Anatomical Teaching in 1800.

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Of the changes which have taken place in medical education in the course of the nineteenth century, few are greater than those in the method and extent of anatomical teaching. This was the only scientific branch of the curriculum which, at the beginning of this period, was studied by practical work, but the nature and kind of the laboratory instruction then given differed widely from the dissecting-room teaching of the present day.

The "anatomy" taught in 1800 was certainly wide and comprehensive. I have the good fortune to possess several students' notebooks on the subject, containing the abstracts of the anatomical lectures in various schools about the begin-

they magnified. The student had generally to be content with the word of his teacher in this and several other departments, and was seldom practically instructed in the art of verifying by original observations the descriptions given. John Bell, one of the best teachers of his time, scoffs at the "noisy mistake" of the Abbé Torrè in supposing that red blood corpuscles are other than spherical, and says that the deception arises from some strange refraction either an effect of lenses or in the nature of these globules. According to him, the Abbé's spherical lenses magnified too highly.

TEXTBOOKS OF THE DAY.

Dissection was hampered by the scarcity of bodies which there was no legitimate method of procuring, and was limited by the difficulties attendant on their preservation. In consequence it was usually hastily done, and restricted to the general topography of the viscera and to the cleaning of muscles and vessels. The latter could be injected easily, and

A Last Century Dissecting Room. The figure standing up above the rest is William Hunter; his brother John is on his right-hand side, and Matthew Baillie is the next figure to William Hunter on the left; Cruikshank is seated at the extreme left of the picture; and Hewson is working on the eye of the subject on the middle table. (From a drawing by Rowlandson.)

ning of the century. From these and the textbooks in use one learns that it included not only what was known of the structure of the body, but also the current theories of the functions of organs, as well as their relations to injuries and disease. Those who taught were practising surgeons or physicians, and their primary aim was to make emphatic the applications of anatomy to surgery or medicine; indeed, more than half of the lectures was taken up with morbid anatomy or the recital of cases.

MINUTE ANATOMY.

Of the minute anatomy of tissues little was known beyond that which could be seen with the aid of a simple lens, for the compound microscopes of the period distorted as much as

the injected preparations could be rendered permanent by steeping in turpentine, drying, and varnishing. Preparations of this kind were kept in most medical schools, and hence a fairly good knowledge of the courses and branchings of the arteries was easily acquired, and constituted a large part of the anatomy which a student had to learn. Veins and lymphatics were little noticed, except such of the former as were superficial, and the peripheral nervous system occupied but a small part of the course. In the large *Edinburgh Anatomy* published in 1784, out of 1,410 pages of text the whole peripheral nervous system occupies 20, and, though written by Monro, is of the most meagre description. For example, in speaking of the cutaneous nerves of the hand, he says: "In

describing the posterior branches of the ulnar and muscular nerves, I did not mention the particular fingers to the convex part of which they are distributed. My reason for this omission is the uncertainty of their distribution; for though sometimes these posterior branches go to the same fingers to the concave part of which the anterior branches of the ulnar and radial are sent, yet frequently they are distributed otherwise" (iii, 325).

In the account of the brain in the textbooks of that day there is no description of structure, and little more than the list of surface markings on the exterior or within the ventricle.

The method of teaching was systematic, not topographical. Textbooks were all constructed on this plan, and had not (as the systematic textbooks of the present day have) directions for the dissection of each part. The separate guides to topographical anatomy now so universal, did not appear in Britain until about the end of the first quarter of the century. Scratchley's miserable *London Dissector* came first; then the anonymous first edition of the *Dublin Dissector*, written by Harrison; and later, the *Edinburgh Dissector*. Particulars concerning anatomical teaching at this period are given in the *Memoirs of James Macartney*, and the life of J. F. South.

As a type of the textbooks then in use, one of the best and most characteristic is that of John Bell, of Edinburgh, of which the second edition was published in 1797. This only included bones, joints, muscles, and arteries. In the third edition, published in 1811, Sir Charles Bell added a description of the nerves and viscera. The second edition consists of two large octavo volumes of 955 pages. It is written in a lively though somewhat verbose style. Were the material it contains sifted and all that is now regarded as descriptive anatomy selected and put together, this bulk would be diminished to less than one-third; and, were the facts in those selected portions expressed in the terse form which it has become necessary to use nowadays in anatomical manuals, they might be fully expressed in half that space.

In this farrago of archaic physiology, of morbid anatomy, of comparative anatomy, and of surgery through which the slender stream of descriptive anatomy meanders we miss two things: First, the definiteness and precision which characterise modern anatomical descriptions; and, secondly, instruction as to method whereby the statements may be verified. There is not from first to last a single direction as to the method of dissection. Indeed, he says that many things are better to be "read in the closet than taught in any public course."

In his preface of twelve pages he deprecates technicalities, "the pride of anatomists and the disgrace of their science." But his abstention from the use of specific names makes his descriptions exceedingly vague.

THE BONES.

The first book is occupied with the account of the bones, and begins by thirty-five pages of generalities concerning the growth of bones and the formation of callus in fractures. There is no reference to Haversian canals, although Gagliardi's pegs are mentioned. This is followed by detailed accounts of the several bones, beginning with those of the head, which occupy seventy pages, of which six are occupied with consideration of fractured skull, the relation of sutures to drainage, etc. His style in describing the bones may be exemplified by his account of the inferior turbinal bones, which are "very spongy, much resembling puff paste, having exactly such holes, cavities, and network as we see in raised paste. They lie rolled up in the lower part of the nose, are easily seen

either in the entire subject or in the naked skull. Their point forms that projection which is touched by the finger in picking the nose, and from that indecent practice very often serious consequences arise." Then follows a page on polypi and other conditions, in the course of which the position of the bone is given thus: "The curling plate hangs down into the cavity of the nostril with its arched side towards the nose." "It has no cells connected with it," and it "covers the end of the lachrymal duct." "In the bare dissected skull we find a neat small hook upon the spongy bone by which it is hung upon the edge of the antrum maxillare, for this lower spongy bone is laid upon the side of the antrum, so as to help the palate bone in closing or covering that cavity from within."

The other bones occupy 20 pages and the principal characteristic of the accounts of these is the vagueness of description, which gives no help in the attempt to visualise the part. There are also positive inaccuracies, for example, he says that the neck "according as it is long or short sometimes has eight pieces, sometimes only six"; that the rib "being fixed to the body of one vertebra and to the transverse process of the vertebra below the motions of the vertebræ are much curbed." In the account of the pelvis as much space is taken up by discussion as to the occurrence of loosening of the pelvic joints during labour as is occupied by the actual description of the pelvic bones themselves.

The muscular attachments are seldom mentioned in the description of the limb bones; indeed, not one muscle is mentioned as being attached to the shaft of the femur. Of the metacarpus he says, "Nothing of importance can be said concerning the individual bones. To speak of them individually is a mere waste of time." How a present-day student would love an examiner who thought so little of such details as Bell does!

THE MUSCLES.

In the 197 pages describing the muscles of the body the attachments are given shortly and in general terms. For the most part he follows Winslow, Cowper, Douglas and Albinus in his accounts of them. Nearly as much space is taken up in detailing their uses as in describing their attachments, and in no case is nervous or vascular supply mentioned. The account of the muscular system concludes with 17 pages on muscular contraction, containing neither an account of muscular structure nor of any of the then known experiments on muscular action. The general tone is a deprecation of the attempt to import physical or mechanical considerations into the study of the *vis insita*, which he regards as an inherent and original attribute of muscle. The descriptions of tendons, bursæ and sheaths are general, and there is no attempt at topographical description, although Monro's treatise had been published nine years before. The younger Monro, although in his *Elements of Anatomy* he only gives a very short account and classification of bursæ takes occasion to introduce Sömmerring's eulogy on his father's work.

JOINTS.

The joints, which fill 53 pages, are meagrely given, but the accounts, though falling far short of the detail of present-day work or of the precision of the newer animal mechanics, yet are on the whole of more value than the accounts of the bones.

CIRCULATORY SYSTEM.

In the second volume the account of the heart is good, but takes careful reading to understand, while it is spun out to 250 pages by long digressions on the circulation, on respiration, on exploded views of the foetal circulation, so that the

descriptive part is masked, and the student's mind left in a maze with the discussion of conflicting hypotheses. The latter half of the volume, on the anatomy of the arteries, is the best bit of real descriptive work in the book, but according to modern notions fails from the want of detailed relations. Many actual mistakes occur. He makes the superior laryngeal artery enter between the cricoid and thyroid cartilages, and brings the greater sciatic nerve over the pyriformis. Here the second edition ends, but to the third the author's brother Charles has added chapters on the remaining parts of the anatomy. These consist of a very brief description of the brain and a still more insufficient account of the peripheral nerves, which in this edition are placed at the end of the second volume.

SPECIAL SENSES.

In the third volume, also by Charles Bell, the organs of sense are first treated, beginning with a psychological disquisition on sense perception, and a sketch of the principles of optics, which occupy 25 pages. Then follow about 100 pages on the anatomy of the eye, of which more than one-third is taken up with digressions on the seat of vision, squinting, nyctalopia, etc. The anatomy of the ear is treated in much the same way, but here the description is padded out with accounts of the ear in the lobster and other animals, with details concerning diseases of the tympanum, and on the sense of hearing.

ABDOMINAL VISCERA.

After the senses come the abdominal viscera, treated more physiologically than anatomically, and he sarcastically criticises those who attempt to reduce physiology to a physical process. "Let us be satisfied with knowing a little. The life residing in the gland is an agent controlling the affinities."

The illustrations absent in the first volume, few in the second, are more numerous in the later third, but are of very little use in rendering the text intelligible. The student whose knowledge was derived from such a textbook might be amused with the destruction of effete theories, but would have, except in the article of arterial branchings, a poor acquaintance with human structure.

The century has taught us that anatomy is nothing if not definite; that anatomical illustrations for the use of students must be diagrammatised; and that the real nexus whereby the discrete facts may be best strung together is morphological relationship. It has been said that human anatomy is a worked-out field; the comparison of old textbooks with those of the present day is the best refutation of this charge, which is based on ignorance, and it is by no means improbable that those who see the end of another century will be able to record advances both in knowledge and method even greater than those that have taken place in the last hundred years.

Physiology in 1800.

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PHYSIOLOGY as a separate study can hardly be said to have existed in this country at the commencement of the present century. In books and in lectures alike it was united with, and considered a part either of medicine under the general term "Institutes of Medicine," or of anatomy. In the great schools of medicine of the Metropolis they were not divided until the first thirty years had passed away.

The University of London set the example, which was soon followed at Guy's Hospital. In an advertisement of 1833 the statement is made that lectures at this hospital were the only special lectures on physiology delivered in London, excepting the course at the London University, then under the charge of Dr. Sharpey. At Guy's the curious practice existed of confiding the teaching of physiology to the lecturer on midwifery, and Dr. Haighton and Dr. Blundell successively held the two offices. In 1846 anatomy and physiology having been in the interval taught simultaneously by Bransby Cooper, the two subjects were once more separated, and the lectureship on physiology was entrusted to Dr. (afterwards Sir William) Gull. Soon after, certain evenings in the week were devoted to instruction in microscopic work, and Mr. Birkett, who still survives to witness the immense development of the subject he taught in its infancy, was appointed the teacher. Histology was associated with physiology when Dr. Pavy succeeded to the chair in 1857, and classes in practical physiology, at which the use of the microscope was taught, were first instituted at this school in 1871. The process of the separation of physiology from anatomy and the introduction of histology followed a similar course in other schools.

The extraordinarily rapid development of physiology is partly owing to the great advances that have been made in chemistry and physics, the sciences on which it rests, and partly to the progress effected in the means of observation. The balance and the methods of chemistry, the microscope and the methods of the histologist, have introduced a degree of precision into modern research unattainable by the older inquirers, who trusted to the unaided senses and have enabled observations to be made revealing the internal processes of the economy almost as astonishing as those which result from the application of the Roentgen rays in displaying the form and position of the bones of the living man.

The tendency of modern research is to show that all those acts and phenomena which were formerly regarded as the results of the operation of a special force, the vital force, are to be explained by the ordinary laws of physics and chemistry. There are many processes that are still enigmatical. We do not know the exact chemical changes that precede the evolution of hydrochloric acid in the gastric juice, nor the mode in which impulses are propagated along nerves, but it is presumed that in both instances intelligible, though perhaps not thoroughly comprehended, molecular changes take place, and that they are certainly not due to the supposititious "anima," or vital spark, which the older writers so readily accepted.

The physiological works published in the eighteenth century were few and unimportant, and were chiefly written in Latin or German. The monumental treatise of Baron Haller, the *Elementa Physiologiae Corporis Humani*, appeared in eight volumes between the years 1757 and 1766. He had already, as early as 1747, sent forth a small book, entitled *Primæ Linæ Physiologiae*, which was a precursor as well as a condensation of his larger work, and translations were immediately made into French and English. In 1786 a translation was published under the auspices of Dr. Cullen, the well-known Professor of Medicine in Edinburgh. This book, with notes by Wrisberg, constituted almost the only physiological work in the hands of the student in this country, whilst the original was used in most of the foreign universities. It represents the high-water mark of physiological knowledge at the close of the last century, and in considering the progress of physiology during the present century it may advantageously be taken as standpoint.