PROFESSOR HUXLEY'S HUNTERIAN LECTURES ON THE ANATOMY OF THE VERTEBRATA.

Delivered at the Royal College of Surgeons of England.

LECTURE VI.

ALL Mammals are provided with a distinct atlas vertebra, and also with an axis vertebra. In the great majority of cases, the os odontoidem (arising as in the Sauropsida) becomes quite ankylosed with the body of the axis at a very early period. This, however, is not the case in the Monotremes. It is an interesting question, whether the lower part of the atlas is (as probably is the case in the Sauropsida) an ossification of an intervertebral cartilage, or not.

Professor Huxley here called attention to a case observed by Mr. Hilton, who had kindly informed the professor of it—a case in which, in the human subject, small wedge-like ossifications had taken place, one at the lower surface of each cervical intervertebral substance behind the axis; and the diagram exhibited showed the singular resemblance between these wedge-like ossifications and the section of the anterior part of the atlas vertebra.

In the great majority of mammals, there are vertebral epiphyses; but these appear to be absent in the Ornithodelphia.

All but the Cetacea and Sirenia are provided with a manifest sacrum. In most mammalia, the cervical ribs ankylose very early with the vertebrae to which they are attached; but in the Marsupials and Monotremes this is not the case, nor is it so in the last cervical of the three-toed Sloth. The number of the cervical vertebrae is constantly seven, except in the Manatee, and sometimes in the two-toed Sloth, where there are but six, and in the three-toed Sloth, where there are as many as nine. The cervical vertebrae are in most cases freely moveable; but, in the Cetacea and Armadillos, they are more or less ankylosed together.

The extinct genus *Glyptodon* presents us with a structure otherwise unknown in the whole class—namely, the complete union of so many dorsal vertebrae as to form a continuous bony cylinder. In most Mammalia, the capitula of the ribs articulate with the bodies of the vertebrae; and, in the hinder part of the trunk, this is their only mode of articulation. In most Cetacea, however, it is only in the anterior part of the dorsal region that the ribs are connected by means of capitula, and these abort further back; while, in the whalebone whales, none of the ribs are so articulated.

Certain accessory vertebral processes are met with in the class Mammalia. These are either projections forwards from the anterior parts of the vertebrae (metapophyses), or backwards from the posterior parts of the vertebrae (anapophyses), or from the side of the neural arch, and connected with the metapophyses and anapophyses.

Sternum.—In the lower Sauropsida, the sternum much resembles that of Amphibians, as may be seen in the genera *Lialis* and *Anguis*. The normal form of the sternum in Lizards, however, is that of a rhomboidal plate, dividing behind into two long cornua. The explanation of this is, that the cartilaginous ribs run together at their distal ends, forming antero-posteriorly directed intercostal arches; and the sternum is formed by the median approximation (through growth) of these arches, the approximation resulting in union first anteriorly. Unless the Pterosauria form an exception, no reptiles have the sternum thoroughly ossified.

The sternum in Birds is almost wholly the representative of the rhomboidal plate before mentioned. The keel is an outgrowth from it, and not the homologue of the reptilian interclavicle, which is a membrane-bone. In keelless birds, ossification takes place from paired centres; in keeled birds, from an azygos median centre. However arising, ossification of the sternum in birds is complete. In typical Mammals, the ossification of the sternum takes place from successive centres, from before backwards, resulting in bones resembling the vertebral centres above, whence they have been called "sternebrae". This mode is not, however, universal, as in some—e.g., in Man—there are paired centres of ossification.

Skull.—To understand the modifications presented by the skull, it is necessary to return to the embryo, and study the process of its development. At first, the future spinal column and skull are represented by one common structure, the primitive groove; but, from the time when the dorsal laminae meet above in the middle, and when the proto-vertebrae begin to appear, the skull and spinal column follow two different routes, in spite of certain curious parallelisms, especially at the hinder part of the head. In the skull, no proto-vertebrae have been observed; but the dorsal laminae unite, and form a primitive vesicle

containing a closed cavity. At first, the notochord extends the whole length of the floor of this cavity; and in *Amphioxus*, in the adult, it actually grows out beyond it. In all other Vertebrata, the primitive vesicle, with its cavity, grows out beyond the front end of the notochord; and in the Lampreys (as also, of course, in *Amphioxus*), no change takes place on the part of the primitive vesicle beyond that front end of the notochord. The cerebral cavity dilates at intervals from behind forwards, forming three compartments, called respectively the fore-brain, the mid-brain, and the hind-brain. The disposition of the axis then changes the anterior part, bending down at a sharp angle over the anterior end of the notochord. It is commonly said that this flexure is afterwards obliterated. It is never actually so, however, though it is so potentially; and the only trace of this early flexure is the pituitary body in its sella Turcica. While these cranial developments have been in progress, the walls of the body of the embryo have been growing downwards, and peculiar changes effected in the pharyngeal region. The cavity of the future alimentary canal is not at first in direct communication either with the pharyngeal cavity anteriorly, or with the cloacal cavity posteriorly; and thus these cavities are quite distinct in origin from the oesophagus and alimentary canal, and the lining membrane is not a product of the stratum mucosum. On each side of the pharyngeal cavity a cleft appears, which is afterwards succeeded by others; and there may be as many as five of these visceral clefts, but, in the chick, the hinder ones are very small and very transitory. On the other hand, the most anterior cleft persists throughout life as the Eustachian tube and meatus auditorius externus. The intervals between and in front of the clefts become thickened, forming the so-called visceral arches; and each arch lies in front of the corresponding cleft. The first arch forms the lower jaw. The upper jaw is not at first represented; but a median process, projecting downwards, is the precursor of the median part of it; while an outgrowth on each side (called the maxillary process) from the first visceral arch forms the more proximal part of the upper jaw on each side. Before these maxillary processes reach the median process before mentioned, we have a transitory double harelip, which is soon obliterated. On each side of the median process, a depression appears, which two are the first sign of the nostrils. The tympanic membrane grows across the first visceral cleft, thus forming a partition. All the clefts behind the first become obliterated in the Bird. In Mammals, a flap grows out from the hinder border of the first visceral cleft; this is the external ear. Another flap grows out from the anterior margin of the same cleft, and becomes the tragus of the ear.

THE CHARACTERISTICS AND WANTS OF THE PRESENT SURGICAL EPOCH.*

By SAMPSON GAMGEE, F.R.S. Edin.,
Surgeon to the Queen's Hospital, Birmingham.

JUSTICE to the title I have selected would demand nothing less than a review of the present state of surgery—a task which I have no present intention of attempting; neither do I contemplate dwelling on those features and results of modern surgical work which are by common admission improvements, if not altogether innovations, on the practice of our predecessors. But, with every desire to point out critically what stands in need of emendation, I cannot omit passing allusion to some of the brilliant achievements and real conquests which must render this epoch memorable in surgical annals. The revolution which has taken place in ophthalmic surgery, since Helmholtz discovered the ophthalmoscope, has resulted in an amount of beneficent change which it would be difficult to rival in an equally brief period of the history of any department of knowledge. We have lived to see orthopaedic and plastic surgery advanced nearly to the level of arts of precision; and, beyond question, this generation will be memorable for the establishment of ovariectomy as not only a legitimate procedure, but, in properly selected cases, one of the successful major operations of surgery. It is pleasing to note that the department of surgery which is the least attractive to the conservative surgeon—that of amputations—has been greatly improved by the labours of Mr. Syme and the late Mr. Teale. The disarticulation at the ankle, with removal of the malleoli and preservation of the heel-pad, is the *beau ideal* of surgical economy. It enables us to remove the diseased part of the foot, preserving the most important element in the construction of the limb as a basis of support; it has almost superseded amputation of the leg for disease of the ankle; it is attended with positively trifling risk to life; and, provided Professor

* Read before the Birmingham and Midland Counties Branch.

Syme's rules be adhered to, it ensures a stump to which an artificial foot can be affixed at no great expense, and with the safest prospect of easy progression, without suffering and without perceptible lameness. Mr. Teale's method has chiefly become famous for the rectangular shape of the flaps; but I am disposed to look upon the principle of measurement as the feature which is most decidedly an advance on other plans. A long flap, a perfect square, each side of which is equal to half the circumference of the limb; and a short flap, equal in length to one-fourth of the other, is a concise and intelligible rule, on the basis of which a considerable section of operative surgery admits of execution with nearly mathematical precision.

As a general proposition, all surgeons admit that the modern practice of excision averts many amputations; and of excision of the elbow, in particular, scarcely any one speaks in other terms than of great praise. But a case exhibited at this meeting illustrates our want of more precise information on the matter. The specimen shown was one in which an arm had been amputated to relieve the patient of an useless limb, months after the elbow-joint had been excised; no union, but, on the contrary, diseased action, having been set up between the ends of the bone. The operator was so able a surgeon, that it is quite probable the result was inevitable. He certainly followed a method which very many excellent surgeons would approve, but with two exceptions; that the joint had been excised through one longitudinal incision, made posteriorly; and that the head of the radius had not been removed, because healthy. Excision of the elbow is certainly practicable through a single incision; but the first element to rapid healing is the performance of a clean operation with the least possible laceration and bruising; and, with this view, I think the **H** incision decidedly preferable. The **H** incision affords still greater facility for the resection, but involves unnecessary exposure of surface, length of cicatrix, and risk of insufficient subsequent solidity. The retaining one of the articular surfaces in such an excision, because apparently healthy, is in theory a conservative proceeding; in practice, the reverse. As regards the choice between partial and complete excision, the latter unquestionably deserves the preference; but, on this point, more precise information is wanted.

As applied to the knee-joint, excision has been for many years, and is still, a subject of animated controversy, carried on, for the most part, without regard to the constitutional cause of the local affection, and with insufficient respect for, and adherence to, the fundamental principles of clinical observation and logical reasoning. If surgeons will keep more steadily in view the great aphorism expressed in the title to Abernethy's work on the *Constitutional Origin of Local Diseases*; if they will be as diligent in the treatment of the earlier stages of joint-diseases as they are in the management of wounds after excision and amputation; if poor young people be not asked to go backwards and forwards to out-patient rooms for their big, tender joints, in the early stages of joint-disease, to be looked at by the surgeon, and painted by an assistant; if proper medical treatment be followed, and nourishment provided; above all, if the articulation be set at perfect rest, by embracing the joint above and below the seat of pain, and if the sufferer be placed in condition to breathe abundance of pure air, and have a clean and healthy skin—we shall hear very little more of either amputation or excision for diseased knee-joints. Long before Sir Benjamin Brodie insisted on the necessity of embracing the hip if you wish to fix and rest the knee, Percival Pott had taught that splints are a mischievous absurdity in the endeavour to maintain rest, unless they fix the joint above the part to be kept quiet; but, in this important point of practice, as in that section of his writings wherein, forestalling Paget, he proves that callus is not essential to the union of a fracture, Percival Pott wrote in vain, so far as the majority of surgeons are concerned. The more faulty part of his theory and practice is remembered; his philosophical precepts are unheeded.

In the preceding remarks, I have especially had in view those articular affections associated with, if not directly dependent upon, the scrofulous or tubercular diathesis. No less important class of cases are those in which the constitutional predisposition is gouty or rheumatic. For the diagnosis and successful treatment of these cases, close inquiry is necessary into the constitutional history, and into the functions of digestion and secretion. The liver and kidney are often at fault; and local treatment stands little chance, if the poison be not eliminated and the assimilation improved. Chemical depuration, local douching at alternately high and low temperatures, friction, and electricity, are an assemblage of resources to which the surgeon must have recourse, if he wish to do justice to his patient, to himself, and to his profession.

The necessity of constitutional treatment, and of a thorough knowledge of therapeutics, is illustrated by no subject better than by syphilis. A great deal has been said about the doctrine of duality, which certainly possesses scientific and practical interest; but, for precise evidence

on the action of mercury and iodide of potassium, we are nearly as much in need as we were twenty years ago. Iodide of potassium, as commonly given in five-grain doses, is powerless in many cases of tertiary syphilis, which yield to it as to a charm if given in scruple doses three or four times daily. The combination with the salts of iron, the alternation with a course of the bichloride and bark, the exhibition of the iodides of potassium and iron with cod-liver oil, are resources of the most potent efficacy; but they will only be productive of the good which may be anticipated from them when a number of accurate clinical observations shall have been conducted, after collection of the large body of information already on record in the surgical annals of various countries.

The subject of hernia was one of the earliest to which surgeons devoted themselves. Many excellent memoirs and treatises have been written upon it; and, since the days of Richter, the question of intra- and extra-peritoneal herniotomy has been a favourite theme. It is now denied by few that it is an advantage, if practicable, to avoid opening the sac; but the comparatively little danger of extraperitoneal herniotomy has been productive of mischief, by diverting attention from the means to be adopted to reduce a strangulated hernia without recourse to the knife at all. If proper and early attention be given to the means of reduction, interference with the knife will be required only in cases of great rarity. Above all, attention must be paid to the position of the body, which requires most perfect rest, with the shoulders much below the level of the hips; and the taxis must be scientifically applied, not for a few minutes with a movement of the fingers like a cook's in making a pie-crust; but the pressure on the tumour with one hand must be gentle, uniform, and long continued, while the fingers of the other hand are delicately engaged in manipulating and influencing the direction of the neck. Chloroform and enemata are, of course, important adjuvants; and I do not doubt that, if people who have a hernia be told the symptoms of strangulation, so that they may guard against them, if once these appear, and immediately apply for professional aid; and if physicians and surgeons will closely adhere to the rule of practice of physically examining the abdomen, as every other part, when symptoms point to its functional derangement, we shall hear little of operations for hernia, which will then cease to be necessary, very rare cases excepted.

(To be continued.)

VOMITING OF PREGNANCY TREATED BY HYPODERMIC INJECTION OF MORPHIA.

By JOHN HARRISSON, Esq., Congleton.

ON the 7th of April last, I was requested to undertake the treatment of Mrs. C. She had been under the care of an experienced medical man for a period of six weeks previous to this date, and during that time a host of remedies were tried without success. Vomiting of a severe character had been the prominent symptom throughout the illness. When I first saw her, there was seldom a longer interval than fifteen minutes between the paroxysms of sickness; and, after each of them, the patient fainted. She retained neither food nor medicine. Lime-water and milk, brandy and water, champagne, beef-tea, and many other things, were tried in vain; they were, in common with cold water and medicines, returned immediately after being swallowed. When at the worst, the patient occasionally vomited stercoraceous matters.

The commencement of the illness seemed to be nearly coincident with conception; but the patient and her friends attributed it to partial suppression of the menses, caused by taking a shower-bath. The os uteri was swollen and tense. There was pain in the lower part of the abdomen, severe palpitation, and an intermitting pulse. A consultation was suggested; the physician who saw the patient with me confirmed the diagnosis, and the remedies recommended by him were administered, but without avail. The patient and her friends are Catholics, and they positively refused to permit any attempt to induce miscarriage. Their decision was ratified by the priest; and at this time such a procedure would probably have been extremely imprudent.

On April 13th, after having tried external applications, nutritive and sedative enemata, vaginal injections, and numberless internal medicines, it occurred to me that hypodermic injections might be of service. I began with a solution of one grain of acetate of morphia in six minims of water, and injected one minim three times daily. At once the vomiting abated, and she gradually became stronger. The dose was increased to fourteen minims, but was only given twice in the day. This treatment was continued until July 1st, with occasional intermissions of one or two injections, that other remedies might be tried; but a tendency to re-