A LECTURE

INTRODUCTORY TO

THE COURSE ON ANATOMY.

Delivered at the Middlesex Hospital, October 3rd, 1876.

BY HENRY MORRIS, M.A.LOND., F.R.C.S.,
Assistant-Surgeon to the Hospital.

IT is one hundred and nineteen years ago since permission was first given for lectures in this institution. On August 4th, 1757, the quarterly court passed a resolution to the effect "That the Physicians and Surgeons of this Hospital have liberty to read lectures on Physic and Surgery in the Hospital". The progress and extension of medical education and the requirements of the examining boards have, years since, made it necessary to increase the number of subjects upon which lectures are delivered, and you will have to attend courses on at least three different sciences during the ensuing session. With me, you are now entering upon a long series of lectures on anatomy; and I intend to-day to spend some portion of our time in considering what is understood by anatomy, to what part of it we have especially to apply ourselves, and the reasons why we ought to study it.

First, what is anatomy? In its broadest acceptance, it is the science which teaches of the structure and form of organised bodies, or organised matter. But what is meant by "organised bodies"? and what is the difference between organised and unorganised matter? All matter, whether organised or unorganised; whether vegetable, animal, or mineral, possesses structure, figure, extension, divisibility, and so forth; and to this extent all matter is in affinity, to this extent man is like the rock of the mountain, the water of the ocean, and the grass of the earth. But the phenomenon which makes the great difference between organised and unorganised matter is expressed by saying that the one is living, the other inert matter; it is the power which the former possesses of undergoing internal changes in structure; of passing through the processes of growth and development, waste and repair; of giving rise to new matter like itself; in fact, of exhibiting all, or some of the characteristics of what is called "life".

An organised body is one in which all the constituent parts, organs, and systems are mutually means and ends to each other, each contributing to the support and duration of the whole; it follows, therefore, that an organised body may be either vegetable or animal, and, as a matter of fact, there is little if any line of demarcation between the two kinds—so little, indeed, that naturalists have long disputed over some of the lowest specimens of life. You perceive, then, that anatomy is a science which, like physiology, embraces both the vegetable and animal kingdoms; is the knowledge of the form and structure of vegetable as well as animal matter; and gives a description of the particulars of the separate parts as well as of the generalities of the entire being. It is not restricted to any class of plants or animals, but is as much concerned with the simplest algae or tiniest polype as with the grandest tree or most enlightened statesman. Hence, there is VEGETABLE as well as ANIMAL anatomy.

Now, though anatomy is a science descriptive of organised matter, and organised matter is characterised by the phenomena of life, anatomy has only to do with the *structure and form* of bodies, and not with their *vital* attributes. It does not undertake to explain the processes of life, it is not the science of the functions of parts, it does not expound the laws which regulate living matter. All this is the province of physiology, a much more intricate subject than anatomy. Physiology is the science of the *life* of organised matter; so that, while the anatomist may be said to regard man (for instance) as an organised *structure*, the physiologist goes a step further, and considers him as a *living* thing. The anatomist seeks to know the formation of the organism, the physiologist the organisation of the form. The anatomist inquires as to the mechanism of an agent, the physiologist as to the action of the machine. As, however, each is engaged upon the same objects, each ought to know much of the other's science. The physiologist could make no way in his study of the functions of organs without knowing the anatomy of the same; while the anatomist would have but scant interest in his dissections of structures, without some knowledge of, or inquiry as to, their functions.

Neither does the anatomist (as such) take any cognisance of those *intellectual* qualities which distinguish man; he notes nothing of those *moral* attributes by which man's conduct towards his fellows is regulated, and his responsibility established; nor of that *reason* which expands with his physical development, and which, while it raises him high above the

brutes and enables him to make all nature subservient to his wants, yet shows him the instability of his own body even when it convinces him of the indestructibility of matter. These are the phenomena which concern the psychologist or mental physiologist; and I would here remark that, by investigating them after the method of comparative anatomy, through other divisions of the animal kingdom, as well as in the different grades of humanity, the elucidation of many psychological problems might doubtless be assisted.

Although it is by no means universally admitted that there is anything like a perfect gradation of existence throughout the range of nature, it is at any rate undeniable that there are manifold transitions. Plants no less than animals vary in the number and importance of their parts and organs; in their internal arrangement and in their external form; in their size, complexity, and degree of perfection. The branch of the science which directs attention specially to these differences is named COMPARATIVE ANATOMY. By the comparative method of regarding the important facts relating to their structure, the members of the animal kingdom have been divided into two sub-kingdoms, viz., the vertebrate and the invertebrate. By this method it has been shown, that the presence in an animal of vertebrae or a vertebral column is an index to others of its important features. We know that it indicates a certain kind of nervous system other than the so-called "sympathetic", which alone is indicated in the invertebrata. We know that the skeleton of the vertebrate exhibits a "dorsal cavity" for this cerebro-spinal nervous system, and a "ventral" cavity for the organs of digestion and circulation, and for the "sympathetic" nervous ganglia. We know that the vertebrate animal has an internal or endoskeleton, whereas the skeleton of the invertebrate is external; that, although the vertebrate may be without limbs altogether, it never has more than two pairs, whilst the invertebrate animals have frequently many; that it has a liver and a *portal* circulation, and that during the course of its development the vertebrate animal has exhibited a series of characteristic transverse thickenings and clefts, known by the name of *visceral arches*.

Similarly we learn how man differs from the monkeys in the diameters of his chest, the obliquity of his pelvis, the proportions of his limbs, the size of his cranium, and the projection of his face. Further, in the same way we trace these and other differences through the various races of mankind; and finally we notice the changes which occur in the curves, structure, and proportions of the different parts of the body at different periods of its life, both intra- and extra-uterine, and thus ascertain the important fact, that conditions which are permanent in some species are only transient in others. By this method we become aware of the differences in the corresponding parts and organs of animals of different classes which adapt them to the various circumstances under which they live. This discovery must fill us with admiration, whether we regard these changes as an evidence of "design" in the construction of the universe, and as a proof of the "benevolence" of the Creator towards the creature; or look upon them from an opposite point of view, as it is now perhaps more fashionable, although not on that account more correct, to do, and consider them as the results of the change or development of a particular *type*, and as, in fact, an argument in favour of the doctrine of the "survival of the fittest".

In these lectures but little can be said upon comparative anatomy, and only a small portion of descriptive or general anatomy will be considered; but though only a small part, it is by far the most important—it is Human Anatomy. In man and most animals there are three separate sets of organs for three distinct purposes; first, a varied and important set by which the body is endowed with sensibility and the power of movement; these are the organs of *animal* functions, and are limited to the members of the animal kingdom. Next there are various organs which provide for the sustenance and preservation of the body, and as these conditions are essential to every organism, the organs destined for them are said to have *vegetative* or *vital* functions. Thirdly, as the period of existence of each individual, as well as of each part of the individual, is limited, it is as necessary to provide for the renovation of the species as for the part. Hence we find a set of accessory or superadded organs, by means of which animals before their decay give rise to offspring like themselves to continue their kind after they themselves have perished. These are the reproductive or generative organs.

If we look a little closer at the component parts of man and the higher vertebrates, we find (1) a complex system of bones which, by their firmness, give a definite figure to, and determine the stature of, the individual, afford attachment and support to the soft parts, and protect important viscera. The description of the bones is called osteology.

(2) There is a set of structures called ligaments, which bind together the bones; in some cases immediately, in others mediately, through the intervention of discs and membranes which break shocks and faci-

litate movements. Thus we have a large number of joints of varying kinds, the description of which is arthrology.

(3) Next, there are the fleshy parts, the muscles (with their tendons), which, possessed of two great properties, irritability and contractility, are capable of moving the bones at their joints. The description of the muscles and of the structures which ensheath and isolate them, viz., the aponeuroses and fasciæ, forms the branch of descriptive anatomy named myology.

(4) The muscles, however, are not the originators of movements; they are only the agents thereof. They are stimulated to their action by the nervous system, which includes the cerebro-spinal centre and other ganglia, as well as the nerve-cords and the organs of special sense. This branch is neurology.

(5) Then there are systems of tubes for the conveyance of the fluids of the body, the lymph and blood, and an organ for the propulsion of the latter. This division includes the arteries and the heart, the veins and capillaries, and the lymphatics. It is called angiology.

(6) We find also a large variety of viscera; first, there are the organs of digestion, for the reception, mastication, and chymification of food, which, after due preparation, is absorbed and conveyed into the blood. But before this absorbed material is fitted to nourish the tissues, and before the blood which has once circulated through the system is fit to do so again, they must be acted upon by the oxygen of the air. Moreover, certain parts must be adapted for the production of the voice. The organs for these purposes are those of respiration, and include the larynx and the lungs. Other organs, again, are provided exclusively for separating useless and deleterious substances from the blood, and expelling them from the body; of these the urinary organs are the largest and most important.

Finally, there are the reproductive organs, some of which are closely associated with portions of the urinary organs.

It is usual, in works on descriptive anatomy, to group all these viscera together under the harsh and ugly word splanchnology.

Such is a brief outline of what human anatomy consists; and you will, I am sure, be glad to hear that it is a completed and worked-out science. It is only minute anatomy—histology—the progress in which keeps pace with the improvements in instruments and in the modes of preparing tissues—which has advanced beyond the point to which Hunter and the anatomists down to his day and a little later brought it. In this respect anatomy differs from all the other sciences you have to study, for they all continue to make rapid strides. It is well it does so differ; for, as anatomy is the groundwork of the rest, our study of them is less hopeless than, and not so endless as, it otherwise would be.

Next, let us inquire the reasons for devoting so much attention to human anatomy. Now, although we are obliged to admit that, in anatomical structure, there is a close resemblance between man and some of the higher vertebrates, especially the tailless apes, all naturalists are agreed that the highest place in the highest class of animals is occupied by man. Anatomy alone teaches us that man has a relatively larger brain than other animals, if we except a few of the small singing birds whose skeletons are relatively much lighter than man's; that he is adapted for the upright position; and that the construction of his limbs is such that, whilst the posterior are fitted for what is called "biped progression", his anterior are intended for wide range and variety of movements, and great delicacy and precision of touch. All this points to his corporeal superiority; so that, while man's mental attributes stamp him as the crown of creation, the construction of his body justifies his being called the "paragon of animals".

Is it not, therefore, a sufficient reason for the study of human anatomy that thereby we acquire a knowledge of the highest of all created things? Have we not been enjoined, in the following lines from the immortal *Essay on Man*—

"Know then thyself; presume not God to scan;
The proper study of mankind is man"—

to learn the structure of our body as well as the nature of our mind?

Again, it is true that man is dignified with the possession of superior intellectual faculties; but the cultivation of these faculties elevates and dignifies him still more. There is no field of study in which our minds can be better trained, or more advantageously exercised, than in the acquisition of anatomical knowledge. No pursuit more thoroughly educates us how to observe; none makes us more aware of the existence of stern irresistible facts; and none, by keeping our faculties of acquisition on the alert, better guards us against untried conclusions or misleading hypotheses. I have said it keeps our faculties of acquisition on the alert, but anatomical study does more; it teaches us the nature of those faculties themselves. If the opinion be correct that we know nothing, except what we have learnt by the senses; if the Aristotelian doctrine—"Nihil est in intellectu quod non fuerit in sensu"—be sound, it follows that, if we know the mechanism of our bodies, we are ac-

quainted with the agents through which the mind not only obtains all its information, but executes its purposes. We learn how the eye and the ear, the nose, and the organ of taste are formed; we learn how the fibres of sensation are all pervading in the organs of touch; and how the cords which convey the mandates of the will are distributed to the structures which obey its influence. We learn by how many expedients nature accomplishes her ends, and of how many different tissues one knowledge-giving organ is composed. Here, then, are two more reasons for the study of human anatomy: 1st, from its character it is a good exercise for the mind; and 2nd, it shows us the organisation of the parts in which the origin of knowledge resides.

Other reasons, too, might be urged to stimulate our interest in the study. Anatomy is of importance to the artist and of advantage to the geologist; it has been suggestive to the architect, and has furnished hints and models to the engineer. To the artist some anatomical knowledge is necessary, and, as a rule, he is not satisfied with mere "surface" anatomy. He familiarises himself with the dry bones; knows how and where they articulate, and goes some way towards understanding how—in the words of the Spirit, in the valley of dry bones—sinews are laid upon them, and flesh is brought up upon them, and they are covered with skin. Some months ago, a friend, who was painting a landscape in Hampshire, told me that he had delayed the drawing of certain trees until after he had made a journey in mid-winter to see them without their leaves, so as to get a correct idea of their skeleton forms. Surely the skeleton of man, and the muscles which move it, as much require the attention of the artist. How else can the painter or sculptor be a truthful delineator of the human frame? how show with accuracy of detail the differences of national character, or the changes made by advancing age upon the features? How else can he with strictness portray the varying attitudes of the body in vigorous exercise or during fatigue; or the varied expressions which our emotions and feelings arouse? And here let me inform you who are not acquainted with it, that one of the most instructive and interesting of books is a work on the *Anatomy of Expression* by Sir C. Bell, who, besides being one of the profoundest anatomists the world has ever known, was also a clever draughtsman and an accomplished artist, of whom it might be said (as it has been said of Camper) that he "has demonstrated that the minutiae of anatomical knowledge are much more conducive to elegance, character, expression, and precision, than could possibly have been imagined by any one totally ignorant of, or but superficially acquainted with, the science".

We come now to the *special* reason why we, as medical men, must devote our thoughts to anatomy. It is because, as I have said, anatomy is the foundation of all medical and surgical knowledge; the science upon which those arts are built; the basis of all medical education. It may be said to be the only basis; for all the other medical sciences are for ever referring back to the structure of the human body.

If the physician be ignorant of anatomy, how is he to diagnose disease? If he know not the organs of the body in health, how is he to recognise the physical signs of illness? Again, if the surgeon be ignorant of the relation of parts, how will he feel when, through some accident or emergency, he is called upon to perform even an ordinary and approved operation? Will he not be like a blind man who has lost his road, mistrustful of himself, faltering and uncertain? Worse still! Will he not jeopardise the limb, even if he do not expose to risk the life of his victim? And will he not be liable to lose his own reputation, and, through the consciousness of his ignorance, his peace of mind also?

It is, therefore, in its applications to the practice of your profession that you have the chief reason for the study of anatomy, and will find the knowledge of it of such service to you. On this account, it is well in teaching, as in learning, human anatomy for medical men to connect surgery with anatomy, by laying stress, from time to time, upon the great facts which furnish the principles which they are called upon to act, which guide them in their reasonings upon the phenomena of disease, and rule their actions in every operation they perform.

But, gentlemen, you must not suppose that you will obtain from the anatomy you will learn here, and in the dissecting-room, anything like an accurate idea of the structures of the body as they appear in life and in surgical diseases. You will not see, upon the slightest touch of the knife, that gaping of the skin, that jetting stream of bright warm blood, or those spasmodic twitchings of the muscles, which you see in life. The bones which you will hear described in this theatre are the bones of the skeleton, but they are only the skeletons of the bones; they are without their periosteum or fibrous covering, without their marrow, without their blood-vessels, lymphatics, and nerves, all of which are such important factors in disease. No demonstrations, not even your dissections of the arteries or joints, will enable you to understand an aneurism or a diseased hip-joint. You will dissect out the origin and

the relations of an artery, you will ascertain the guides to its exact position in the limb, and the points at which the circulation through it may be controlled by pressure, yet, in all probability, you will fail to recognise at least the first aneurism you see. You will observe the peritoneum, and follow it as it passes from above downwards, and from side to side; you will learn its reflexions, prolongations, and relations, and will be told that this membrane forms the sac of a scrotal hernia, and yet, when you have done all this, you will not be able to diagnose a hernia. You will also, with especial care, dissect out the openings in the abdominal wall through which the spermatic cord naturally descends, and the bowel in inguinal and scrotal hernia unnaturally passes. You will see the dimple of the internal ring and the striking pillars of the external, and yet, you will not, in the whole course of your experience, see these rings in the living body as you found them, after dissection, on the subject; for when you will be called upon to interfere with them, they will be altered in structure, changed in form, and disturbed from their relative positions.

It is true, then, that the changes which occur in disease are so great that the normal gives you only an imperfect idea of the abnormal. To see the structures under their altered conditions, you must follow the examination of the body in another place, viz., the *post mortem* room of the hospital. There, also, anatomy will be taught you; not, however, the anatomy of the sound, but of the unsound, body; not normal but morbid anatomy; and, unless the former is supplemented by the latter, the surgeon cannot fully profit by that science upon which his art is founded. What shall we say, then? If the anatomy of surgery and medicine differ so widely from the anatomy of the schools, shall we be warranted in neglecting the latter, and giving our whole attention to the former? Most certainly not; for, if we are not familiar with the body as we find it in the dissecting-room, it is not possible we could rightly interrogate or interpret it as it appears at the bedside or in the operating theatre. By divorcing anatomy from pathology, we should deprive ourselves of the measure we employ for judging of diseased states, for verifying our opinions and correcting our errors.

By neglecting normal anatomy, we should be returning to the empiricism of a time long passed, when there was no standard measure of science to test the deductions from experience. We should fall back into the errors of the medicine-men who lived before the days of Galen, or even of a much later date, viz., before the middle of the fourteenth century. Until the middle ages at earliest, there was no scientific practice of medicine or surgery, *because there was no systematic study of anatomy*. A body of well ascertained facts had no doubt been handed down to posterity by Hippocrates, the great father of medicine, and those who followed him; and it is marvellous that so much was effected by them, and especially by the genius of Hippocrates himself, without the assistance of anatomy and physiology; but, on the other hand, centuries passed away without a single step being made in advance, until men began to give themselves up to the study of the *normal* anatomy of the human body.

The various methods of studying anatomy are four, viz., reading, attendance at lectures, attendance at the demonstrations in the dissecting-room, and dissecting for yourselves. All ought to be combined; you will derive assistance from each; but the two latter methods are of the most importance, and reading and lectures should be only auxiliary to them. You must read to save time, and to prepare yourselves to profit fully by your work upon the body; and you should attend lectures to hear the organs of the body described in an order arranged according to their nature, *i.e.*, in a descriptive and not in the topographical manner followed in the dissecting-room; but dissecting should be your chief resource. Dissect all you can; it will educate your senses to observe with accuracy, and your fingers to manipulate with skill. By dissecting, you have the advantage of obtaining knowledge for yourselves, independently and at firsthand, instead of receiving it upon the authority or diluted through the medium of another; your "eye negotiates for itself and trusts no agent"; you will interrogate nature to her face, and discover and verify by her aid alone. Dissection is the only perfect way of learning anatomy, which has been even defined as a "doctrine learned by dissections". Every facility will be given you for so studying it, for dissecting no longer requires that moral and physical courage which, in old times of superstition and torture, was necessary in those who prosecuted it.

By these several means, endeavour all you can to become proficient anatomists. It was by their knowledge of anatomy that the great surgeons, as well as the great naturalists, of this and other countries and times, achieved their fame. It was their knowledge of anatomy which placed Paré and Heister, Petit and Le Dran, Wiseman and Pott, Abernethy and John Bell beyond their fellows, and made them great surgeons. It is on account of their anatomical works that you will come to venerate the ancient names—of Galen, whose writings

were the only standard authority in anatomy for upwards of eleven centuries, from 200 A.D. to 1326; of Mundinus, who, a little before this latter year, published a treatise on anatomy, which was the recognised text-book of the universities and of teachers down to the middle of the sixteenth century, and from the date of which medicine may be said to have started on a scientific basis; of Andreas Vesalius, the Copernicus of anatomy, who cleared away the time-venerated errors of Galen, and who, from his love of anatomy, was falsely accused of desecrating the human dead, and, for his observations on comparative anatomy, was attainted of heresy; of those contemporaries of Vesalius—Vido Vidius and Jacob Sylvius—the latter of whom has given his name to an aqueduct which provides for the most marvellous, as it is the most important, hydrostatic agency in the body; of Fallopius, whose name may be said to ring in the ear of every medical student, and points to the high road of our creation; of Eustachius, who discovered the anatomical explanation of what is called throat-deafness, and whose name, with those of Arantius and Valsalva, will for ever dwell in the hearts of men; of Fabricius, the discoverer of the valves in the veins, and the teacher of the renowned Harvey; of Harvey himself, the discoverer of that perpetual miracle, the circulation of the blood; of Havers, whose name permeates throughout the structure of bone; of Glisson and Scarpa; of the immortal Hunters; and of many others, both English and foreign, whose names are retained in the nomenclature of anatomy.

You will likewise hear with admiration of Goodsir and Quain; of Owen and Huxley; Humphry and Struthers; and of that philosophic surgeon, my esteemed master John Hilton, from whose admirable dissections the Anatomical Museum of Guy's has been filled with models of unrivalled excellence, and who, by the application of exact anatomical knowledge to the elucidation of some of the most difficult problems in surgery, has given to the world that classic work on *Rest and Pain*. You will hear, too, of many more who, in modern times, have carved their names for ever into the records of anatomy.

Lastly, it will gratify you to know that many who have taught in this school have distinguished themselves by their anatomical works. There is that pinnacle of light Sir Charles Bell, the first lecturer on anatomy at the Middlesex Hospital, whose discovery of the roots of the spinal nerves did for the anatomy and physiology of the nervous system what Harvey's great discovery did for the circulation. There is our consulting-surgeon Mr. Alexander Shaw, who, as the assistant of his relative Sir C. Bell, and by his independent writings, has made many valuable contributions to anatomy. There is Mr. John Tomes, the first surgeon-dentist to the hospital, who has given to science much on the anatomy of the teeth. There was the beloved De Morgan, whose name (with that of Tomes) is inseparably associated with the minute anatomy of bone. There is Professor Flower, the conservator of the Hunterian Museum, whose writings on anatomy and zoology are as important as they are various. There is Mr. Nunn, who for many years was one of the most popular and successful demonstrators in the metropolis; and whose little treatise on the arteries has been translated into the French language, and is quoted in our English text-books on surgery. There is, too, our present lecturer on surgery, Mr. Hulke, whose researches on the minute anatomy of the eye formed the subject of his very valuable lectures at the College of Surgeons.

Let the work performed by these men stimulate us in our own. Let us strive to follow along their honourable path; and, by the careful and honest study of anatomy, take the first step in the only true way to be great in our profession.

ON THE TREATMENT OF COMPOUND DEPRESSED FRACTURES OF THE SKULL.

BY SAMPSON GAMGEE, F.R.S. EDIN.,

Surgeon to the Queen's Hospital, Birmingham; President-elect of the Birmingham and Midland Counties Branch of the British Medical Association.

In a clinical lecture on this subject, which obtained the privilege of publicity through these columns (BRITISH MEDICAL JOURNAL, July 8th, 1876, p. 37), I endeavoured, on the basis of three successful cases, and after a review of leading authorities, to justify my conviction that, "in compound fractures of the skull, without brain-symptoms, the proper course of practice is *not to trephine*".

I now go further. Still holding to the reservation made in the lecture quoted, "that there may be cases of compound fracture of the skull justifying operative interference", I maintain that many cases of compound depressed fracture of the skull, *with brain-symptoms*, do perfectly well without the trephine. Here are two cases in point.

On the 22nd November, Edward Armit was admitted into the Queen's Hospital under my care. He had a transverse wound about