the school believed at least that by this means foul humours could be evacuated.* In fevers, however, they had no doubt that to reduce diet, and at the same time to draw blood, was to exhaust the patient; † therefore, to prevent the inflammatory indraught of blood into the arteries in fever the master, after the Alexandrian tradition, bandaged the patient's limbs so as to keep the synastomoses closed, and thus to prevent the conflagration of blood and *pneuma* in the thorax. For we have seen that Erasistratus, to account for blood in the arteries, assumed certain more or less distal communications between the veins and the arteries, gates normally guarded or closed. On account of this meticulous shunning of venesection, though they limited rather than repudiated it, Galen waxed almost as hot against the pneumatists as against the methodists; but Celsus (52, 3), in his cool and shrewd way, had said long before, in reference to Asclepiades—*"Sanguinem incisa vena mitti novum non est, sed nullum paene morbum esse in quo non mittatur, novum est."* The pneumatists, or Erasistrateans, reasonably argued that in many cases local ought to be preferred to general bleeding, as by cupping, scarification, or leeches; and that in many cases even dry cupping or a cataplasm would suffice to draw off a congestion.‡

EMINENT PNEUMATIST PHYSICIANS.

After this discussion of pneumatic doctrines, modified or masked, generation after generation from Alexandrian times onwards, by empirical, sceptical, stoical, and eclectic tendencies, and even by changes of name, and at length formulated for Medicine by Athenaeus in Rome, I propose to return, so far as the fragments will permit me, to the personal story. Of Agathus, and after him of Agathinus the Spartan, who lived in Rome under the Flavian Caesars, and were important links in the chain between Athenaeus and Archigenes, we know little; but it would appear that both of these physicians played a considerable part in the fusion of doctrines to which I have often referred, a fusion which made the name rather than the essential doctrine of the pneumatist short-lived. Greenhill regarded Agathinus as taking the lead in these eclectic or "episynthetic" § modifications: *"Εκλεξάμενος τὰ ἀρέσπαντα ἐξ ἑκάστης τῶν ἀρέσεων."* Archigenes, who was a pupil of Agathinus, said of his master that he was accurate in all things, and ripe in experience. Still guided by three main clews of pneumatist doctrine—namely, the pulse lore, the fever lore, and the hygienic, paedagogic, and dietetic forms of therapeutics—we perceive at this period more explicitly the fusion of Pneumatism, Methodism, and Empiricism, with a younger and more liberal Hippocratic, or clinical, medicine.|| This blend of old and new suggests to us progress, an orderly development of medicine; and we shall see presently that a solid, sagacious, clinical school—variegated, indeed, by some sectional

dissent—survived, and superseded the arrogant domination and the sterile maxims of the later methodists, such as Thessalus. And yet we must admit that on the dogmatic or clinical side this evidence of sound development was accompanied not merely with a respectful appreciation of older doctrine but with a mechanical tradition of form and letter such as seems to us to be contrary to the spontaneity of life. For although we are wont to suppose that the medicine of summists, of copyists, of large and literal transcripts, belonged to Byzantinism, and signified then the routine, if not of decrepitude at least of an unintelligent conservatism, yet we have seen that the era of scribes and summists must be carried back much farther than we had supposed to a period not only far before Oribasius and Aetius, but before Varro. And plagiarism was not confined to the scribes; even men of natural genius, such as Soranus and Galen, excerpted largely, literally, and anonymously; so did that imposing surgical phantom, Antyllus; and so, says Wellmann, did that no less considerable surgeon, Heliodorus, whom, on the slender relics that remain, I am disposed to regard as of still richer genius. In discussing, then, all these Romano-Hellenist medical writings, we must bear in mind the custom among them of lifting both terms and volumes of the literature one from another, and this without acknowledgement, unless when, happily for us—as often in Galen—controversial animosity goaded to personal attacks. That Celsus named his sources so generously may in the enemy's mouth be one more point of evidence that he was a layman! In the fragmentary and disconnected state of the records of the period, then, we cannot be sure whither and how many of these embedded remains are in their origin and order to be distributed. Any such distribution which, with the aid of far greater scholars than myself, I may now attempt, in order to distinguish individual authors, must therefore partake of much uncertainty, and be in its nature provisional; but in justice to the memory of Archigenes it must be attempted.

Archigenes and Aretaeus.—To appreciate Archigenes, one of the greatest of the physicians of this period, we must first discuss the place of Aretaeus, who, by name at least, is familiar to us all. And probably not a few of us, attracted by the story of the past, have perused, or at any rate dipped into, his treatise, so admirably rendered for English readers by Adams, and have been deeply impressed by his gallery of diseases—portraits select, succinct, deft in their handling, and speaking of character and experience. Galen, more diffused in generalities, never painted such telling pictures of morbid species. From it we have formed, and justly formed, a high opinion of the medicine of the age. This impression I say was just; but that Aretaeus in person justly deserved the honour is another matter. The ancients gave him no such meed. The author, who drops systematic pneumatism in his practice, which is on sound Hippocratic lines and probably moulded in some part upon Asclepiades, and interprets *pneuma* merely as *φύσις* in the Hippocratean sense of *δύναμις ζωτική*, or generative energy, yet by phrases here and there, such as his emphasis on *τόνος*, betrays his school. He seems to have lived under Domitian or Hadrian, but to have fallen into a long neglect. The first mention we have of him is in the sixth century by Aetius; then by Paul in the seventh; after then he sank once more into oblivion till the middle of the sixteenth, when the Greek MS. of a large part of his work was discovered, and was printed in Paris in 1554. It was now observed that the treatise was written in Ionic Greek; now the Ionic singsong in his day had become a literary fancy, and to use it in medicine was an affectation, even—so competent scholars assure us—an affectation so "grotesque" as to strengthen some suspicions of the writer's originality in other respects. Was the neglect of Aretaeus by the ancients because they knew him to be but a secondhand and archaistic scribe? It does seem probable that in Aretaeus the Cappadocian, who so far as we know never visited Rome, we find a conspicuous example of that prevalence of copying and recopying without acknowledgement which, not unknown among ourselves, then prevailed in the large measures I have indicated.¶ Delicate and complicated as is the task of

* It is interesting to note that in almost all schools of ancient medicine melancholia was attributed to toxic causes.

† In more than one passage of Galen's XIth Book. See also Book X, 376.

‡ Which vein to open in a particular case or malady, in the elbow, in the ankle, in the temple, at the nasal angle, in the tongue, in the little or ring finger, and, not least, on which side of the body, was in the times of which we are speaking, and still more in the Middle Ages, often decided on fantastic reasons. Arteriotomy was practised occasionally by the ancients, but under what conditions is not precisely known.

§ Not, of course, the philosophical school so-called.

|| We may observe in the pneumatist succession the continuous use of methodist technical words—such, for example, as *ἐνστάσις*, a stoppage of the pores.

¶ We do not, of course, estimate these annexations by modern ethical standards. In ancient times written matter when published became the common property of the reading public, "*δεδομοστώμενα τοῦ κατὰ βέλγηται.*"

tracing such stolen property from one obscure author to another, yet as out of it comes to light the figure of Archigenes of Apamea, of the time of Trajan, who, like Asclepiades, seems to have suffered unmerited eclipse, we must try, if on main lines only and by renouncing some of those impressions of form which we call the higher criticism, to make clear in summary* certain restorations and redistributions suggested by modern students concerning these records.

Of the confessed compilers Oribasius, who lived during the last three-quarters of the fourth century, was the chief; and of his collection about one-third is extant. The chapters on the poison literature are lost. We know, honest man, from his own references, that he swept into his net Dioscorides, Archigenes, Antyllus, Philumenus, Philagrius, Poseidonius, and Galen. About a hundred years later flourished another such scribe, namely Aetius, and in his collection lies our main source of the poison literature, after Pliny. But Aetius, luckily, did not copy from quite the same sources, nor quite the same things, as Oribasius; he borrowed from Asclepiades, and, so far as extant MSS. inform us, he made a larger use than did Oribasius of Philumenus. Now, who was *Philumenus*? Well, he too was an eclectic methodist and pneumatist of the generation of Galen (about 180 A.D.), and likewise a compiler after the spacious manner of Oribasius; but only some portions of his work, those contained in Aetius and Paul of Aegina, were known until Wellmann's discovery, in the Vatican, of 37 short chapters of his work, most fortunately with the names of the authors submitted to his scissors.† Philumenus again gathered his materials from somewhat different sources; so that these three compilers throw cross lights upon each other and upon their various sources, so that by comparing them certain identifications begin to appear. Philumenus has this particular value for us, that Archigenes seems to have been one of his principal sources. This inference first suggested itself to Wellmann while reading a certain chapter containing an antidote to viper venom which he recognized as the antidote of Archigenes. Now Aetius, in all the diseases concerned, while similar to Aretaeus, is fuller, and presents also some peculiar differences; for instance, in respect of pleuropneumonia and empyema Aretaeus does not extend beyond Soranus. And in respect of headaches and of epilepsy the identification can be carried farther; for herein Soranus, and even Galen, and much later Alexander of Tralles, as well as Aretaeus, followed Archigenes. Not to detain you on points of cumulative evidence, I may say that in the divisions of matter, in the way in which certain drugs are selected and used, and so on, there are further coincidences which are very significant. The conclusion seems to be, then, that Aretaeus was a copyist, as was Aetius; that they copied from some source common to both, and that this source was Archigenes, whom indeed Aetius happens to name. Wellmann, comparing them in parallel passages, declares that Aretaeus is just a servile copy of Archigenes, if not directly, then by the intermediacy of Philumenus; and this may be. But I would remind you that there is much verbal identity with other authors in Galen also; and if I may venture to demur to a judgement of this distinguished scholar, it would be that the agreement in many such passages is substantial rather than literal; and in a broader sense I would urge that similarity of terms, and even of phrases—"literary universalities"—does not necessarily convict an author of plagiarism. Phrases which become current in one period fall out of another. In the medical journals of to-day we may readily note the professional dialect and shibboleths of our own time, especially in the writings of the less literary of our brethren. And thus, under the Roman Empire, although, for instance, Aetius did not copy Oribasius, yet in many places there is much similarity

between them and no little verbal identity. Nevertheless it seems more than probable that, whether through Philumenus or not, Archigenes was the main source of Aretaeus; and that Philumenus, who reproduced Archigenes, was in his turn the main source of Aetius and no inconsiderable source of Oribasius.

However, there is yet one more of these compilers to whom, if you will forgive me, I must refer—namely, one *Alexander*, of whom I, at any rate, know nothing except the remarkable treatise, easy to lay hands upon, which stands first in Ideler's collection. It consists of two sections, one on problems and one on fevers; and with this it is that we are now more particularly concerned. For this fever chapter is in close conformity, often in verbal identity, with Galen's writings on fever, the pathology of which, with some qualifications of his own, he drew from pneumatist sources. Now in both Galen and in Alexander we find fever divided into two categories, thus: (1) as to severity, *πυρετοὶ μέγαλοι καὶ μικροί*; (2) as related to the three kinds of bodily substance respectively—the dense, the moist, and the vaporous;—that is to say, quotidian, septic, and hectic. But on turning to the same passages in Alexander we find a third category—as to "rhythm"; namely, slow, quick, intermittent, and continuous; though it is added that as the motions of heat are infinite so these rhythms glide the one into the other. And, in respect to those kinds of bodily substance, he goes on to say that the harder its constitutional substance the less is the body swayed by the fever, and the less the sympathetic propagation of its motions through the system: thus a quotidian is brief because it vibrates only in the rarest substance of the body. Now this additional matter Alexander must have got from the large work of Archigenes, mentioned by Galen, *Περὶ τῆς τῶν πυρετῶν σημειώσεως*, from which he had made a somewhat larger excerpt than had the others from the common source to which they all betook themselves. Now fortunately, Galen (VIII, 203) gives the title of an important pathological work of Archigenes; and Oribasius (II, 146) that of his work on therapeutics—namely, *Τῶν ὁξέων καὶ χρονίων παθῶν ὁρισμὸς*; and *Θεραπεία τῶν ὁξέων καὶ χρονίων παθῶν*, respectively; both apparently in four books; and these titles, as we shall remember, correspond to the four books of Aretaeus, On the Symptoms and On Treatment of Acute Diseases, and On the Symptoms and On the Treatment of Chronic Diseases.

Now we have the titles of two others of the more celebrated treatises by Archigenes—namely, the *Περὶ τῶν κατὰ γένος φαρμάκων* and the *Περὶ τῶν πνευματικῶν* (in three books), to which Galen gives high praise. The work on the seats of disease would have been an invaluable document for the historian. We are told that in it Archigenes, with a genuine clinical instinct, inquires if from a comparison of the varieties of functional perturbation, or symptom groups, seats of disease could be inferred; if there be, that is, a signal group for each seat? For example, if we observe this series—orthopnoea, rusty or dark and livid or frothy sputum, fever, pain in the side, and a rapid pulse—we infer a peripneumony. Dyspnoea is common to many maladies, it is true, but we interpret it by its associates; as in this case by fever, the kind of sputum, and so on. Galen (*De locis affectis*) scoffs at a narrower argument of his, that the seats of disease might be discerned even by several kinds of pain; apparently it did partake too much of the nature of a logical exercise, for Galen complains of its new-fangled notions and terms; but nevertheless the method was a sound one. Moreover, upon it Archigenes seems to have built another fruitful clinical idea, that of sympathetic parts, and primary and secondary symptoms. Thus he pointed out how disease in a certain part might betray itself by pain or disorder in a distant part, not itself diseased. He instances, and very appropriately, confusion of vision caused by a disorder seated in the stomach. These views, and the seat or the hegemonic pneuma in the heart, Galen contested; though on the whole treating his great predecessor with respect, and paying him the dubious compliment of copying from him extensively, often without acknowledgement. For example, Galen's description of that notorious disorder the *πνιξ ὑστερική*—the hysterical suffocation—is identical with that of Aetius, as are both with that of Philumenus, the plagiarist or

* In this summary I rely on Wellmann's *Pneumatists*, and on his article in *Hermes*, 1908; also on Daremberg's edition of Oribasius, and of Rufus.

† This discovery was one of the many fruits of the formation of the preliminary catalogue for the Corpus by the associated academies. Unfortunately, a vast pile of MSS. thus revised and catalogued has brought in little so far; such matter as 150 indifferent MSS. of the Aphorisms; 100 of the Prognostics, and so on, with quantities of Arabian, Syrian, and Hebrew translations. So it may prove that for Galen we shall have little better than the Ed. Pr., or for Paul than the Aldine. And Aetius is complete only in the Latin version of Cornarius. There was a sad loss of MSS. in the fury of early printing. (See Vith vol. of Pauly-Wissowa; art. on Dioscorides.)

‡ στερεά, ὑγρά, and ἀερῶδες οὐσία.

copyist of Archigenes.* This description was that the restless uterus attacked the heart through the arteries; the liver through the veins, and the brain through the nerves; the simulation of death was described; and the cause was attributed to a chill to the *pneuma*, a pathology opposed to the more rational notion, of Soranus, of an inflammation of the womb, which engendered in the cavity a cold and moist phlegm; in quantity no doubt small, but, as he urges, how minute may be the venom of a snake or of a mad dog. Now, in commenting upon this account in Aetius, Valentine Rose proved, by facts with which I will not trouble you, that Aetius did not copy from Galen, but, as we have seen already, from Archigenes, the common source of both writers.

On other subjects, as concerning the cynanches, for instance,† and certain drugs and their uses, a like correspondence is notable, but I will touch on two more coincidences only—namely, concerning elephantiasis and concerning the hellebores used in the treatment of it.

Elephantiasis was so hideous, so alarming, and so conspicuous a disease that, if prevalent, it could not escape observation. We may recognize this horror in its various names, such as leontiasis and satyriasis. On the evidence of silence, then, we may assume that elephantiasis did not appear in Italy until about the time of Themison and Celsus. The first description of the disease, so far as we know, was written in the third century B.C. by Straton, a description handed down to Themison through his master Asclepiades. Of this disease and of its treatment Aretaeus gives a full report;‡ and Wellmann, comparing its passage by passage with that of Archigenes as preserved in Aetius, points out that in this chapter again Aretaeus was a plagiarist of Archigenes. The treatment of the disease was also identical in both—namely, venesection at the elbow, hiera, hellebore, whey, viper preparations; and—externally for the tubercles, the unguent was similar.

The hellebores were in occasional use by physicians in more ancient times. Herophilus, on whose bent for pharmacy I have already insisted, seems to have pushed this use of the drugs in some opposition to Erasistratus; and under Themison, Archigenes, Rufus, and others they came into the common use which is familiar to all classical scholars. Anticyra, Sicily, and Galatia produced the best kinds. Hellebore was used chiefly perhaps for melancholia (which, as I have said, was generally, or always, regarded by the ancients as a toxic disorder), for other insanities, and for pains in the head. Now Aretaeus further appropriates from Archigenes full directions for the use of the herbs: the white hellebore to act especially upon the upper bowel, the black on the lower; and if a prompter action were required the herbs were to be cut very fine. They were used also as urgent emetics. In spite of the prudence of Asclepiades in therapeutics—a prudence and reserve I dwelt upon last year—and the large development of the physical methods of treatment, yet under methodists and pneumatists alike reckless attacks upon disease by powerful drugs prevailed more and more; and unhappily the influence of Galen did little to discountenance them. Emetics were used by the Hippocrateans more rationally, and in moderation by Asclepiades and Celsus also, who advised them in bilious constitutions, and for certain chronic diseases. Asclepiades indeed gave warning that abuse of emetics led to loss of appetite, atony of the stomach, indigestion, and emaciation. Nevertheless, vomitives obtained their vogue under the Empire, and as an instrument of gluttony, became almost habitual. These agents were many in number, ranging from a feather in the pharynx to a pound or a pound and a half of radishes in a horrible mixture with honey, salt, and vinegar; the oxymel of squills being another mawkish alternative.

While referring to the use of hellebore in insanity I may mention not inappropriately that on the treatment of this class of disorders Archigenes seems to have held opinions of remarkable enlightenment. Seeing the priests of Cybele

scampering, and flagellating, and cutting themselves after their manner, he said "they are insane, do not leave them to these bloody gods of the East, send them to me." And his therapeutics was no less enlightened, for he fed up the maniac and soothed him with music. What would Bedlam have thought of this eccentricity!

Archigenes, as reproduced by Aretaeus, had a considerable knowledge of the veins and ducts of the liver, and wrote well on phthisis, and on diabetes which was regarded as a melting down of the flesh into urine—a sort of runaway dropsy. And of the anatomy and diseases of the nervous system his knowledge was considerable; for instance, he seems to have been the first to show that hemiplegia falls upon the side opposite to that of the cerebral lesion; and moreover to attach the aura to epilepsy. In his description of tetanus Haeser thinks a note of cerebro-spinal meningitis is to be detected. He recognized also the glandular nature of the kidneys, of the testicles, and of the mammae. One remark of Archigenes might, after the lapse of all the centuries, come as a fresh light to the modern examiner. "What we need is to be fertile in expedients, not to be always paying attention to the writings of other people."§

The surgery of Archigenes, whose fame, says Dr. Withington, was no less honourable as a surgeon than as a physician, and that of other eclectic physicians of this period, presents a very fair story. The ancient Greeks shrank from mutilation; and amputation, mentioned by the Hippocratean physicians only in gangrene as a subsidiary aid, seems, even in Alexandria, to have made no great progress; for Celsus also regarded it as a last sad resource in gangrene; yet by the time of Trajan, under Archigenes, amputation had become a recognized procedure for ulcers, growths, injuries, and even for deformities. The limb to be removed was bandaged, and a tourniquet was placed above the line of severance; or sometimes the chief blood vessels were first cut down upon and tied, and the smaller tied, or twisted, during the operation||—"transfixing them with a sharp hook and twisting them round and round and closing them by this twisting"—a proceeding of which there is no trace in Hippocrates, nor apparently in the earlier Alexandria. These good methods were afterwards obliterated by the bad fashion of the searing iron. But we know that Galen used the ligatures, and where the shop was at which he bought them. Moreover, as we noted under Soranus, the whole field of surgery had come under a more intensive cultivation. Still, if it be true that in Alexandria capital operations had not made much way, yet by the traditions of Apollonius of Kition, of Lysimachus of Cos and other Hippocratean commentators, of Apollonius Mys (a Herophilist from Alexandria), of Dioscorides, and especially of Philoxenus, we learn that nevertheless in that anatomical school surgery was carried actively forward; for instance, in cutting for stone and operating for hernia, operations which, before and after the prey of specialists and adventurers, seem then for a while to have been undertaken by the general surgeon; and by Heliodorus resection of the long bones was performed. How much of the more advanced surgery under the Empire was due to Romano-Greek physicians, as, for example, to Heliodorus and to that tantalizing shade, without local habitation, Antyllus—a personage who probably owed much to Heliodorus but of whom we have little more than a glimpse in Oribasius—and how much of it flowed derivatively from earlier sources we cannot definitely say; but the progress seems to have been substantial and largely original.

Out of such fragmentary and allusive records as I have tried to stitch together recent historians of medicine, and Wellmann especially, have endeavoured to reconstruct the figure of the great eclectic pneumatist, of methodist origin, Archigenes of Apamea; a figure not wholly eclipsed in the transit of Galen, for in the sixth century his memory is still revered by Alexander of Tralles as *θειότατος ἐπερ ἄλλος*. That Juvenal speaks of him as a fashionable practitioner need not derogate from his merits, as we pleaded in the life of his greater predecessor Asclepiades, and as we might have to plead for fashionable physicians of our

* We may conveniently regard Galen's works as consisting in part of his own original observations and thought; in part of fugitive pieces concerned with questions of the day; in part of compilations.

† Vide, e.g., *Die Halskrankheiten bei d. allgerichtschen u. römischen Aerzten*, von J. Weigel, Leipzig, 1907.

‡ It is a curious feature in Aretaeus (Ed. Adams, p. 123) that he describes at length the elephant from which the disease took its name. Why? As a transcriber? Oppian gives this same description, one copied, it is said, by both writers from Amyntianus' *Περὶ ἐλεφάντων*; a book I find (in *Smith's Dict.*) is referred to by a scholiast on Pindar.

§ *ἥ ὅρη δὲ καὶ αὐτὸν τινα συνευπορέειν, μὴ πάντα ἀλλοτρίῃ ἐνυγραφήῃ προσέχοντα τὸν νόον.*

|| Vide Daremberg and Bussemaker's edition of Oribasius, excerpts from Heliodorus's great *Χειρουργούμενα* in five books; and notably the passage *περί στρέψαντες πολλάκις καὶ ἀποτυφλώσαντες αὐτὰ διὰ τῆς περιστροφῆς*.—Lib. I., c. 4.

own day, who, wise men as they are, do not disdain empirical and persuasive remedies when no arm of precision is at hand. Archigenes seems in character to have been a blend not only of several schools of doctrine, but also of several complementary qualities: of theorizing proclivity, yet rational in methods and technically sound in practice. To his clinical insight the fruitful distinction between primary and secondary disorders, and the indication of localizing symptoms, which I have quoted from Aetius, is strong testimony. If, on the one hand, it appears from Galen's respectful criticism, and from other witness, that, after the fashion of the pneumatists, he was in preciosity of language and in sophistical dialectic something of a pedant, yet, on the other hand, he did much to deliver medicine from the cramping influence of the methodist common forms based upon an abstract principle, like the "homoeopathic" formula which in our own day became for a while so dear to that most theoretical of creatures the "practical" man. Nay, if besides he seems to have fallen in with the use of amulets and such like, probably it was a tolerant and humorous observer of the foibles of mankind, and of the magical influences of faith, rather than as a charlatan or a sorcerer.

I have said that to enter upon the poison literature would in this course be impossible, for in its biological and pharmaceutical aspects it would require a lecture for itself alone. Such a chapter may be added to these lectures hereafter; but in conclusion I would indicate the place of Archigenes in this current of medical history. We have seen that Philumenus, in his *Περὶ τῶν ἰσθμίων ὥων καὶ τῶν ἐν αὐτοῖς βοηθημάτων*, drew largely upon him, as he did upon less eminent men of the school of Athenaeus and Soranus; and this not least in respect of poisons and their antidotes. Our tradition of the poison literature, more or less mingled in its course with that of cosmetics, begins with one Apollodorus of Alexandria (c. 300 B.C.); and thence in dark volume it flowed through Nicander, Philinus, Andreas, and that remarkable man, a Herophilean turned empiric—Herakleides of Tarentum. Krateuas, who seems to have worked under the patronage of Mithridates Eupator, is a very important link of this chain.* It is with Krateuas that we enter upon the Attalid and Mithridatic period of this art and mystery on which the *locus classicus* is the twenty-fifth chapter of Pliny's *Natural History*; and so to Dioscorides, to Philumenus, to Aetius who borrowed from Philumenus, and to Galen. Thus at second hand Archigenes became a main source of this sinister lore for the Middle Ages, and for the papal and ducal circles of the Renaissance.

In these lectures, Sir, if I have failed—and with but our present resources we may hardly succeed—to bring the physicians of Rome out of chronological tables and to present them in living portraiture; yet, if, in my subordinate degree, I have made some fair endeavour to illustrate the inner movements and to read the genius of those variously gifted races of whom Roman medicine was engendered—the dreamy Sicilian, the positive and sagacious Greek, the subtle and demonic Oriental—which, blended in Alexandria, inspired the motley players who walked the stage of our art and mystery at the feet of the imperious mistress of the world; if in any fair measure I have done this, my labour and your long-suffering—for which I gratefully thank you—may have been not wholly in vain.

FOUR CASES OF PNEUMONIC PLAGUE.

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CASES of plague in this country are comparatively rare, and although the daily press has given somewhat distorted accounts of the four cases recently occurring in Suffolk, readers of the JOURNAL may find an account of them to be not without interest.

The cases occurred at Freston, some five miles from Ipswich, in the households of two farm labourers. C.'s child, aged 9 years, was taken ill on September 13th and died on the 16th; the mother, aged 40 years, was taken ill on the 21st and died on the 23rd; C., aged 57, was taken ill on the 26th and died on the 29th; and a neighbour, Mrs. P., aged 43 years, who nursed C.'s

wife on the night of the 22nd and 23rd, was taken ill on September 26th and died on the 29th.

True to description, the disease had picked out two very dirty households; and again, of all the people coming into close contact with the patients, only those who had but little respect for hygiene were infected. Three nurses who were unremitting in their attentions to the sick escaped.

The incubation period was definitely five days.

Prodromal symptoms were not well marked. All the patients complained of being "not well" a few hours before the onset of illness; and in one case—that of the child—there was sickness.

The invasion was sudden, and in one case at least the illness was ushered in by a rigor. All complained of severe frontal headache. The features were drawn, the expression vacant, and mental ineptitude was well marked. The temperature was high from the commencement, the thermometer registering 105° in two of the cases and 103° in the other two within a few hours of the onset of the illness, and remained high till within twelve hours of death, when in each case the temperature fell a couple of degrees.

Respiratory System.—Respirations in all four cases were quickened from 30 to 40 per minute. In only one case (Mrs. P.) was there definite lobar pneumonia; in two there were evanescent patches, and in the fourth no signs of pneumonia were detected. The case with definite pneumonia had no expectoration at any time of the illness; the other three had thin dark blood-stained expectoration.

Circulatory System.—The pulse in all cases was feeble and fluttering, and ranged from 120 to 140 per minute.

Digestive System.—The tongue in each case was red at tip and edges, but the dorsum was covered with a thick yellowish fur. In two of the cases there was sickness and diarrhoea.

The spleen in one case at least (Mrs. P.) was enlarged, but no other glandular enlargement was detected.

Nervous System.—In the child there was delirium, but in the others consciousness was unimpaired till the end, and in one case (Mrs. P.) the patient gave thoughtful and intelligent instructions within ten minutes of her death.

Diagnosis.—It was at once recognized that this was a highly contagious disease, so that prompt measures to isolate contacts were adopted. Drs. Brown and Heath, of Ipswich, were asked to see the cases in consultation, and from specimens of sputum and blood taken from the last three cases Dr. Heath ultimately discovered the *Bacillus pestis* in all the specimens, but this was not demonstrated till too late to administer serum treatment.

Investigation as to the cause of the outbreak elicited the fact that a great many rats were dying in the neighbourhood, and on bacteriological investigation many of these, as well as a hare and a cat, were found to have plague. On further investigation it was elicited that five years previously eight persons were similarly attacked near Shotley, and about six miles distant from Freston. Of those eight persons attacked, six died, and I have no doubt, from the reports given me, that they also were plague. These cases occurred about a quarter of a mile from the river Orwell, and at a point exactly opposite to where the larger ships anchor to lighten their cargoes into barges to enable them to proceed up the river to Ipswich. It would be an easy matter for rats to swim ashore from those boats at this point, and it is surely not mere coincidence that rats on the other bank of the river at this point have since been proved bacteriologically to have plague. There certainly has been an undue mortality amongst rats since the occurrence of those eight cases, and it would almost appear as if there has been a chronic condition of plague amongst rats in the district since that time.

There are, however, other possible sources of infection which are under investigation; the results, when complete, will no doubt be made known.

It is now known that other districts in Suffolk have a "rat plague," the cause of which is being investigated alongside with this district.

To prevent the spread of infection stringent measures were adopted. All contacts were quarantined for a period of ten days; in both houses all articles that could not be thoroughly disinfected were burned, the rooms were carefully disinfected, their walls were stripped, and afterwards

* Vide Krateuas, von M. Wellmann, Berlin, 1897.