either by donkey, camel, or horse, and is distant under three hours from it—a journey which in the winter may with comfort be accomplished in one day from Cairo. Indeed, if his Highness, the Khedive, who has done so much for the comfort of travellers in making a magnificent road to the pyramids, were to extend it for some half mile farther through the tract of soft sand, carriages could easily drive all the way to the Kôm el Khashob. The locality is now well known to the Pyramid Arabs, and most able and intelligent guides will be found in Ali Dobree, Omar, or others of this Bedouin tribe.

HUNTERIAN LECTURES BY PROF. FLOWER

Lectures VII. VIII. IX.

THE family Edentata includes the Bradypodidæ, Dasypodidæ Myrmecophagidæ, Manidæ, and Orycteropodidæ, the first three being from the new world and the last two from the old. Considering them shortly, the Bradypodidæ are leaf-eaters; they have five molars above and four below, no other teeth being present, each tooth is a cylindroid column with a persistent pulp, and is surrounded externally by a harder layer, which causes the free surface to become cupped during wear. There is a peculiar descending process from the incomplete zygoma. The number of the vertebræ is great, their spinous and other processes are but little developed as the back is not much employed in supporting the body. There are extra articular surfaces on the lumbar vertebræ of the three-toed sloth, not found in the two-toed species. The clavicles are sometimes rudimentary, never complete. A bony arch joins the acromial process of the scapula to the coracoid, and the distal end of the clavicle in Bradypus is attached to the latter, a peculiarity which has been explained by Mr. Parker. The supra-spinous notch is converted into a foramen by a bony arch running over it, and there is a supra-condyloid foramen in the humerus of Cholopus only. Considerable rotation of the radius is possible; the hand is peculiarly modified, the fingers being bound together. It is generally stated that the trapezium is anchylosed to the scaphoid, which is very long, but that such is not the case is proved by the examination of the young animal; the trapezium, in fact, anchyloses with the first metacarpal bone. In Cholopus the second and third toes are only present. The ilia are broad, the femur short and with no ligamentum teres; some peculiar small bones are found round the knee. The tibia and fibula are firmly united, but not anchylosed; both genera have three toes on the hind foot. The inner surface of the fibular maleolus sends inwards a conical process, which acts as the pivot in which the externally cupped astragalus is hinged, and thus allows of a great range of movement of the foot. The peculiarities in the number of the cervical vertebræ are well known, no similar abnormalities are found in the fossil genera.

The other Edentata are not purely vegetable feeders; they eat ants and other animal food. In the Dasypodidæ the teeth are numerous, and the cervical vertebræ tend to anchylose together. As in the whole family the sternal ribs are ossified. The degree of development of the carapace is indicated by the size of the vertebral processes, and an extra series of articulations, as in the ant-eater and sloth, occurs in the lumbar region. In Myrmecophaga there are no teeth; the hind feet are quite normal, the front very peculiar, possessing five toes, and claws on the middle three. In the Old World forms, Manis and Orycteropus, there is no extra interlocking of the lumbar region, and in the former no teeth. Orycteropus possesses teeth, each of which may be said to be a compound tooth, each element of which has a persistent pulp.

Hitherto no true sloths have been found fossil in South America; they were then represented by the Gravigrada, which are so termed in contra-distinction to the Tardigrada; they abound in the Pampas of Buenos Ayres, and are found as far north as the United States. *Megatherium* was the first of these large animals discovered, and the original skeleton, obtained in 1789, is now at Madrid. Since then several entire skeletons have been obtained, of which two very fine specimens are to be seen at the Museums of Turin and Milan. Those of the College and of the British Museum are partly from casts. Leidy has placed the North American animal in a distinct species (*M. mirabile*), on account of its geographical distribution, but he is unable to detect any osteological peculiarities, The only teeth in this animal are five molars with persistent pulps above, and four below on each side, as in Bradypus; and they form a continuous series. Each tooth has a double transverse ridge, the hollow of which fits the ridges in the opposite jaw. These ridges do not disappear as the animal gets old, but are permanent on account of the dentine not being uniform in density, the middle being softer than the sides, and therefore wearing away more readily. The teeth in the middle of the series are the largest. The skull is small considering the size of the animal, and the brain-case remarkably so. The brain itself, as known from a cast of the interior of the cranium by Prof. Gervais, closely resembles that of the sloths. The skull is very much elongated, the anterior condyloid foramina being large, it is probable that the tongue was so also. The palate was extremely narrow, and the premaxillary portion extensive. An enormous bony process descended from the zygoma which is also a peculiarity of the other members of the same family. The ramus of the lower jaw was immensely high. In the megatherium only is the molar portion of the mandible of unusual depth, and this is to hold the continually growing teeth. There are seven cervical, sixteen dorsal, three lumbar, five sacral, and eighteen caudal vertebræ; the lumbars, as in Myrmecophaga and Bradypus, possess interlocking processes; the whole column resembles that of the former of those animals more than the latter. The tail was strongly developed, and chevron bones existed on the neural surfaces of the caudal vertebræ. As several scutes were found with the bones of Megatherium, and as the different processes of the vertebræ were strong, it was at one time supposed that this animal possessed a shield, but there is no doubt that the scutes were those of Glyptodon, and the vertebræ do not resemble those of the Armadillo. The sternum was composed of seven pieces, and the clavicles large and well developed, being the only examples of these bones, which are bigger than those of man. As in the sloths, the acromion joined the coracoid, and the supraspinous foramen was strongly bridged over. In its distal limb segments the animal was peculiar. There was no supracondyloid foramen to the humerus; the radius and ulna were free; all the bones of the carpus were represented; the pollex was lost, and the other digits were present; the fourth and fifth metacarpals were elongated, the proximal phalanges very short, and the distal of the index, middle, and ring fingers constructed to carry huge claws, which differed from those of the cats in being flexed instead of extended when they were not in use, upon which depends the difference in the shape of their articular surfaces. The second and third phalanges of the middle finger were anchylosed, and a phalanx was missing in the fifth finger, which did not carry a nail. The pelvis presented the peculiarities of the sloths, and was very large. The femur had a small pit for the insertion of the ligamentum teres. The tibia and fibula were anchylosed at both ends. All the leg bones were massive. The foot was very peculiar, the animal must have rested on its outer edge. The os calcis was very large, with the calcarcaneal process going nearly as far backwards as the toes forwards. The

ankle, as in Megalonyx and the other allies of Megatherium, was not pivoted as in the sloths, but the inner maleolus was quite cut away and replaced by a slightly concave articular surface looking downwards and a little inwards, which was continuous with that of the lower ends of the tibia, a ridge intervening. The superior surface of the astragalus was consequently of a peculiar form, possessing a longitudinal median groove. The first and second digits of the foot were missing, and a claw was present only on the third, in which the middle and distal phalanges were anchylosed; there were two phalanges on the fourth toe, and only one was present on the fifth. As to its habits, there is no doubt that Megatherium was not a burrower as supposed by Pander, nor arboreal as suggested by Lund, but that Prof. Owen's hypothesis is correct in which he considers that it was terrestrial, feeding on trees, which it uprooted or broke boughs off.

Mylodon possessed the same number of teeth as its allies and the sloths, but the anterior pair in the upper jaw were separated by a considerable interval from those behind. All the teeth were more or less cylindrical and had persistent pulps; the worn surfaces were cupped and not ridged, because the dentine was softest in the centre; the fourth lower molar was elongated and grooved. Several species of this genus have been found, one only in North America. Gervais has divided off some with more separated anterior molars into a new genus, but Burmeister does not think this justifiable. The College of Surgeons possesses a very good skeleton, almost perfect, obtained in 1841. The skull was very slothlike, the fore part being truncated and the nasal fossae open. There was a large descending process of the zygoma and an ascending one; the bony arch was complete. There was no enlargement of the molar region in the lower jaw like that of Megatherium. Air cavities existed all round the brain-case, as in the elephant, but to a less degree The vertebræ were C. 7, D. 16, L. 3, S. 7, and Caud. 21. The lumbar vertebræ were anchylosed together to the last dorsal and to the sacrum. The tail was long and powerful; the limbs much like those of Megatherium, but differed in the radius and ulna being separate, as were the tibia and fibula. In the fore-foot Mylodon had the five digits, with claws on the first three. The ankle was as in Megatherium; the hallux only was missing, and the fourth and fifth toes did not carry claws.

Scelidotherium was smaller and altogether lighter built than those mentioned above; the teeth were equidistant and elongated from before backwards as was the head. The rest of the skeleton much resembled Mylodon, but the lumbar vertebræ were not anchylosed.

Megalonyx was a North American form. Prof. Leidy has described it fully. There was a great gap between the anterior tooth, which was large and much like a canine, and the other molars, whose number were the same as in the sloths. The animal had longer and slenderer limbs than those described above and therefore more nearly approached the sloths.

[In last week's report of these lectures, *Thylacoleo* is misprinted *Thylacoles*, and the animal is stated to have 32 instead of 2 molar teeth in the lower jaw.]

FAUNA OF THE NEW ENGLAND COAST

PROF. VERRILL, in discussing the collections made by the parties of the United States Commissioner of Fish and Fisheries upon the Coast Survey steamer *Bache* during her cruise off the coast of New England, in the summer of 1872, sums up by stating that they represent six distinct faunas and sub-faunas as follows:—

(1) The surface fauna outside of the banks, and, at certain times, even extending over their outer slopes. This is essentially the same as the fauna prevailing over the entire surface of the central parts of the Atlantic Ocean, and shows very clearly the direct effects of the Gulf Stream.

(2) The surface fauna inside of the Banks, which is decidedly northern in character, very similar to that of the Bay of Fundy. The contrast between the two shows that the Gulf Stream is almost entirely turned aside by the Banks, and has comparatively little effect upon the fauna between them and the coast.

(3) The fauna of the St. George's Bank itself. This is decidedly boreal in character, and essentially identical with that of the Bay of Fundy at corresponding depths, on similar bottoms, and in regions swept by strong currents. The fauna of the south-western part, however, is less boreal than that of the north-western.

(4) The fauna of the Le Have Banks, and off Halifax. This, even at the moderate depth of twenty fathoms, is decidedly more arctic in character than that of the St. George's or the Bay of Fundy at similar or even greater depths.

(5) Between the St. George's and Le Have Banks and the coast there is a great region of cold and comparatively deep water—in places more than 100 fathoms in depth—with a bottom of mud and fine sand, and communicating with the great ocean-basin by a channel between the St. George's and Le Have banks, which is comparatively narrow and, in some places, at least 150 fathoms deep. This partially inclosed region has, physically and zoologically, the essential features of a gulf, and may be called the St. George's Gulf. The deeper waters of the Bay of Fundy are directly continuous with those of this area. The fauna of this Gulf and of its outlet is peculiarly rich in species new to the American coast, and nearly identical with that of the deeper waters of the Gulf of St. Lawrence, and agrees very closely with that found on muddy bottoms, and at similar depths, on the coasts of Greenland, Finmark, and Norway.

He also presents additional generalisations as follows:—

(6) The deepest dredging, in 430 fathoms, was outside of the St. George's Banks, on the slope of the actual continental border, and within the limits of the true Atlantic "basin." The fauna there is especially rich and varied, decidedly northern in character, and agrees closely with that of similar localities and depths on the European side. The animals were mostly such as inhabit bottoms swept by strong currents in the Bay of Fundy.

(7) Everywhere over the banks, and especially on the southern slopes, the difference between the bottom and surface amounts to from 15° to 20°, or even more; the surface temperature being usually from 60° to 72°. The temperature of the air was very near that of the water, generally one or two degrees higher.

(8) No such contrast of temperature was found inside of the Banks in the St. George's Gulf or the Bay of Fundy; the difference seldom being more than ten degrees, and often, especially in the Bay of Fundy, less than five. The surface temperature at corresponding dates in the Bay of Fundy were 48° to 53°, showing an average difference of about 20° for the surface temperature in the two regions, while the average bottom temperatures do not appear to differ materially.

(9) The high surface temperature of the Banks is evidently due chiefly to the direct influence of the Gulf Stream.

(10) The very low surface temperature of the Bay of Fundy is largely due to its *geographical position*, and the *absence* of any appreciable influence from the Gulf Stream, but it is no doubt intensified by the powerful tides, which are constantly mixing the cold bottom water with that of the surface.

The facts hitherto observed do not seem to warrant the assumption that an "arctic current," properly so-called, as distinguished from the tidal currents, enters the St. George's Gulf or the Bay of Fundy. The action of