Sketch of the early history of anatomy : an address delivered to the Hunterian Medical Society, in the University of Edinburgh, at the commencement of the session 1867/68 / by J. Warburton Begbie.

SKETCH

OF THE

EARLY HISTORY OF ANATOMY:

AN ADDRESS

DELIVERED TO THE

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THE EARLY HISTORY OF ANATOMY.

GENTLEMEN,—The subject to which I desire to call your attention is the early history of Anatomy, or the progress which was made in the study and knowledge of Human Anatomy, antecedent to the brilliant discovery of our immortal countryman William Harvey. The period of time embraced in this inquiry is a lengthened one, from the commencement of the fourteenth down to an early part of the seventeenth century, while it also includes many most important events. Within the compass of such an address as the present, it is indeed impossible for me to do anything like justice to so productive a field. In the prosecution, however, of the purpose which I have in view, it will be unnecessary for me to dwell on various topics otherwise well worthy of illustration. What I aim at is to make you acquainted with the rise and progress of Anatomy as a study, and at the same time to interest you in a class of men, of whom it may be affirmed with truth that their labours conferred very signal benefits on mankind. This much indeed may be reasonably allowed, while we hesitate to adopt the glowing panegyric—which I shall afterwards have occasion to quote—pronounced upon Anatomists by Portal.

At the outset, however, it is incumbent upon me to offer you a brief sketch of Anatomy in ancient times, in order that you may correctly apprehend the extraordinary advance it underwent during the centuries already mentioned, and more especially that you may find reason to justify the language employed by the learned Italian writer *Tiraboschi*,—"But anatomy in this very century (the 14th) may truly be said to have risen into a new life in Italy, owing to the works of the famous Mondino."[1] It is to a consideration of the life and labours of this celebrated anatomist that I shall return, after

[1] Tiraboschi; Storia della Letteratura Italiana, tomo v., libro ii., p. 239.

we have hastily glanced at the antecedent condition of his science in Greece, and then among the Romans and Arabians.

You are aware that the earliest medical writings of any importance which have reached our time belong to the school of Cos, of which school Hippocrates, justly styled the "Father of Medicine," was the chief ornament. Hippocrates flourished in the fourth century before the birth of Christ, the precise date of his birth being 460 B.C. With the nature and contents of the numerous works which have passed under his name, we are not at present concerned. That a few of these are genuine, written by Hippocrates himself, admits of no doubt, while a much larger number of the so-called Hippocratic treatises were in all probability the production of certain of his immediate descendants in the Coan school, among whom his son-in-law, Polybus, was unquestionably one. The question as to whether Hippocrates made acquaintance with Anatomy by dissecting the human body, is one of very great interest, and one also which has at various times excited no small amount of controversy. There is indeed a good deal to be said on both sides. A recent writer, in his instructive work on Aristotle, has certainly committed an error in saying that "it is now generally accepted as beyond dispute that his (Aristotle's) predecessor Hippocrates never dissected the human body."[1] Very different is the opinion of the distinguished French surgeon Beclard, not long deceased, and of the late highly accomplished translator of the Hippocratic works into our own language, Dr Adams of Banchory. They, as well as many others, held that abundant proof is afforded in several of the genuine treatises of the illustrious Greek physician, that the dissection of the human body was practised in his time—that Hippocrates himself dissected. There are certain of the Hippocratic writings the perusal of which makes it very difficult indeed to suppose that he had acquired his knowledge of Anatomy in any other way than by dissection of the human body. This remark applies to such treatises as those,—"Περὶ ἄρθρων," on the Articulations, and "Περὶ ἀγμῶν," on Fractures. But, while I presume such to be the probable reflection of the professional reader, of the works now cited, and, although in a less degree, of certain other treatises, it will be admitted by all that the osteological knowledge which these display their author as possessing, was far in advance of his acquaintance with other departments of anatomical inquiry. In Myology Hippocrates was certainly not well informed. The Greek word μῦς does not occur in any of

[1] Aristotle; a Chapter from the History of Science, including Analyses of Aristotle's Scientific Writings, by George Henry Lewes. See p. 159.

the undoubtedly genuine writings; when reference is made to muscles, it is by the term σάρξ, equivalent to the Latin *caro*, flesh, or fleshy part. This is the word, or rather its plural σάρκες, which four centuries before the time of Hippocrates was used by Homer, in whose descriptions of the wounds received in battle it is sufficiently remarkable that, with no little appearance of anatomical nicety, flesh and not muscle, just as in the pages of the later medical writer, is the term usually, indeed almost constantly, employed. The late learned Dr Whewell[1] has remarked that Homer "nowhere employs the word *muscle*." In this, however, he is not correct, as the following passage from the Iliad proves. I take the translation of Professor Blackie:—[2]

> "Phyleides then Amphiclus caught with keen-preventing glance,
> And stayed him in his mid attack, and drave the forceful lance
> Into his leg *where thick the muscle swells:*[3] his sinews' might
> The baleful weapon rives: and deathful darkness veils his sight."

It is scarcely necessary to remind you that the pages of Homer, both of the Iliad and the Odyssey, contain much that is of interest to the student of medical history, were it only in the parts played by Podalirius and Machaon, the so-called sons of Æsculapius, who followed Agamemnon to the Trojan war.

But returning from this short digression, it may be said that in the peculiarly hostile feeling which the Greeks entertained to any interference with the bodies of the dead, as well as in the ignorance of anything like correct anatomical knowledge displayed in their writings, there is unquestionably sufficient proof of dissections not having been *generally* practised. As to the former, the Greek laws of sepulture were stringent in the extreme. In Athens the Demarch, governor of the people, who allowed a corpse to remain for a single day unburied, was subjected to a heavy fine. The laws of certain states required that whoever found a dead body should obtain for it immediate interment on pain of death; and the history of Greece reveals the fact that victorious generals have been condemned to die, because they neglected to see to the burial of those who had been slain in battle. How sacred the dead were considered by the Greeks is abundantly shown by Sophocles in the Antigone, as well as by Euripides in certain of his plays. The strong popular feeling in this respect was further increased by the belief that the soul, freed

[1] Whewell; History of the Inductive Sciences, from the earliest to the present time; 3d edition, vol. iii., p. 319.

[2] Homer, Iliad, book 16, line 306; Translation, vol. iii.

[3] "ἵνθα πάχιστος Μυὼν ἀνθρώπου πίλεται."

at death, wandered about on the shores of the Styx, so long as the body remained unburied.

Again, the absence of accurate anatomical knowledge in his writings favours the conclusion that dissection of the human body was rarely practised in Hippocratic times. Allusion has already been made to the ignorance of Myology which then existed. Not only so, but under the one name τόνος or νεῦρον, Hippocrates included nerves, tendons, and ligaments. Aristotle, who has been denominated not unjustly the Father of Comparative Anatomy, at least of Zoology, the successor of Hippocrates, born 384 B.C., was scarcely better informed. He describes the νεῦρα as arising from the heart. "They connect the bones," he says, "and surround the joints." But this would imply even greater ignorance on the part of the illustrious Stagyrite than was really the case. Hippocrates confounded nerves and tendons, or rather was unaware of the existence of the former; Aristotle in a measure distinguished them. The νεῦρα, the origin of which, he says, is from the heart, were evidently not nerves but muscles, and the former are styled by him πόροι, ducts, tubes, or canals. Thus the first, second, and seventh cranial nerves are distinguished by Aristotle; but, in the same way, he also denominated other ducts or canals—the ureter and intestine for example—these are πόροι, and are only distinguished from the nerves by the latter being styled πόροι τοῦ ἐγκέφαλου, canals of the brain. Thus, the view of Philippson and Lewes is probably correct that πόροι never meant organs tantamount to nerves, but simply brain-canals, not discriminated from other canals or ducts except by their position. George Henry Lewes says that he has "sought in vain throughout the pages of Aristotle for any intimation that these brain-ducts were special structures." There is probably no good reason for concluding, as has often been done however, that Aristotle discovered the nerves,—if by that expression is to be understood his acquaintance with the nervous system as an important part of the animal economy,—or that the πόροι were intimately connected with sensation, which has been asserted, or with the mechanism of motion.

Much that Hippocrates says of the heart is true, and by no means incorrect. He recognised the fleshy nature of its substance and its pyramidal shape, also that it is covered by a membrane which incloses a fluid resembling urine (liquor pericardii). He describes the heart as possessing two ventricles, separated by a small partition. These two ventricles compose the whole heart; the cavity of the one is larger than that of the other; they are both marked by inequalities on their internal surface. Of the heart Hippocrates writes,

as the foundation of human nature, of the streams which irrigate the entire body and give it life; when these cease man perishes. As to Aristotle, among many instances which might be adduced of his profound ignorance, there is none more remarkable than the assertion that the brain is destitute of blood, and that the back of the skull is empty. It is the latter statement which led Portal to conclude that Aristotle had never opened the cranium:—"ce qui prouve qu'il n'avoit jamais ouvert de crane."[1]

Lewes, in his recently published and most interesting volume on Aristotle, already referred to, contends that this great man and diligent cultivator of the stores of Natural History, wanted the powerful fascination which alone can suppress the shuddering repulsion that keeps men from the dissecting-room. Have you, gentlemen, felt this shuddering repulsion? Do any of you still feel it? I cannot help thinking that the potency of its influence is greatly exaggerated by the able writer I have just named. But whether this be the case or not, you cannot fail to be interested by the graphic picture he has drawn of studies, in which all of us have been, and some of you are still engaged. I shall therefore offer no apology for quoting the passage at length:—"The fascination must be strong, for the disgust is powerful. Our senses are affected by the sickening scent of a corrupting body, by the painful sight of blood-stained instruments, and the scattered shreds of a dismembered corpse. There is also a deeper moral disgust, peculiarly affecting to imaginative minds. The spectacle of death is always accompanied by a certain awe. At the bedside, or in the battle-field, no gazer remains unmoved; pity, and a sense of community in death, steal over every mind when unshaken by violent emotions. How much more painful the dissecting-room, where the corpse is untended by affection and unpitied by strangers! None of the sanctity of death surrounds it; none of the tenderness of love watches over it; none of the ceremonials of respect defend it. There it lies, naked, and alien alike from affection and respect, flung upon a table in oblivious disregard of its having once been the temple of a human life. It is no longer that temple; it is not even a corpse; it has become a *subject*. Yet all these sources of repulsion have been, and daily are overcome. Men sit patiently for many hours, inhaling the nauseous odours, exploring with their scalpel the winding intricacies of vein and nerve—steadfast, patient, victorious. They have suppressed the suggestions of the scene by firmly fixing their minds on the object of their task. It is not because their

[1] Portal; Histoire de l'Anatomie, et de la Chirurgie, tom. i., p. 42.

sensibilities have become obtuse, but because their power of abstraction has overcome the solicitations of suggestion. They have not become hardened; they have simply learned to concentrate their thoughts upon a definite pursuit. Were it not for this we might wonder that men did not consent to remain for ever unenlightened on the marvels of their organization, rather than acquire the knowledge by so repulsive a route. But the passion for knowledge is imperious. It urges men to surmount all obstacles—to brave the prejudices of others after suppressing their own—to brave human laws—to rob the grave in the dead of night, and pursue their study in secrecy and peril. This passion furnishes the power of abstraction; and hence it is that Anatomy has been pursued by poets, theologians, and even women. Goethe, for example, a nature of the keenest sensibility, who could not bear to look upon Schiller dead,—even he was an anatomist. Haller, one of the greatest anatomists, was early and late a poet of some mark. Bossuet was not repelled from the study; he wrote an anatomical tractate. Anna Manzolina made those wax preparations of every part of the body which became the pride of Bologna; and for these she had herself held the scalpel, "con virile e forte animo, e con incredibile costanza." [1]

Leaving the times of Hippocrates and Aristotle, we come to the period of the early cultivation of Medicine in Egypt. You have all heard of the city and library of Alexandria. The former—founded as its name denotes, by the renowned Alexander the Great—rose into importance through the magnificence of the Ptolemies, the Grecian kings of Egypt, about three hundred years before the birth of Christ. In that city there existed a famous medical school, and, in connexion with it, there were eminent cultivators of Anatomy, to whose labours a brief reference must now be made. In an early part of the first book of Celsus, when the writer is taking a short survey of the history of Medicine antecedent to his own time, there occurs this passage:—"Post quem"—that is Hippocrates, to whom he had just paid a well-merited tribute of praise—"Diocles Carystius, deinde Praxagoras et Chrysippus, tum Herophilus et Erasistratus sic artem hanc exercuerunt, ut etiam in diversas curandi vias processerint." The last two mentioned in this enumeration of worthies—Herophilus and Erasistratus—were the pillars of the anatomical school of Alexandria. The acquaintance which we have with both is due entirely to the works of Celsus, Galen, and Cælius Aurelianus (probably the contemporary of Galen in the second century of the Christian era), none of their writings, except in a

[1] *Op. cit.*, page 161.

fragmentary form in the authors just named, having reached our time. Galen, in one of his treatises (De Dissectione Matricis), speaks of Herophilus carrying the practice of Anatomy to the highest possible degree of perfection. Fallopius, one of the most distinguished anatomists in more modern times (1532–62), testifies in the highest terms to the accuracy of his descriptions. It is beyond all doubt that the dissection of the human body was practised by Herophilus as well as by the scarcely less distinguished—although that was more as a physician—Erasistratus. Celsus not only alludes to the zeal with which they studied Anatomy, but accuses them of performing vivisections. In discussing the principles and practice of the two rival sects—and they were the earliest in Medicine—the Dogmatists and Empirics—this renowned Latin writer observes:—"Necessarium ergo esse incidere corpora mortuorum, eorumque viscera atque intestina scrutari; longeque optime fecisse Herophilum et Erasistratum, qui nocentes homines, e regibus ex carcere acceptos, vivos inciderint, considerarintque, *etiamnum spiritu remanente*, ea, quæ natura ante claussiset, eorumque positum, colorem, figuram, magnitudinem, ordinem, duritiem, mollitiem, lævorem, contactum; processus deinde singulorum et recessus, et sive quid inseritur alteri, sive quid partem alterius in se recipit." That the accusation, moreover, was believed by Celsus to be true, is apparent from the apology for the practice, offered by him a little further on in the same connexion:—"Neque esse crudele," he observes, "sicut plerique proponunt, hominum nocentium, et horum quoque paucorum, suppliciis remedia populis innocentibus sæculorum omnium quæri." The charge thus brought against these famous Alexandrian teachers has, however, been substantiated by no other medical authority. Curiously enough, it is repeated by Tertullian—the most ancient of the Latin Fathers whose works remain—in a strange passage, in which he further mentions that Herophilus had dissected six hundred persons; while he styles him "ille medicus aut lanius." It is also alluded to by the industrious collector of information of every kind and from all sources, Pliny. For my part, I do not credit the impeachment, and am of opinion that the steady devotion of these eminent men to their favourite study of Anatomy, had led to what I shall venture to characterize as a base slander. This view, moreover, receives a strong support from the circumstance, which is not lost sight of by Hæser, the German historian of Medicine, in his learned work "Geschichte der Medicin," that a similar charge, and one wholly without foundation, was brought against the foremost anatomists in those modern

times, to which I am soon to call your attention. As regards the acquaintance which Herophilus had with Anatomy, it is quite clear that he was familiar with the brain—he had distinctly noticed the origin of nerves from the brain, πόροι—using, you will observe, the same word as that employed by Aristotle. Moreover, he had recognised them—and he was the first to do this—as organs of sensation. The ligamentum teres of the hip-joint (round or polished) he described, styling it νεῦρον. Motor power he placed in veins, arteries, and muscles. His description of the intestines, and particularly of the duodenum, is very good. He also demonstrated the differences which exist between the liver of man and that of the lower animals, describing with more than usual minuteness the liver of the hare. Finally, let me remind you that, in connexion with the venous arrangement within the head, you have all committed the name of this great anatomist to your memories. The junction of the cranial sinuses opposite the spine of the occipital bone was first carefully observed, and afterwards styled by him ληνος (a tub or trough), also σωλήν (a gutter or canal), less accurately rendered into Latin, torcular (a press for making oil or wine); it is now universally known and described as the "Torcular Herophili." I cannot now dwell on the labours of Erasistratus, the distinguished contemporary and fellow teacher of Herophilus in the Alexandrian school, and there is the less reason for regretting this, because, although equally devoted to Anatomy with the latter, Erasistratus achieved a greater fame, from his diligent cultivation of the more practical parts of their common profession.

We pass, then, to the prosecution of Anatomy as a study *in Rome*. You are probably aware that the first native Roman who acquired any high distinction in Medicine, or in the branches of learning connected with Medicine, was Celsus. Antecedent to him, all the distinguished practitioners in the then capital of the world were either Greeks or Asiatics. Aulus, or Aurelius Cornelius Celsus, to whom, with justice, has been applied the titles of "Hippocrates Latinorum," et "Medicorum Cicero," was an inhabitant of Rome in the reigns of Tiberius, Caligula, Claudius, and Nero; he was probably alive, although if so, still only a youth, during the latter years of our Saviour's life on earth. It is doubtful if Celsus ever practised the healing art, or was a regular member of the medical profession. It is more than probable that he merely devoted himself to the study of Medicine, as he is known to have done, in regard to both agriculture and the veterinary art. This is not the occasion for discussing the interesting question now referred to, and

I should not even have named the great Roman writer, did I not, in doing so, emphatically distinguish the period we have reached in this short sketch; and, besides, it is possible that some of you might have attributed my silence regarding him to inadvertence. The admirable work of Celsus—as it has reached our time, no doubt incomplete—"De Re Medica," or "De Medicina, libri octo"—is occupied entirely with the description of internal and surgical diseases, together with their appropriate treatment. His observations on Anatomy, with the exception of Osteology, are not numerous. In the department just named, however, there is an excellent description of certain of the bones—the maxillary bones for example; and it is very evident, from the accuracy of the details which are supplied, that this distinguished Roman writer had carefully investigated the anatomy of the ear, and recognised the existence of the semicircular canals, which, as you know, three in number, are situated above and rather behind the vestibule.

But Celsus must not detain us, nor can I find time at present to say anything of Asclepiades, who, shortly before the time of Celsus, coming from Prusa in Bithynia, of which he was a native, settled in Rome, and achieved a great reputation; or of Cassius, Themison, the founder of the Methodic School, Thessalus, Archigenes, Aretæus, the renowned Cappadocian, as elegant a writer as he was a skilled physician;[1] Scribonius Largus, Ruffus Ephesius, and many others, of whose labours, were I now offering you a sketch of the progress of Medicine as a whole, it would be altogether unpardonable to avoid making at least some mention. These men, however, did little or nothing for the advancement of Anatomy, and so we come to the time of Galen—that is the second century of the Christian era. He was born A.D. 131.

In respect to the great physician of Pergamos, the question has also been debated, whether his knowledge of Anatomy was gained by dissection of the human body, or solely from that of dogs and monkeys. To the latter, frequent references are no doubt made in the Galenic writings, as well as in those of other Greek physicians; and there can be no question that the ape was selected, because it was supposed to bear the closest resemblance in its anatomical structure and conformation to man. Of the vast importance of Anatomy as a study, Galen was profoundly conscious; and frequently,

[1] Inaccurate in his anatomical descriptions, and, indeed, uninformed in Anatomy as this great physician was, it is interesting, notwithstanding, to notice that his genius had already recognised Anatomy and Physiology as the true basis of Medicine.

in his writings, upholds the practice of dissection. It is, however, very doubtful if he ever dissected the human body. Studying, as he did, for a time in Alexandria, he counts himself fortunate to have there observed two human skeletons, of which one was that of a robber to whom the right of burial had been denied. The erroneous application of facts observed in Comparative Anatomy, to that of the human body, is conspicuous in many passages of his writings. This remark holds true even in his Osteology—a branch of the subject with which acquaintance could most readily have been formed. He is, for example, strangely inaccurate about the ribs. He never found more than thirteen—eleven he had seen rarely—the usual number was twelve. Again, he says, there are seven distinct pieces of bone in the sternum.

In Myology he made important discoveries: he first observed the "popliteus muscle," also the cutaneous muscle of the neck, named by him πλάτυσμα μυῶδες (muscular sheath or expansion), a term still retained; both superficial muscles, you will notice, not requiring dissection properly so called, for their examination, and which, in so far as the human subject is concerned, he probably made acquaintance with, in some instances of persons wounded in the neck and lower limbs. Curiously, he denied a muscular structure to the heart, maintaining that such is far too simple for the numerous functions which it has to perform. The muscles of mastication, in part, and those of the larynx, he fully described; also the muscles of the back, the ligaments of the spine, and the vertebral column itself. His knowledge of the vascular system was far from accurate. Veins originated in the liver; arteries had their commencement at the heart. The anastomosis of veins and arteries he knew. I cannot now follow the Galenic descriptions of the nervous system; suffice it to say, that he derived the nerves of sensation from the brain, and those of motion from the spinal cord. To the heart he allowed no nerves; it was an insensible organ. The cerebral eminences, four in number, two on each side behind the pineal gland, are accurately described; these were afterwards styled, and, as you know, still go under the vulgar names of the "nates and testes." The "septum lucidum," and "corpus callosum," are indicated; the lateral ventricles more fully delineated. The eye is well portrayed by Galen, but it is much more the eye of a sheep or a calf than of man. I am forbidden, by want of time, from continuing this account of the Anatomy, and from entering at all on a consideration of the Galenical Physiology. In the centuries succeeding that in which Galen flourished, there were many Greeks

who attained great eminence in the cultivation of medical science—such, for example, as Paulos of Ægina—commonly known as Paulus Ægineta; Theophilus and Etienne of Athens; John of Alexandria, and Palladius. Important, however, as were the additions made by these and others to the sum of knowledge in the whole Art of Healing, in Medicine, Surgery, and especially the Obstetric art, little advancement took place in Anatomy.

To the Greek and Roman School of Medicine the *Arabian* succeeded. In the tenth, eleventh, and twelfth centuries, there flourished in Arabia and in Spain many most distinguished men—such as Rhazes, Albucasis, Averrhoes, and Avicenna. But neither to them are we indebted for any important advances in Anatomy. We do, however, owe a debt of gratitude to the Arabian physicians, indirectly although that may be, in connexion with Anatomy. They, by their translations, preserved the works of the ancient Greek writers; and, it is more than probable, that without them we should not now possess the works of Hippocrates, Galen, and Aristotle, not to mention the strictly speaking classical writers of antiquity.

Having offered you this very brief sketch of the progress of Anatomy antecedent to the fourteenth century, we are now prepared to notice the rapid advancement it underwent, along with the other arts and sciences, after the period of the Revival of Learning.

The first name of any importance which meets us at this stage of our inquiry is that of Mundinus or Mondini. Portal asserts that he was born at Milan, and there taught Anatomy about the year 1315. Tiraboschi, however, says of Mondini, that there exists as much uncertainty about the place of his birth as about that of Homer; that no fewer than five cities claim the honour of being his birthplace. These cities are Milan, Florence, Bologna, Pisa, and Venice. However this may be, there is no doubt that Mundinus achieved, as an anatomist, a brilliant reputation; so freeing the science from the barbarism and neglect into which it had for many ages fallen, as to entitle himself to the appellation of "*Restorer* of Anatomy in Italy." Massa applies to Mundinus the title "Anatomista illustris, vir in Sectione celeberrimus." We have seen reason to conclude that dissections of the human body were made at a period long antecedent to that which we have now reached—that Hippocrates probably dissected the human body; that Herophilus and Erasistratus certainly did so; and that while the knowledge of Anatomy which Galen possessed was chiefly derived from his inspection of the lower animals, dogs, pigs, and

monkeys, it is a legitimate conclusion from his writings, as well as from what we otherwise know, that he may occasionally have practised a similar dissection. Still these dissections were all made in private—indeed *secretly*—through fear of discovery and consequent ill usage and disgrace. Mundinus was the first publicly to dissect the human body. In 1315, when Professor of Anatomy in Bologna, it is recorded of Mundinus that, for the first time, he publicly dissected the bodies of two females. Thereafter he published a description of the human body. This manual of Anatomy of Mundinus attained so high a reputation that, till after the middle of the sixteenth century, the demonstrator of Anatomy in the University of Padua—then the most distinguished medical school in Italy—was bound to use this work and no other. What the demonstrator did, indeed, was to show the parts on the dead body according to the text of Mundinus. It was required of all candidates for the degree of medicine in Padua, that they should be well instructed in the Anatomy of Mundinus. His book was much more to them than Quain or Ellis, or Holden, or Gray's is to you, gentlemen; as the following excerpt from the academic law on the subject will prove:—"Ut Anatomici Paduani explicationem textualem ipsius Mundini sequantur." And this law was not abrogated, but remained in strict force for two centuries after the death of Mundinus. Thus there was no encouragement given to discovery or improvement in anatomical knowledge. To know what Mundinus had done and written was enough. While we cannot fail to denounce the absurdity of this plan, it is nevertheless sufficient to exhibit the great respect and esteem in which Mundinus and his work were held. Mundinus also published a volume of Anatomical Plates; and some of these, engraved on wood, are to be found in certain of the old editions of his book. "They are not," says Portal, "absolutely bad." I shall not dwell in detail on the descriptions of the Bologna professor; it is more interesting for you to hold in remembrance, in connexion with his name and time, that in all the universities of Europe then existing, with which Medicine was incorporated as a faculty, and that held true of most—Montpellier in France being for a time only an exception—there was established, as the direct consequence of the labours of Mondini, the public dissection once or twice every year of the human body. The dissection was intrusted to a youthful barber, who accomplished it in the rudest manner by means of a razor; and, while so engaged, the professor demonstrated the parts by a reference to the work of Mondini.

I have said that for two centuries after the death of Mundinus,

his work, and that work alone, continued to be the acknowledged, and indeed the only permitted, text-book of Anatomy. During that period there were many distinguished men in the profession of Medicine and Surgery, of whom Guy de Chauliac and Vigo, in their attachment to the latter, may be mentioned. Nor are there wanting, during the same period, names sufficiently eminent in Anatomy —as, for example, Richard, surnamed Anglus, to distinguish him from a French anatomist of the same name; Mathieu de Gradibus (that is, of Grado, a village near Milan); and Gabriel de Zerbus, who, at the very commencement of the sixteenth century, published a volume of Anatomy, containing evidence of no inconsiderable research. The restrictions which had been imposed on the method of studying Anatomy had, however, effectually hindered all progress till a somewhat later period of the same century. Among several highly distinguished anatomists to whose lives and labours your attention must now be briefly directed, there ranks first, in point of time, Berenger of Carpi, or, in his own language, Jacopo Berengario da Carpi, very commonly called simply Carpi. Carpi ultimately became Professor of Surgery in the University of Bologna. In order to acquire as thorough a knowledge of Anatomy as possible, Carpi dissected a large number of animals, and was wont likewise to boast that he had dissected more than a hundred human bodies. So great was his zeal for anatomical investigations, that a slander similar to that already mentioned in the case of the ancient professors Herophilus and Erasistratus was raised against him, of practising human vivisection. Tiraboschi thus refers to it: "That in order to satisfy his curiosity, and at the same time to gratify his hatred against the Spaniards, he opened two men of that nation, that he might observe the movements of the heart in each; for this offence he was exiled from the city." Of course Tiraboschi does not believe the report thus propagated to the injury of Carpi; on the contrary, denouncing it as a slander, he ascribes it entirely to what he styles "la popolare credulità."[1] Portal, the learned author of the "Histoire de l'Anatomie et de la Chirurgie," thus expresses himself in regard to it: "This imputation is little merited; Carpi himself, in a passage of one of his works, declaims against Erasistratus and Herophilus for having pursued this method of investigation: the reproach which Carpi repeats against these two great men is as little applicable to him as to them. "The public" (Portal continues) "enlarges or greatly embellishes all such subjects, and regards as marvellous what it is unable to understand. From the

[1] Tiraboschi, tom. vii., part ii., page 30.

time of Herophilus and Erasistratus dissections had been little practised, while the period during which Carpi flourished was as superstitious, if not indeed more so. The Inquisition being disquieted by the somewhat free manner in which Carpi had been discoursing about the organs of generation—and it must be admitted that the professor had given some little cause for this disquietude—attacked him, and, to escape its punishment, he voluntarily banished himself to Ferrara." In exile he died.

Carpi was without doubt a highly gifted and cultivated man; he enjoyed the best possible professional education, being himself the son of a distinguished surgeon, who was his earliest instructor. He was equally eminent as a surgeon and anatomist. To him has been, with some degree of probability, ascribed the original employment of mercurial inunction in the treatment of syphilis. Whatever merit may, however, be attached to this distinction has likewise been claimed for Pietro Pintor Spagnuolo, the physician to Pope Alexander VI., to whom, curiously enough, he dedicated his curious and now very scarce work "De Morbo Gallico," in which mention is made of the "unzion mercuriale." For Anatomy, Carpi did enough to entitle him to the favourable regard of all who are interested in its history and progress. He published a compendium of anatomy, entitled "Carpus Berengarius, Anatomia Carpi, Isagogae breves in Anatomiam humani corporis" (4to, Venice, 1535). Carpi divides the human body into four parts—three bellies and the extremities; the first belly is the head, the second, the chest, and the third, the abdomen. In proceeding to the dissection of the body, he recommends the abdomen to be first examined, as the contained parts are most liable to putrefaction. In his descriptions we meet with many Greek and not a few Arabic terms. "Examine," he says, "first of all the umbilicus, for that is, as it were, the root of man." An excellent description of the mesentery is given; indeed the earliest accurate account of this membrane is that by Carpi. The thorax of man, says Carpi, is larger than that of woman, but on the other hand, the female pelvis is more capacious than the male. It would weary you to dwell at any length on mere descriptive details; suffice it to say, that in respect to the vascular system, Carpi was tolerably well informed, that his osteological observations are briefer and less accurate than those of some preceding writers, and that his account of the brain, spinal cord, and nerves is far from satisfactory. In the same century (the sixteenth), and at no great distance of time from Carpi,

[1] Portal, vol. i., page 172.

there flourished a distinguished French anatomist, who caused great advances to be made in the knowledge of Anatomy, and with whose name, at least, you are all abundantly familiar. You all know the fissure of Sylvius, and have at all events heard of the aqueduct of Sylvius—the "iter a tertio ad quartum ventriculum." These two signal-posts testify to the carefulness with which a certain Sylvius had examined the brain. But that is not the Sylvius of whom I now speak, and we must be careful not to confound them. The enthusiastic explorer of the brain, François de la Boë, surnamed Sylvius (on account of his paternal acres), flourished at a period remote from the time which now engages our attention, and to which our present inquiry will not conduct us—the middle of the seventeenth century.

The complete name of the earlier anatomist Sylvius was François Jacques Dubois. He was born at Louville, a village in France, near Amiens. His social lot was very differently cast from that of his successor in the seventeenth century. Portal says he was born of a family "peu riche et très chargée d'enfans," or as we should express it, although the expression is objectionable, "poor and with many encumbrances." The great merit of the earlier Sylvius—that which secures for him the title of "Restorer of Anatomy in France," as Mondini was in Italy—lies in the circumstance that he first substituted the human body for purposes of dissection, for pigs, which previously had always been so employed. To Sylvius has been assigned by some the distinction of having first practised injection of the vessels for anatomical investigations. Whether he deserves this merit or not, there is no doubt that Sylvius is the first author who makes mention of this most important and valuable practice. But, being a blind admirer of the ancients, an enthusiastic worshipper of Galen, one who had never learned the lesson,

"Nullius addictus jurare in verba magistri."

Sylvius, while describing many facts with sufficient accuracy, fell into numerous errors. On discovering a discrepancy between his own observations and the descriptions of Galen, he was far too prone, and indeed ever prone, to confess his own want of correctness, and to magnify the physician of Pergamos. To so ridiculous a length did Sylvius carry this practice, as to account for the deviations from the Galenic descriptions, by concluding that the human species had undergone a marked degeneration since the days of *Galen*.

One great distinction Sylvius had, although, as we shall presently see, he at one time sadly abused it—he was the teacher of Vesalius.

We have now reached a very bright epoch in the history of Anatomy, for "every early anatomist," as the distinguished Hallam, in his "Introduction to the Literature of Europe," has expressed it, "was left far behind when Vesalius, a native of Brussels, who acquired in youth an extraordinary reputation on this side of the Alps, and in 1540 became professor of the Science at Pavia, published at Basle, in 1543, his great work, "De Corporis Humani Fabrica."[1] Portal, who certainly runs the risk of being supposed to account all mankind inferior to anatomists, exclaims, in the rapturous strain of one devoted to his own science, "Vesalius appears to me one of the greatest men who ever existed. Let the astronomers vaunt their Copernicus, the natural philosophers their Galileo and Torricelli, the mathematicians their Pascal, the geographers their Columbus,—I shall always place Vesalius above all their heroes—

'The proper study for mankind is man.'"

Having completed his studies at Brussels, Vesalius passed to Paris, and there, under Sylvius, of whom mention has been made, continued with unabated zeal to prosecute his anatomical inquiries. He subsequently acted as a military surgeon, and, his reputation augmenting, accepted the invitation of the Republic of Venice to fill the chair of Medicine and Anatomy at the University of Padua. That duty he discharged during a period of seven years, and, while so engaged in 1539, published his anatomical plates, which at once arrested the attention of the scientific world, and have ever since been deservedly regarded as an enduring monument of his wonderful genius and power of observation. As was likely, Vesalius, describing Nature as he found her, ran counter in many particulars to the dicta of Galen, and thus excited at first the jealousy, and subsequently the bitter hostility of those able though prejudiced men who still accepted implicitly the whole burden of the physician of Pergamos. Ultimately Europe itself rung with the violence to which Vesalius was exposed. The renowned Eustachius at Rome, Dryander at Marbourg, and Sylvius, his old master and friend, at Paris, attacked him in the most furious manner—the last mentioned, acting as unhappily some scientific men in all ages of the world's history have manifested a tendency to do,—condescended to add to his censoriousness the lowest conceivable invective. He addressed Vesalius as Vesanus (mad, insane)—an opprobrious epithet to be applied to a genius of the highest order. On demitting his chair at Padua, Vesalius became Court Physician to the Emperor

[1] 5th edition, vol., i. p. 467.

Charles V., and was fortunate enough to cure the young prince Don Carlos of a serious wound of the head, occasioned by a fall. While thus engaged, his zeal for anatomical pursuits underwent no diminution—he was busily engaged in dissection. His good fortune, however, after a time deserted him, for it has been placed on record that, having attended a young Spanish gentleman who was supposed to have died of smallpox, he craved permission to examine the body, and, opening the chest, found the heart still beating. This sad catastrophe became noised abroad: Vesalius was arraigned before the Inquisition as a murderer, and only escaped a capital sentence through the personal intervention of the Emperor. Leaving Spain he journeyed in the Holy Land, and, having been summoned by the Venetian Senate again to take the chair of Anatomy, rendered vacant by the too early death of the illustrious Fallopius, was proceeding to Padua when the vessel in which he journeyed suffered shipwreck on the isle of Zante, and thus, on the 25th October 1564, Vesalius perished, being at the time exactly fifty years of age.

The additions to anatomical knowledge made by Vesalius were most valuable as well as numerous. He was the first to publish a complete account of the anatomy of the human body, and this he did while still in his twenty-fifth year. He thoroughly exposed and blew to the winds of heaven the errors and sophisms of Galen, while he demonstrated the utility and absolute necessity of a careful dissection of the human body. To Vesalius, further, belongs the high merit of having conjoined anatomical drawing with textual description. The plates in his atlas are beautiful; and yet it is no wonder, seeing that he employed for the purpose of illustration, the pencil of Titien, and that of his chief scholar, Jean de Calcar.[1] To enter into an account of the anatomical descriptions of Vesalius were to write a treatise on the subject.

"Nihil erat quod non tetigit: nihil quod tetigit non ornavit."

He it was who first accurately described the bones of the feet and hands. Various muscles he first named, and of few was he altogether ignorant. His visceral anatomy is excellent; the heart, with its openings and valvular structures; that of the brain—although only rendered complete by Sylvius (De la Boë), and Winslow, our own countryman, and others, a century and more after his day—is wonderfully accurate. Even his account of the bloodvessels and

[1] Geschichte und Bibliographie der Anatomischen Abbildung, von Dr Ludwig Choulant.

nerves may be studied now with interest. I will not say that these afford the best evidence of his genius and skill—how could they? Was not a new physiology required for the former, before the vascular ramifications could be accurately described or at all understood? and that only came when, at the beginning of the seventeenth century, Harvey proclaimed that the blood everywhere circulates.

Before leaving Vesalius, let us pause one moment to admire his intense devotion to science—his favourite science in particular, Anatomy. His zeal and that of his fellow-workers led them to strange scenes of adventure. "They," to use the striking language of Hallam, "prowled by night in charnel-houses, they dug up the dead from the grave, they climbed the gibbet in fear and silence to steal the mouldering carcass of the murderer; the risk of ignominious punishment and the secret stings of superstitious remorse, exalting no doubt the delight of these useful but not very enviable pursuits." How different our position, and how much greater our privileges now, gentlemen! Such scenes as are thus graphically described by Hallam, have indeed been enacted within a much more recent period than that embraced in the latter portion of this sketch. The "resurrectionist" is an individual familiar to, and "grave doings" —as Samuel Warren with a questionable facetiousness styles it—is an employment not altogether unknown by some still living members of our profession. The exigencies of science demanded a remedy, and the "Anatomy Act" in great part provided it. If the history of our profession teaches us anything, it teaches the importance of anatomical studies, both for the surgeon and the physician. All good surgeons are good anatomists. Our excellent and esteemed chairman[1] is an example of the truth of that statement; before he became distinguished as a surgeon, he was reputed one of the most accomplished anatomists of his day. But I hasten to bring these already too lengthened observations to a close, and this I shall do by a very brief reference to the life and labours of two most distinguished anatomists of a period identical, or nearly so, with that of Vesalius—Eustachius and Fallopius. Both are names as familiar to you as your own; both have given an impulse to anatomical nomenclature which has secured their own immortality.

The latter of these, Gabriel Fallopius, was born at Modena in 1523, and became, as already mentioned, the pupil of Vesalius. Before applying himself to the study of Medicine Fallopius had made great

[1] Professor Spence occupied the chair during the delivery of this address; and there were also present Dr Handyside, Dr G. W. Balfour, Dr Joseph Bell, Mr Annandale, Dr Fordyce Messer, etc., etc.

progress in the sciences and philosophy. After a considerable time spent in travelling, Anatomy soon attracted his attention, and to its study he devoted himself with the most extraordinary zeal. To so great an extent did his fame extend, as to secure for him the appellation of "The Esculapius of his age." He was successively Professor in the Universities of Ferrara, Pisa, and Padua. The life of Fallopius was a short one: he died at the early age of thirty; some have said that he reached his thirty-ninth year. He wrote many treatises —the most famous of which were the "Observationes Anatomicæ," published at Venice, 1563. It was the magnificent work of Vesalius which excited the desire of Fallopius to study Anatomy, and to become the pupil of the former. For Vesalius he ever entertained the greatest respect and regard. Of him Sprengel says that he was a greater man than either Vesalius or Eustachius,—"In him were united a modesty the most amiable, manners the most engaging, an immense erudition, and a profound acquaintance with the structure of the human body." There exists a curious passage in the writings of Fallopius, implying that when bodies for the purpose of dissection were scarce, recourse was to be had to the king or emperor, as the case might be, and occasionally a criminal was awarded to the teacher, who, after being gently poisoned by opium, was publicly dissected. Many important additions to anatomical knowledge were made by Fallopius. His descriptions of the bones, particularly of the bones of the head and face,—among the former, of the ethmoid and sphenoid,—are far more exact than those of any preceding anatomist. In Myology and Splanchnology he made important discoveries. The anatomy of the female generative organs he made a special subject of study; and so accurate was the account he gave of the oviducts, that to this day, as you know, they pass under the name of the "Fallopian tubes."

It is with a tubular structure, also, that the name of Eustachius has become so intimately associated. The canal conveying air from the pharynx to the tympanum of the ear, which, thanks to a modern instrument, we can now examine during life, was first recognised and described by Eustachius. He also, in carefully exploring the heart, noticed the valve-like process, consisting of a thin fold of its lining membrane, and extending from the anterior margin of the vena cava inferior to the anterior border of the fossa ovalis,—a structure of fœtal life, to be viewed as its remains in young subjects,—the so-called "Eustachian Valve."

Bartholemew Eustachius was born at San Severino, near Ancona, and, as already stated, was the contemporary of Vesalius and Fal-

lopius. He taught Anatomy in Rome, and was the personal friend as well as professional adviser of the reigning pontiff. His anatomical publications were sufficiently numerous, the chief of them being "Opuscula Anatomica," Venice, 1563, and "Tabulæ Anatomicæ Clarissimi viri Bartholomai Eustachii," dedicated to Pope Clement the XIth. Scarcely a single subject in Anatomy but received addition and enrichment from the correct observation and able delineation of Eustachius. I have alluded to his chief discoveries, and time now peremptorily forbids me to enlarge.

At another time I may be permitted to continue the sketch thus commenced; but, whether or not, let me conclude with the expression of a hope, that on the present occasion some grains of useful knowledge have been disseminated.

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