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THIS INTRODUCTORY LECTURE

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BY THOMAS FIRTH,

AND IS MOST RESPECTFULLY DEDICATED TO
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INTRODUCTORY LECTURE.

Mr. President and Gentlemen,

Strabo, the historian, informs us that the Chaldeans were the earliest philosophers of the ancients, and that they held a society in the city of Babylon; the members of this society were called Chaldei, and those who were distinguished for extraordinary talents were called Magi.

At this æra so highly esteemed was the healing art that kings and princes considered medicine an indispensable study; but little is recorded of their anatomical pursuits. The Egyptians have always been highly extolled for their superior method of embalming, which circumstance has led many to believe that they were also skilled in the science of anatomy; but the knowledge which has been collected on that subject appears to favour an opposite opinion, and is strikingly confirmed by the custom of their placing persons to watch over the bodies during the process of embalming, and from the embalmers being subject to be stoned if an unnecessary examination of the bodies had been made. It appears, therefore, that neither the process of embalming, the method of the priests called extispasia, nor the observations made upon slaughtered animals, made much progress in the science of anatomy, further than to elucidate some of the hidden causes of disease: certain it is that the ancients by those methods became acquainted with animals becoming lean by violent and continued exercise, and that the medullary oil became absorbed by excessive motion; also that biliary and urinary concretions, with obstructions in the viscera, were the result of inactivity, obviated only by exercise and change of diet.

In the works of Chalcedios we are informed that Alcmeon, the Crotonian, was the first teacher of anatomy amongst the Greeks; and Le Clerc, in his writings, quotes many authorities to prove that he was the first who dissected animals. Many doubts have arisen respecting the truth of this assertion, in consequence of Alcmeon being a disciple of Pythagoras, whose doctrine went to prove the transmigration of souls.

Empedocles is considered the contemporary of Alcmeon, and is stated to have discovered the cochlea, that beautiful but intricate part of the organ of hearing.

History likewise informs us that Democritus added greatly to the stock of anatomical knowledge; he was a great, wise, and persevering senator of the city of Abdera, a town of Thrace. To such an extent did he carry the dissection of animals, and so great his assiduity, that his health became injured. The object of this philosopher was to discover the origin of bile and the seat of madness; and is it not surprising that he who was endeavouring to find out the cause of madness, should have been suspected of being himself insane? That Democritus was suspected of being insane, we have the writings of Hippocrates to prove, in which are given, not only the request of the senators of Abdera to Hippocrates, but the conference between Hippocrates and Democritus.

It appears, by the works of Clemens Alexandrinus, that all the knowledge of the Egyptians was concentrated by Hermes into forty-two books, and that in the thirty-seventh, thirty-eighth, thirty-ninth, fortieth, forty-first, and forty-second all things relating to medicine and surgery then known were generally concentrated. The eye, diseases of females, and the use of some instruments are particularly noticed; but it is generally considered that these works were written by a more modern Hermes than the one alluded to; I shall therefore pass them over without further comment.

I now beg leave to introduce the name of Hippocrates, generally considered as the father of medicine; he was a native of Cos, in the Island of Crete, and flourished four hundred years before the birth of Christ; from his works all the knowledge of antique anatomy may be collected, and many prognostications—the distinction of disease, which time and great discernment has more and more verified.

Although many important truths are there recorded, by which the practice of physic and the knowledge of disease may be understood, yet you must bear in remembrance that these facts are interspersed amongst many very erroneous notions. Hippocrates was aware of the vast importance attached to a correct knowledge of the structure and function of the human body to those who study medicine and the cure of disease, and therefore recorded all the anatomical knowledge of the day.

It is generally considered that Hippocrates had dissected human bodies, from his having described parts which is inferred could not be known but by dissection: he describes the human body as consisting of fluids and solids, of spirits, and parts containing and contained. The essentials of the body he divided into blood, phlegm, choler or bile, and melancholy, the latter of which he considered occult bile.

These principles were founded upon the philosophy of the age, viz. that earth, air, water, and fire were considered the only elementary substances.

Hippocrates appears to have been acquainted with some of the blood vessels, viz. the aorta, pulmonary artery, and vena cava. The heart he called a powerful muscle, and said the auricles were like a fan. He stated that all the arteries originated from the heart, and all the veins from the liver, from which all the blood flowed and in which bile is separated; he believed the arteries to convey a spirit, and therefore was ignorant of the circulation of the blood; he considered that the soul of man lay in the left ventricle of the heart, and the lungs and heart received part of our drink; he said the brain is a gland, but he knew nothing of nerves or of the use of the diaphragm; nor did he know an artery from a vein, a vein from a nerve, or a nerve from a tendon. Hippocrates appears to have been entirely unacquainted with sensation and vision, notwithstanding he had placed the seat of wisdom in the brain; he however formed a rational idea on moles or false conceptions, and the way by which the fœtus receives its nourishment. He says the communication between the mother and the fœtus is by the umbilical cord; yet, after this, he believed the fœtus was nourished by the liquor amni, and that it entered by the mouth. The above opinions are some of the many which Hippocrates has handed down to posterity, some agreeing with the opinions of the present day, others not; and, probably, many of those errors originated from the want of better and more frequent opportunities of dissecting the human subject. After the death of Hippocrates, the study of anatomy was for some time thought less necessary for the physician; consequently the science was only taught at Athens, at which place the celebrated

Socrates, Plato, Xenophon, Aristotle, and Theophrastus flourished: the works of these great men are worthy of particular attention. When Athens began to lose its celebrity as a medical school, that at Alexandria began to flourish under the Ptolemies, in which school Erisistratus and Hierophilus became highly distinguished for their anatomical knowledge. The opportunities for human dissection at this school enabled Erisistratus and Hierophilus to correct many errors that had been previously promulgated, and to place on a solid foundation that part of the science called neurology. In the period between Hierophilus and Erisistratus to that of Galen, many became celebrated for their acquaintance with anatomical science, but more particularly Rufus, Epheseus, Asclepiades, and Celsus; and it is to Epheseus and Celsus that we are indebted for all the names and situations of the various parts of the human body.

The name of Galen stands very conspicuous in medical biography; he was physician to four of the Roman emperors, and certainly the most learned of that age; he arranged in his Treatise on Medicine the knowledge which Erisistratus and Hierophilus had acquired by dissections, and his opinions were taught in all the medical schools in Europe for nearly fifteen hundred years.

In the works of Galen anatomy is very well arranged, and the situation and uses of all parts of the body are described. The discoveries he made cannot easily be ascertained, and commentators have been usually satisfied by stating that "he was the first author who digested into regular order the human functions, the brain and its membranes, the senses, the contents of the abdomen, osteology, a complete myology and neurology, the insertion and action of all the muscles, and the distribution of the whole nervous system." Galen appears to have been acquainted with the exhalent and inhalent arteries, but of their use he was unacquainted. The lacteals also he appears to have known, but of their use and termination he was entirely ignorant.

Although anatomy had been extensively studied up to the fifteenth century, it appears that the use of the liver, glands, heart, circulation of the blood, pancreas, kidnies, ureters, bladder, diaphragm, and the power of the nervous system over the arteries and veins remained undiscovered; consequently they were unknown to Galen and his predecessors.

For a short period after the death of Galen anatomical science declined, physicians and surgeons being considered learned or otherwise in proportion to their acquaintance with his works. After Alexandria was destroyed, learning was introduced into Arabia, in which place Abdollaliph discovered many errors which Galen had introduced respecting osteology. It does not appear that Abdollaliph made his discoveries from dissecting human bodies, but from his studying the bones which he procured from burial places, to which he often resorted.

In the fifteenth century Vesalius appears to have been engaged in the cultivation of anatomical science, and by anatomical demonstration proved incontestably many errors of his predecessor Galen.

Vesalius who was endowed with a mind, education, and perseverance beyond the generality of men, was born at Brussels in 1514. After he had laid the foundation of his education at Brussels, he went to Montpelier, and thence to Paris, and at both places studied under the most eminent professors. When Vesalius was at Paris, a war broke out between France and his native country, consequently he was compelled to leave Paris, and from thence went to settle at Louvain: he evinced an ardent desire for anatomical knowledge, and by his manner of obtaining subjects for dissection, exposed himself to imminent danger. Some time after he had settled at Louvain he was chosen first physician to the army, and was afterwards elected Professor of Medicine in the university of Padua, in which place he gave lectures for several years. The inroads which Vesalius made upon the ancient standard of medicine and anatomy, procured him many eminent opponents, amongst whom were Silvius and Eustachius; also Fallopius, a former pupil of Vesalius. Notwithstanding all the force of opposition directed against Vesalius, he became more and more renowned, and had the honour to be chosen first physician to the Emperor Charles the Fifth, who retained him always at court.

Unfortunately for Vesalius, not long after he had become the king's physician, a serious disaster befel him, through which he was condemned to death; but from the king's interference his punishment was commuted to banishment, after which he visited Palestine. The disaster to which I have alluded arose from Vesalius having opened the body of a Spanish Nobleman, whom prejudice and malevolence circulated was opened alive. This circumstance cannot fail in some degree to awaken the minds of every individual to the danger and hardship attending a medical education, and of the prejudices which practitioners in medicine and surgery have to contend with. Vesalius travelled to Cyprus and Jerusalem, in the company of a Venetian general; and on the death of Fallopius, was recalled by the senate of Venice to fill the anatomical chair of that city. The latter part of this great man's life appears to have been fraught with misfortunes; for, upon his return, he was shipwrecked on the Island of Zante, where he died of hunger, on the 15th of October, 1564. After the death of Vesalius anatomical dissections became more appreciated, and although opposed by overbearing prejudices, the science spread over all the civilized world.

Fallopius, (who, with Eustachius, was contemporary with Vesalius), discovered the tubes which bear his name. Eustachius discovered the Eustachian tube, and both were celebrated for their anatomical knowledge.

Early in the seventeenth century the circulation of the blood was discovered by Dr. Harvey, who was born at Folkstone in Kent, on the 2d of April, 1578.

Dr. Harvey studied at the university of Cambridge, and afterwards travelled through France and Germany to Padua in Italy, where he was honoured with the degree of Doctor of Medicine. On his return to England, he became a graduate in medicine at Cambridge, and afterwards settled in London; and in the year 1615 was made a Fellow of the London College of Physicians. In the following year he read a course of lectures, developing the circulation of the blood, and with such accuracy that no improvement in it has been made, although the discovery took place two hundred and fifteen years ago.

It is a surprising coincidence, but not more surprising than true, that when one discovery has been made another has quickly followed; and in this place it is strikingly exemplified by Asalius discovering the lacteals, which Pecquect traced to the thoracic duct, and thence to the left subclavian vein. About thirty-eight years after Harvey had discovered the circulation of the blood, Rudbeck and Bertholin discovered the tubes called lymphatics. This discovery was not made from the joint, but individual, efforts of those anatomists, each being unacquainted with the other's discovery, until after it had been published, which occurred about the same time. The description which Bertholin gave of the use of this system of vessels was more generally approved than that given by Rudbeck, consequently his merits were duly appreciated. Although Bertholin's description was superior to that of his contemporary Rudbeck, still this explanation was very imperfect, and became the subject of Glisson's consideration, from whom it received considerable improvement. The discovery of the lymphatic system left little to be accomplished by anatomists of the seventeenth, eighteenth, and present centuries, further than confirm what had been previously discovered, and direct their attention to a further and correct knowledge of the functions and use of the various parts of the human body. Amongst the vast number who have thrown considerable light upon anatomy, and particularly physiology, the following names stand prominently conspicuous, viz. Albinus, Cooper, Diemerbrock, Highmore, Cheselden, Lewenhoeck, Malpighi, Willis, and Winslow, in the seventeenth century; and in the eighteenth, Haller, Morgagni, Scarpa, Soemmering, Monro, Hunter, Cruickshanks, and Bell. Those of the present are Gall, Spurzheim, Cooper, Abernethy, C. Bell, Bichat, Majendie, Cuvier, and many others whom I shall have to mention in the physiological part of those lectures.

Having concluded a short, and therefore a very imperfect history of some of the most important discoveries, I shall now briefly notice them in as concise a manner as the subject will permit. In the first place I beg leave to direct your attention to the changes which the impregnated ova undergoes during the first period after impregnation to that of the fifth month, and which changes are admirably represented by the plates of Soemmering. An embryo of three or four weeks' duration is represented in those engravings something like a mustard seed beginning to shoot out; the head of the fœtus appearing like the body of the seed and its body like the root. Assisted by a microscope, we discover a small circle in the situation of the eye, and an oblong depression corresponding in situation to the mouth; we also perceive four small prominences that correspond as to situation with the upper and lower extremities, and it is curious to observe a prolongation between the two inferior extremities, called the coccygeal protuberance. It is generally considered that the body of the fœtus is observable seven weeks after conception—that the upper extremities are divided into arm and fore-arm, and two depressions can be seen corresponding with the nostrils. Eight weeks after conception, microscopic observations discover a small hole in the situation of each auricle, and the naked eye can discover the appearance of the hand, fingers, arm, and fore-arm; also parts corresponding with the thigh, leg, and foot. At the expiration of nine weeks the form of the fœtus is more considerably developed, an eminence can be seen in the region of the nose, the toes are formed, the auricles are partly formed, the pudenda is distinguishable, and the coccygeal protuberance can be no longer observed.

The head of a very young fœtus is larger in proportion than other parts of the body, and the face smaller compared with the head, and the extremities are not in proportion to the trunk. About the fourth month of gestation the size of the fœtal extremities correspond; but in a less advanced period the upper appear larger than the inferior extremities, and after this period the inferior extremities are the largest. About the time when the inferior extremities have become larger than the superior extremities, viz. the fifth month, the hair begins to make its appearance on the eye-brows and head.

The male fœtus may be distinguished from the female by the head being larger in proportion to the body, less rounded, the occipital protuberance greater, the crown of the head flatter, and the chest is more prominent than the umbilical region. The male trunk is arched between the superior part of the loins, whilst in the female it is hollow; there is also a considerable difference in the appearance of the extremities; they are generally longer, not so plump and round; the wrist and hands are usually broader, and the fingers not so small and pointed. There is also an obvious difference in the circumference of the body over the hips, which is usually considerably less in the male than in the female. The lower extremities partake of the same difference of dimensions as the upper; the heel is generally more prominent, and the length of the great toe exceeds that of the other toes.

The growth of the child, in embryo, as stated by Soemmering, is much more considerable during the first week after conception than at any other period, and it does not make the same progress at all periods of gestation. It is the received opinion, that the growth of the fœtus is less rapid during the second than the first month; that it is accelerated from the commencement of the third to its termination; its growth retarded to the middle of the fourth; and from this period to the sixth month, more progessive than from the sixth to the termination of the ninth month. There is also a difference in the dimensions of the sexes in the fœtal state, as proved by a calculation of sixteen males and eight females, born at the full time. The mean length of the sixteen males was $20\frac{5}{6}$ inches; the eight females $20\frac{1}{3}$ inches. From these small dimensions the growth of the body increases in the male until it arrives to five feet eight inches to six feet, and we have occasionally an opportunity of seeing an adult of seven feet and upwards; but these are exceptions, the average length of the male being about five feet eight inches, and that of the female five feet five inches.

The weight of the fœtus is said to be about two ounces in the twelfth week; about sixteen in the sixth month; in the eighth month from four to five pounds; and at birth about seven pounds. It has likewise been computed that the relative weight of the female child at birth is about nine ounces less than the male, and that in the case of twins the proportional weight is considerably less than in a single child. Upon calculation of fifty adult males of ordinary size, they were found to average about one hundred and forty pounds, and the weight of the female about one hundred pounds.

This body then, the changes and weights of which are so various at various periods, is made up of four elementary substances, viz. oxygen, hydrogen, carbon, and azote; constituting, by various combinations, bone, membrane, ligament, tendon, muscle, arteries, veins, nerves, lymphatics, absorbents, cellular substance, adipose substance, skin, and hair. It will be necessary for me to survey these formations, and I shall begin by stating that the heart, arteries, and veins constitute the circulating system. The heart is a compound of muscular and membraneous substances; it is of a conical form, and situated in the inferior part of the chest, with its apex towards the left side. It is divided into auricles and ventricles, and these are subdivided into right and left by a fleshy substance, generally called septum. Each of the ventricles have two openings, the first of which is from the auricles, and the other the commencement of the large arteries, the pulmonary arteries, and the aorta. It has been thought desirable to ascertain the relative size of the cavities of the heart, and many experiments have been made for that purpose, the result of which has led to the following conclusion, viz. that the right ventricle of an ordinary sized adult heart will contain two ounces and a half of water, and the left not more than two ounces. The heart is covered throughout its external surface by a membrane, called serous membrane, and it is most dense and strong about the auricles. On viewing the heart we observe various parts of a straw colour; this is adipose substance, and lies interior to the membrane above described. Under the membraneous and adipose coverings the muscular coat is situated; and lining its whole interior surface there is a transparent membrane, apparently void of fibres, absorbents, arteries, veins, or nerves. Throughout the whole of the left and part of the right auricles this membrane assumes an appearance different to serous membrane, being somewhat whiter, stronger, and thicker, and is attached by cellular substance to the muscular coat of the heart. Of all the peculiarities of the fœtal heart, that of the foramen ovale is the most important, and it is found in the division or section by which the auricles are divided. This important peculiarity consists in the foramen ovale admitting nearly all the blood from the right to the left auricle during gestation, which takes a different route after the child breathes atmospheric air. The communication between the auricles is not exactly a direct communication, for by dissecting a fœtal heart after the fourth month, we observe a thin transparent membrane partly covering this foramen and inclining inwards, leaving a free curved edge towards the left side. This membrane or valve is double the breadth of this oval opening, to the lower third of which it is attached, and the loose portion admits of being pushed towards the cavity of the left auricle, otherwise this opening from the right to the left auricle might be obliterated by the valve becoming stretched over its orifice.

It appears that anatomists have not had sufficient opportunities to discover whether this valve does or does not exist before the fourth month; but the present belief is, that it does not exist before the termination of the second month, and after this period Senac states that its growth is progressive until it attains a nearer approach to the superior border of this fossa. When the fœtus has arrived at the last month of its being in embryo, an obvious change begins to manifest itself in the appearance of this opening; the valve becomes shorter, and therefore thicker; the sides of the opening thicker, and its orifice smaller. In a preceding part of this Lecture I have stated that the right ventricle of an adult heart is larger than the left, and here I beg leave to state that the auricles of the fœtal heart are larger than the ventricles, viewed in proportion to the adult heart, but after birth this difference is less observable.

I next come to consider the Arterial System, which consists of two trunks, the one arising from the right ventricle of the heart, called the pulmonary artery; the other from the left ventricle, called the aorta. The diameter of these arteries are nearly the same, being about one inch and a quarter, and the thickness of their sides is about the twelfth of an inch. Immediately at their origin they begin to give off branches, the various ramifications of which supply all parts of the body with blood.

Arteries have been said to terminate in open capillary vessels, which pour out their contents upon various surfaces, also into glands and cells; but their termination in the venous system is the only one that can be demonstrated.

Arteries are formed of several coats or coverings, some anatomists describing five, while others consider them to have only three, viz. an outer, middle or muscular, and inner or smooth coat. Others again have considered them merely a folding together of cellular substance. In describing the appearance of the outer coat of an artery, I must state that it consists of very small white fibres, so connected that they cannot be separated in any regular order. The middle or muscular coat is the thickest, and is composed of very delicate fibres, closely united together and surrounding the artery. The inner coat is like that which lines the heart, with this exception, that it is more elastic. Some anatomists have considered arteries to have a cellular covering, but as this covering or coat is not universally to be found, we must regard it rather as an accidental than a regular coat.

It is generally considered that small arteries consist throughout of the same texture as the larger ones; still there are some who have maintained them to partake more of a fibrous than a membraneous structure.

I beg leave, in the next place, to draw your attention to the venous system, which has its origin from the minute termination of the arterial system, and can be easily demonstrated by a well injected subject viewed by a microscope. The large veins have two distinct coverings; and in some of their parts we perceive, between these two, another coat. The outer coat is like that which surrounds the arteries, with this exception, that it is thinner and not so closely interwoven. The inner coat of veins is somewhat thicker than the inner coat of arteries; they are alike transparent; considerably stronger, and their fibrous threads can be distinctly separated.

The middle and partial covering which is found in the larger veins does not always completely surround them; it is in some parts thicker than in others, and in structure appears to be intermediate between the external and middle coats of arteries. Veins, like arteries, are considered to have other points of communication than by minute arteries; but excepting their communication with sinuses, they are not demonstrable.

In speaking of the Lymphatic System, I have to state that it consists of a number of tubes; and, like the blood-vessels, those tubes are distributed throughout the body, and are in some parts so exceedingly minute that their origin has not been discovered, except in the inner surface of the small intestines, not even by the aid of a microscope.

The lymphatics of the alimentary canal take the name of absorbents, and in their origin appear of a circular form. It was in the alimentary canal that Mr. Cruickshanks first discovered those vessels, tinged with a milky fluid, and from this circumstance he traced great numbers to their origin. The structure of these vessels is not so clearly understood as that of the arteries or veins; they are thought to consist only of one coat, similar to the inner coat of the veins. They are interspersed with numerous valves, which are prolongations of their covering: and terminate in the thoracic duct, which conveys its contents into the left subclavian vein.

The Glands, which form part of the Absorbent System, consist of a substance very peculiar, they are surrounded by a membrane entirely transparent, very vascular throughout, and which may be separated into very fine fibres. Mascagric states that the lymphatic vessels divide into a considerable number of branches before they enter a gland, some of which pass directly into its centre, whilst others distribute themselves more towards the surface. The larger branches are contorted, and cross each other in all directions, uniting freely one with the other; in some places they abruptly become narrow, while in others they swell out into small cells, so that the surface of the gland, when injected, appears as if covered with small eminences. By the division of the minute lymphatic vessels, a kind of network is formed on the surface of the gland; they afterwards pass between the large branches into the body of the gland, or open into those large branches. From the cells above described, or from the space between them, a number of very small vessels are seen to ascend, which, after they have interspersed themselves over various parts of the gland, unite together, and form the vassa afferentia. It has been stated above, that the lymphatic vessels of a gland in some parts become abruptly smaller, and afterwards form into small cells; I also beg to observe that they sometimes continue nearly of the same dimensions throughout, when little or no appearance of cells can be seen in any part of the gland.

In ascending the scale of this elaborate piece of workmanship, I find the Nervous System is the next in order. The Brain and Spinal Cord are the centre of this system, to which, in the first place, I beg leave to draw your attention; and in the second place to their ramifications.

The Brain generally weighs from forty to forty-eight ounces, but this calculation is liable to variation, though not in proportion to the various dimensions and weight of individuals. Anatomists have divided that portion of this central mass which is contained within the cranium into cerebrum and cerebellum, and again, into right and left hemispheres, or halves. The weight of the cerebral portion is usually forty ounces, and the cerebellum is from an eighth to a fifth of that weight.

The Brain is almost wholly composed of a substance called nervous matter, and surrounded by three membraneous coverings: the substance of which the brain is composed has been divided into two portions, white and brown, the last of which is sometimes called cineritious.

The white portion of the brain has been recently stated to be fibrous; but prior observations go to prove that it consists of globules, having the appearance of cells, filled with proper medullary substance. This portion of the brain is considesed by some to be highly vascular, while others deny that blood vessels pass beyond the arachnoid membrane. The cineritious portion of the brain is considered softer than the white, but when viewed through a microscope, it presents the same globular appearance. The white and cineritious portions of the brain are intermixed in various ways: in some parts a covering of the brown surrounds a portion of the white; at other times a strata of one surrounds a strata of the other, presenting uniformity of order in all its parts. The cerebellum presents an appearance different to the cerebrum, but we are told this seeming difference arises not from a greater portion of grey matter than in the cerebrum, but from the manner in which it is mixed with the white matter.

In describing the membraneous coverings of the brain, it is usual to include the dura mater with the pia mater and arachnoid membrane; but some anatomists have considered it only as a covering of the inner surface of the cranium.

The pia mater lies immediately under the dura mater, and is wholly made up of blood-vessels for the supply and nourishment of the brain. Bichat describes this membrane as having a cellular tissue; but the anatomists of this country have not been able to discover it, nor can absorbents or nerves be therein observed. This membrane, in some of its parts, presents an appearance of white threads, so very minute that anatomists have not as yet been able to determine whether they are blood-vessels or otherwise. The arachnoid, or third covering of the brain, takes its name from the strong resemblance it bears to a spider's web, and differs from the membrane last described not only in structure but in its distribution. It is very compact; its colour is nearly imperceptible, being almost transparent; and it is free from blood-vessels, absorbents, and nerves.

The relative proportions of the brain, and its dimensions progressively, have been particularly attended to by the Wenzels. They have stated that the brain and cerebellum make a little more progress in its length and breadth in the last six months before birth than in seven years afterwards; that the brain does not increase in size after the seventh year, but continues of that size during the whole life after that period. They have likewise stated, that the brain does not increase in weight after the third year, and continues of the same weight ever afterwards. This weight, according to their calculation is from forty-one ounces thirteen pennyweights to forty-five ounces sixteen pennyweights; sometimes it may extend to fifty ounces, but never exceeds this weight. In opposition to the foregoing opinions, I beg leave to introduce the opinion of Dr. Gall, viz. that the brain does not acquire the full extent of its growth until the age of twenty or thirty, when its powers of perception and retention attain their height.

I shall now descend from the cerebrum and cerebellum to the spinal cord, which is divided into cranial, cervical, and dorsal portions; it is composed of both kinds of nervous matter before alluded to, and an additional membrane: the outer edge of which is serrated, and is whitish, thin, nearly transparent, and considerably stronger than the pia mater, to which its inner border is attached. The dura and pia mater surround the spinal cord nearly to its extremity; and it is to the dura mater that the outer edge of the serrated membrane is firmly connected.

The statements of some anatomists would lead us to conclude that the nervous matter of the spinal cord is shorter in children than at the age of maturity, and also that it becomes shorter after the body has arrived at its climax. Whether these opinions are founded upon correct experience, or otherwise, I am unable to say; but I think it not unreasonable, though perhaps we have not sufficient proofs before us to decide this point.

I have before stated that the brain and spinal cord are composed of two kinds of matter, brown and white; I beg leave here to observe that the brown portion is absorbed in the decline of life, and that, if its place is not supplied by a greater quantity of white matter, the dimensions of the brain and spinal cord must be decreased; but I believe it is generally thought that it is supplied by an increase of white matter.

The nervous ramifications are inclosed by a peculiar substance, called neurilama, and are distributed throughout the body in a variety of ways: they are composed of small filaments, varying in size, seldom exceeding the thickness of a hair, and frequently very much smaller. They are distributed on the side of each other, and give out so many small ramifications, that their connexion appears to be almost indivisible, and they are united into bundles or fasciculi, by a membrane somewhat resembling cellular tissue.

Nerves are, by a peculiar connexion, formed into ganglia and plexuses; the first being composed of nervous filaments of various sizes united together, and forming those ganglia which have the appearance of small kernels or tumours; and the second, or plexuses, is an intermixing of a variety of nerves, which appear lost one with the other, and bears some resemblance to a piece of network.

The structure of ganglia appears to be very obscure, as is obvious by the difference of opinion that exists respecting their use and the coloured matter of which they are composed. Between the fasciculi of the various nerves which pass through ganglia, we observe a grey or yellowish kind of matter, which has been said by some anatomists to be of the same description as that found in the brain and spinal cord, whilst others affirm that it bears no resemblance to that substance.

I must now draw your attention to the various textures which enter into the formation of the human body, and shall commence with the Muscles, which are a compound of very small fibres, supplied with a vast number of blood vessels, nerves, and absorbents, and so connected together with cellular substance, that they appear very red, and highly vascular. It is stated that the diameter of the smallest fibre does not exceed the forty-thousandth part of an inch, and that they are placed parallel to each other, and thus form into fasciculi, the largest not being greater than the eighth part of an inch, and the smallest not less than the sixteenth part of an inch. The muscular fasciculi have been said to be of various lengths, and Prochaska states that he has traced their continuance from one end of the largest muscles of the body to the other. The fasciculi above alluded to are considered the primary fasciculi of a muscle, and by their union are formed into others of a second, third, and more than a fourth order. Almost every muscle has its muscular and tendinous portion, and this portion is generally situated at the extremity, where it is inserted to the bone, and its appearance is white and glittering. Sometimes this tendinous substance is stretched over the surface of muscles, when it takes the name of aponeurous, and sometimes facia, as in the muscle of the thigh, the palm of the hands, and soles of the feet. The fibres are collected into bundles, and are generally united in a longitudinal manner; occasionally we find them presenting the same regularity of appearance as the threads in a piece of fine muslin; while, at other times, the mode of their union partakes of considerable variety. Tendon not only spreads itself over muscles, and forms their extremities, but also extends over bone, when it is denominated periosteum, except on the skull, where it is called pericranium; in other parts it constitutes membrane.

The substance of Bone is uniform throughout; very firm; of an areolar organic tissue, in which is deposited earthy particles; and is supplied with arteries, veins, and nerves. Bone may be rendered softer by artificial means, without any apparent addition or diminution of its substance.

The extremities of Bone, and some ligaments, are covered by an elastic substance called Cartilage, the appearance of which is white and shining. When examined by a microscope it appears uniform in its structure, and without cells, fibres, or laminæ; nor can blood-vessels be perceived in it, except in that portion which covers the extremity of growing bone, where their presence can be readily observed.

The Membrana Cellulosa, or Cellular Membrane, is found in almost all parts of the body, and by it these various parts are connected: it is composed of a substance which is fibrous, and disposed in transparent layers, so as to intersect each other, and form various sized cells. This substance is supplied very plentifully with blood vessels, especially that which lies under the skin, and that about the mesentery, &c. It will not be required of me to describe the appearance of this substance more particularly, as every one whom I have the honour to address, (with the exception of a few pupils) is doubtless well acquainted with it. It may not be amiss, however, to mention the circumstance, to which most anatomists have referred, of this portion of the body being employed by butchers for ornamenting their veal. I am not aware that microscopic examinations of this substance have discovered more than that it is composed of exceedingly fine fibres, interspersed in all directions.

Adipose substance is principally an oily matter, deposited in a liquid state between cells; it is vascular and more delicate than the cellular substance.

Membrane is a substance which expands itself over various cavities, and from which is secreted a matter of a peculiar kind. These membranes are divided into mucous, serous, and synovial membranes, and in addition to the above, some anatomists add a fibrous membrane. Mucous membranes are said by Bichat to present two surfaces, "the one adhering to the adjacent organ, the other freely covered with villi." These membranes are supplied with glands of a spherical form, and of a size varying considerably; they do not appear to be enveloped by membrane; they are also soft and vascular, and supported by cellular structure.

Serous membranes, as well as mucous, are strictly membraneous; and, like them, have one of their surfaces free, and the other attached to the adjoining parts. This membrane, says Bichat, is nothing else than a union of absorbent and exhalent vessels by cellular tissue, with a small number of blood vessels; and those arteries which have generally been considered to belong to them, he thinks are nothing more than branches from other parts passing over their surface.

Synovial membrane, like the last mentioned, is thin and transparent, and has two surfaces, the one presenting itself to the interior of the joint, and the other attached to the edge of the bone forming the joint. This membrane, in its healthy state, is slightly vascular; and, according to Bichat, these vessels pass over its surface rather than enter it, and partakes more of a fibrous nature than the serous membranes. The fibrous membrane described by Bichat is objected to by almost all anatomists, the term applying to nerve, muscle, tendon, ligament, &c. The whole structure of the body might be justly considered a fibre, and the textures fibrous, and the compound membranes as consisting of two or more simple fibres.

The cuticle or skin is a substance surrounding the body, and is divided into two layers by some, and into three by others. The outer layer is denominated epidermis, the inner cutis vera, and the middle layer rete mucosum. This layer, according to Dr. Gordon, is not seen in the inhabitants of Europe, and therefore only belongs to coloured people, and on it their colour depends.

The scarf skin, or epidermis, is thin and transparent, without blood vessels and nerves, and its colour is of a yellowish white. This substance having no supply of nerves, will be readily conceived to be without sensibility. The outer surface is every where marked by lines, perforated by minute openings, exhalent and inhalent vessels and hairs, and its inner surface presents a shaggy appearance. The cutis vera, or true skin, differs greatly from the scarf skin, being made up of minute fibres, blood vessels, nerves, and absorbents; it is elastic, very sensible, every where perforated by an infinite number of small openings; and upon it is situated a vast number of nervous fibres, constituting the organs of touch. On examining each of its surfaces, we perceive the outer more vascular than the inner, and upon which its colour entirely depends. The rete mucosum is said to be stretched between the epidermis and cutis vera in a net-like form, its thickness and transparency differing according to its situation, being thickest about the scrotum, and very fine and delicate over the lips, mouth, vagina, &c.

The Nails on the fingers, &c. are said to be a continuation of the epidermis or cuticle; and like the cuticle they are insensible and without vessels; they have the appearance of horn, and like horn are transparent; they are deposited in layers of different sizes laid over each other, and their fibres are longitudinal.

The Hairs of the Body are elastic, thin dry filaments, arising from bulbs situated in the cellular membrane, immediately under the cutis vera, and so closely that no portion of the hair can be seen between it and the bulb. They are thicker at the root than the other extremity, towards which they taper to a point. As the hairs pass through the cutis vera, they are received into a kind of groove, which passes obliquely to the exterior surface, so as to correspond with the openings in the epidermis, through which they pass. They are generally considered to be entirely solid; yet the root, which is situated in the bulb, is perforated. Each bulb is surrounded by two capsular bags; the inner one, embracing the very root of the hair; it is very delicate and vascular, and between it and the outer one there is an oily fluid, which is thought to give to the hair its various colours; the outer capsule is much firmer than the inner one, and much less vascular.

The various Viscera are formed of a substance called parenchyma, which is a combination of membrane and vessels, surrounded by a serous membrane; this peculiar substance is almost always glandular, as in the liver, lungs, kidnies, &c. although it is not so sometimes, as in the spleen.

Glands are divided into three varieties, viz. the follicular, conglobate, and conglomerate; the follicular glands are said to be tubes of a cylindrical shape, continued from arteries opening upon the external and internal membranes. The conglobate glands are exemplified in the glands of the lymphatic system, having no excretory duct. The conglomerate glands are those which have an excretory duct, as the liver, kidnies, and salivary glands; they consist of separating vessels and a duct, by which their peculiar secretion is conveyed to other parts.

Gentlemen, I have at length surveyed all the substances which enter into the formation of the human body; and if I am not intruding upon your patience, I will pass on, and make a few remarks upon the Human Skeleton, the particulars of which I will refer to in another lecture.

The Skeleton is made up of a number of bones, some anatomists enumerating two hundred and forty-eight, and others two hundred and fifty-four. These bones are divided into round, long, flat, and cylindrical, some of which contain a substance called marrow or medullary oil, the nature of which is not properly understood. It does not acquire its proper consistence before the body arrives at its full growth, and in old age it acquires a yellowish colour, and the membrane that surrounds it becomes less vascular.

Bones are also surrounded by a very thin membrane, called periosteum, which is universal, except on the crown of the teeth. It is thicker in the fœtus than the adult, and also more sensible and vascular. I have stated that this membrane is universally found covering the bones; but I must likewise mention that it receives various names, according to the parts it covers; hence we find it called pericranium, periorbita, perichondrium, and peridesmium.

Bones are connected together in two different modes, the one admitting of motion, and the other not. In those parts which admit of union their surfaces are provided with an extension of cartilage, between which there is a substance called intermediate, and is compressible. The cartilaginous surfaces that enter into the formation of joints is exceedingly smooth and polished, and covered by an extremely delicate synovial membrane. The connecting media of articulated joints are called ligaments, and are of two kinds, fascicular and capsular; the first presenting the appearance of cords, and the second that of a bag. Between the fascicular ligaments we observe portions of synovial membrane, connected on one side to those ligaments, and on the other to the edge of the articulating surfaces of the joint: it has been thought that this membrane expands itself over the inner surface of those ligaments.

The vertebral column is united, without articulation, by a substance before alluded to, called intermediate, which is flexible and compressible, partaking of properties between cartilage and tendon: one piece of this substance connects the body of two of the vertebræ.

The second kind of connexion of bone is by suture, and synchondrosis, or connexion by intervening cartilage.

These unions are well understood by you, but for the sake of order and regularity, I beg to state that suture is a direct contact of two bones, which receive the serrated portions of one into the spaces of the other, and over which the periosteum extends itself, without dipping down between their union. The union which takes place by intervening cartilage, called synchondrosis, is also strengthened by various ligaments—an example of which presents itself in the union of the os innominatum with the sacrum.

According to Soemmering, the skeleton, in its dry state, is about an inch shorter than during life; its average length being about five feet seven inches: this admeasurement is the length of the male skeleton, the female being from two to three inches shorter. The weight of the male skeleton averages from about nine pounds six ounces to twelve pounds eight ounces, and the female from six pounds four ounces to the minimum weight of the male.

Parts that resemble the adult skeleton are seen when the embryo is seven or eight weeks old; but their substance is something like jelly or periosteum. Some of those parts are every where gelatinous, others wholly membraneous, and some partake of both these substances. In most parts ossific deposition takes place after the second month, though in some it is delayed until after the birth of the infant.

Having detained you much longer than I had intended, I must now conclude; but before I do, allow me to name the plan that I shall adopt with regard to the Lectures to which this is introductory. My next Lecture will be on the Bones, which I shall demonstrate before you; and also the Ligaments, Muscles, Arteries, Veins, Nerves, &c. I shall also introduce various diagrams, which will enable me to explain with greater clearness the more intricate parts, as also some parts of physiology. The physiology of each system of parts will be considered after those parts have been demonstrated, and one lecture will be delivered every six weeks throughout the year.

Before I sit down, allow me to return you my sincere thanks for the polite attention shewn me on this occasion; and to assure you, that it will be my most anxious desire always to render those lectures worthy of your attention.

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