THE

FOSSIL REPTILIA OF THE LIASSIC FORMATIONS.

CHAPTER III. ORDER—DINOSAURIA, Owen.

Genus—Scelidosaurus, Owen.

In the year 1858 a few fragmentary fossils of limb-bones were submitted to my inspection by James Harrison, Esq., of Charmouth, Dorsetshire, obtained from the upper part of the "lower Lias," near that place. They included portions of a femur and of a tibia, in which the texture of the wall and the size of the cavity of the shaft showed them to have been parts of a Saurian of more terrestrial habits than any of those which had been previously discovered in those liassic deposits: traces, moreover, of the extent and direction of certain processes, although broken away in the fossils, were discernible, which led me to suspect they belonged to a reptile allied to Iguanodon. I therefore briefly notified the fact of a liassic Dinosaur in my 'Palæontology,'¹ and indicated the animal by the generic name Scelidosaurus.²

The femur of the Iguanodon, as shown in vol i, p. 310, vol. ii, Pl. 20, is characterised by the deep and narrow fissure dividing a compressed external trochanter from the head of the bone, and by a process from the middle of the shaft, on the inner side, opposite to the part where the "third trochanter" projects in some of the large herbivorous mammals (Perissodactyla). Both these characters were repeated in the specimen of the shaft of the femur first submitted to me; but the shaft, viewed sideways, showed a more decided sigmoid flexure than in the Iguanodon, and the fissure between the great trochanter and the

¹ 8vo. ed., 1860, p. 258.
² Gr., σκελής, limb, σαύρος, lizard; from the indications of greater power in the hind legs than in most Saurians.
proximal end of the bone was relatively deeper. This end, divided by the cleft from the great trochanter, was subcompressed from side to side below the swelling out of the head, which had been broken or abraded away, showing a fine cancellous structure at that part. The antero-posterior diameter of this part is 6 inches; the transverse diameter, opposite the base of the outer trochanter, is 3 inches 8 lines.

The fore part of the shaft showed at its upper half a flattened, oblong, rather rough surface for muscular implantation. Below, and on the outer side of this surface, was a rough, roundish, slightly prominent tuberosity, continued at its inner side into a ridge, which descends with a slight curve outwards on the fore part of the middle of the shaft of the femur, where it terminates in a point at v. These risings indicated the force of the large muscles acting upon the limb, and by their insertions raising and drawing forward the femur. Behind the base of the process was a large, oblong, rough ridge indicating the extension of the surface of attachment, behind and beyond the process itself, for a powerful muscle depressing and drawing back the femur. From the great trochanter a narrow, rough surface, not projecting as a ridge, extended nearly straight down the outer and back part of the shaft. Exterior to this surface was an oval foramen, most probably for the passage of the blood-vessels and nerve to the medullary cavity.

The transverse section of the middle of the shaft is nearly circular; the thickness of the compact wall of the medullary cavity is here about one sixth of the transverse diameter of the bone. I have not seen a bone of any other Dinosaur indicative of more vigorous action of the hind limbs than the present femoral shaft.

The foregoing instructive fossil was accompanied by the shaft of a tibia of corresponding size, crushed and broken at both ends; it measured 18 inches in length and 2 inches 8 lines in diameter at its middle, the circumference of the shaft there being 10 inches.

These proportions indicated a hind leg, longer and more slender, relatively to the trunk, than in the Megalosaur, Iguanodon, or other Dinosaur with which such comparison may be made. The bone being fractured across the middle of the shaft, shows a large medullary cavity; the compact, bony wall does not exceed 3 lines in thickness, the cavity itself being 1 inch 3 lines in diameter.

At the proximal end the antero-posterior expansion and its ridges have been broken away. The bone gradually contracts, as it descends, to a subtriedral shaft, with a triangular transverse section, two of the angles being rounded off, and the third remaining, which was opposite the fibula. The distal expansion has been, in like manner, broken away; but its commencement shows the rise of an anterior ridge in addition to the fibular one. I shortly after received from
Mr. Harrison the lower half of a right femur and the upper half of the right tibia and fibula, cemented by the matrix in the natural relative position in which they enter into the formation of the knee-joint, when bent. This remarkable specimen indicates the tranquil state of the sea-bed or bottom after it had received the dead carcass of the Dinosaur. No agitation or other external violence had displaced the bones of the leg after the solution of the ligaments which tied them together in the living animal; when the depth to which they had sunk, and the consistency of the mud or clay bed, tended to retain them in their natural position. The portion of femur preserved indicates a slight backward bend of the shaft, which at the fractured part—probably a little below the middle of the bone—presents an almost circular transverse section. The circumference here is 10 inches; the compact wall of the bone is 6 lines thick; the medullary cavity 2 inches in diameter. A little below the fractured end, and 8 inches above the lower end, the shaft shows the termination of the characteristic inner process. From this point the femur expands gradually, and chiefly in the transverse direction. Posteriorly it becomes impressed by the popliteal cavity, which deepens and widens to the upper and back part of the inner condyle; which, by its production towards the outer condyle, contracts the lower end of the popliteal cavity transversely. On the outer side of the distal expansion of the femur the external wall is in part broken away; but a shallow and narrow longitudinal impression is indicated, terminating below in a rather shallow notch, which marks out the inner and hinder part of the outer condyle from the outer part of the same condyle. This notch corresponds with that between the tibia and fibula, and defines the portions of the outer condyle assigned to those bones respectively. The inner condyle is rather flattened on the inner side. The tibia is much expanded at the proximal end, chiefly by an extension of the bone forward; it is slightly convex on the inner or tibial side; a longitudinal prominence extends from the fibular side of the expansion, near the fore part, answering to the ectocnemial process in the bird’s tibia; the main expansion forms the procnemial process which has subsided to the ordinary level of the shaft about six inches down the bone. The back part of the proximal end of the tibia presents two almost hemispheric protuberances, side by side; they might be mistaken in a detached bone for the backwardly projecting condyles of a femur, but are less deeply severed. The outer tuberosity articulates with a slight depression in the contiguous part of the fibula. The fore part of the proximal portion of the tibia is, transversely, concave, exterior to the pro- and ectocnemial processes. The fractured part of the shaft, eleven inches below the knee-joint, presents a full, oval section, with the same proportion of compact bony wall to medullary cavity as in the femur; the white spar filling the cavity contrasts strongly with the jet-black colour of the petrified bone. The
transverse diameter of this part of the shaft is 2 inches 3 lines; the fore-and-aft diameter is 2 inches 6 lines.

The fibula expands chiefly in the fore-and-aft direction at its upper end, where it measures 5 inches across. Six inches lower down this diameter has contracted to one of 1 inch 8 lines; eleven inches lower it measures 1 inch 3 lines, the transverse diameter being 9 lines. Seven inches from the proximal end the fibula presents at its outer and back part a thick, longitudinal, rough ridge, for the attachment of a muscle. It continues in contact with, and gets rather behind, the tibia as it descends.

The foregoing indications of a Dinosaur in the lower Lias excited speculation as to whether it had been herbivorous, like the Iguanodon of the newer Mezozoic beds, or carnivorous, like the Megalosaur, which has been traced from Wealden down to the Great Oolite. The structure of the femur pointed the former way, but the proof which the dentition only could give was wanting.

The persevering encouragement afforded by Mr. Harrison to the workmen in the Lias quarries was subsequently rewarded by the acquisition of the fine specimen of a skull which forms the subject of Plates 45, 46, 47.

The teeth, in their close-set, thecodont implantation, relative size to the jaw, degree of expansion, and general shape of the crown, resemble those ascribed to the Hylæosaurus (Vol. i, p. 367, Pl. 39); but the crown presents the median longitudinal prominence and marginal serrations which bring it closer to the Iguanodont pattern; and, in the degree in which they depart therefrom, they still more closely resemble the teeth of the Echinodon from the Purbeck, which may prove to be a small kind, or young, of a Dinosaur. They, however, present different proportions.

Referring, therefore, the skull in question to the Dinosaurian order, it supplies most acceptable information as to the cranial structure of that group, in addition to that derived from the Iguanodon Foxii of the Wealden beds (Vol. i, p. 520, pl. 49, figs. 9, 10).

Of Megalosaurus, and Hylæosaurus, portions of lower jaw, and fragments of the upper jaw, palate, and basis cranii, are all that have hitherto come to light. But the present specimen is the entire skull, wanting only the fore end of the upper and lower jaws.

The cranium has been slightly crushed and distorted by oblique pressure, due to movements of the matrix after imbedding and petrifaction. The right halves of the mid-frontal and nasal are depressed a little below the level of the left halves of the same bones, and the right diverging branch of the parietal has been broken from the rest of the bone, near the median line, and dislocated by the same pressure from its union with the mastoid. The right ramus of the
mandible, accompanying the movement of that side of the head, has been pushed so far below the left ramus as to have its inner side brought into view below that of the left side of the skull.

The occipital conforms to the Lacertian type (Pl. 60, fig. 2, 4), in the proportions and direction of the par-occipital; this process is long, narrow, straight, directed outwards, compressed from before backward, and slightly expanded at the extremity, which is applied to the back part of the mastoid and tympanic at the junction of those bones. It has been slightly displaced, its end appearing on the left side at 4, Pl. 45, with matrix intervening between it and the tympanic (28). A part of the exoccipital which projects backward to contribute to the formation of the condyle is exposed near the mass of matrix, including the atlas vertebral and nuchal dermal bones.

The cranial part of the skull, posterior to the orbits, is shorter in proportion than in the lizards, and resembles, in this respect, that of the Iguanodon (Pl. 49, fig. 9) and crocodiles. The parietal is short, and bifurcate behind, as in lizards. The body of the bone, or part between the temporal fossæ, is subcompressed where it forms the smooth, concave, inner sides of those depressions, which do not meet above, but are separated by a narrow, flat tract; this might be converted into a ridge in older individuals. The fore part of the parietal slightly expands where it is overlapped by the frontals. Each hind branch of the parietal extends outward and a little backward; its pointed end is obliquely overlapped anteriorly by the mesial branch of the mastoid, completing therewith the hind boundary of the temporal fossa. The crushed and dislocated state of the calvarium along its middle line does not permit the usual evidence of a foramen parietale to be detected, but the appearances are against such perforation being present. This foramen is not constant in modern lizards; the Scelidosaurus may agree with Cyclodus and Tejus in this respect. The parietal bone, as a whole, plainly accords with the lacertian, not with the crocodilian, type of that bone.

The mastoid (8) is a triradiate bone, forming the upper and hinder angle of the cranium, from which one ray passes mesiad to join the parietal (7), a second ray forward to join the post-frontal (Pl. 46, 12), and a third ray downward (Pl. 45, 8), to join the tympanic (28). A fracture of the body of the mastoid, by which he anterior branch is broken away on the left side, exposes a cancellous cavity, probably forming part of the organ of hearing.

The two halves of the mid-frontal (Pl. 47, 11) have been separated along the medial line, and the right half depressed. The separation appears to have been at a suture, as is certainly the case with the nasal bones; the medial margin of three fourths of the left frontal show the jagged, sutural character. I conclude, therefore, that the mid-frontal was divided, as in Iguanodon (Pl. 49, fig. 9, 11), and as in Varanus and Lacerta proper; and that it was not a single bone, as in
the Iguana and most *Lacertilia*, and as it is in the *Crocodilia*. Each half of the frontal in *Scelidosaurus* is a long, inequilateral triangle, the medial being the longest side, the posterior, which joins the parietal, the shortest; the antero-external border is irregularly and deeply notched, uniting with the post-frontal, super-orbital, pre-frontal, and nasal bones; it is excluded, as in *Lacerta* proper, by the large super-orbital bone (71) from the orbit. The outer surface of the frontal is sculptured by irregular lines and grooves, but less deeply than in *Crocodilus*.

The post-frontal (12) forms the back and part of the upper border of the orbit, uniting with the super-orbital, the frontal, and malar, and sending backward an angular process to join the mastoid, completing the upper bar or zygomatic arch of the temporal fossa. This arch had been broken away on the left side (Pl. 45), but is preserved on the right side (Pl. 46, 8, 12).

The pre-frontal (Pls. 45, 46, 14) presents a horizontal and a vertical portion; the former and larger part is wedged between the frontal, super-orbital, and nasal bones, the descending plate joins the lacrymal (73), and touches the upper angle of the maxillary (21). In the Crocodile the aspect of the whole outer plate of the pre-frontal is upward; in some Lacertians the major part looks outward.

The nasal bones (15, Pls. 46, 47) unite above and behind with the frontal (11) by a short border, obliquely and irregularly cut, to include the pointed anterior ends of the lateral halves of the frontal; the nasals expand as they advance, in union, first, with the pre-frontals, then with the maxillaries, where they slightly decrease in breadth. The outer plate of the nasals looks upward; the maxillary border is slightly bent down (15, fig. 2, Pl. 46), and is overlapped by the maxillary (21, ib.). The mutilated fore part of the skull precludes the determination of the relations of the nasals with the pre-maxillary, and of the character of that bone; but it most probably repeated, in the main, the conditions which it presents in Iguanodon.¹

The fracture shows the superior thickness of the median and lateral borders of the nasals, the intervening part being, as it were, channeled below for the air-passage; this has not here been divided by any ossified vertical septum; the thickened palatal and alveolar parts of the maxillary, as they bend toward each other, present a convexity transversely to the nasal passage. This is closed below, as it seems, by the vomer (Pl. 46, fig. 2, 13).

Of the hind part of the bony palate the pterygoid was brought into view by removing the matrix between the diverging rami of the mandible. The body of the bone is in the form of a subtriangular plate, of 1 inch 7 lines extent along its mesial border, which is slightly concave, receding from its fellow at the medial line, or base, as in the Iguana; the apex extends outward, and a little downward to abut against the fore and inner part of the ectopterygoid. From the hind

¹ Vol. i, p. 521, pl. 49, figs. 9, 22.
border near the base a long and narrow process is sent off to abut against the tympanic. There is no trace of teeth on the pterygoid, as in the recent Iguanas; the higher type of Saurian dentition is retained in *Scelidosaurus* as in *Iguanodon* (Pl. 60, fig. 5, 20, 24).

The hind and probably main part of the maxillary, here preserved, is chiefly remarkable for the horizontal ridge which nearly equally divides the outer or facial plate of the bone into an upper and lower facet; and this ridge is continued a little way below the orbit upon the malar bone. It corresponds with the more strongly marked ridge in *Ptychognathus* and *Oudenodon*.¹ There is a lower and slighter longitudinal prominence of the maxillary along the outer alveolar plate. The maxillary reaches back beyond the middle of the orbit, from which it is separated, as in other Saurians, by the malar and lacrimal bones.

On both sides there is a small, unossified space between the maxillary and lacrimal; this corresponds with the larger vacuity in that part of the bones of the face in the Pterodactyle, which is reduced to the present proportions in some Teleosaurs, and becomes the functional nostril in the Ichthyosaur; but I believe that the true external nostrils of *Scelidosaurus* were included in the fore part of the skull which has been broken away, and were, as in the Teleosaur, distinct from the maxillo-lacrimal vacuities.

The orbits of *Scelidosaurus* are subcircular, almost vertical, looking outward. Were the super-orbital ossicle in *Crocodilia* enlarged and fixed by suture in the upper scoop of the orbit, it would give a less vertical outlook to the eye than it usually presents, especially in the skull of a crocodile from which that ossicle has been removed. But the composition of the rim of the orbit in *Scelidosaurus* is open to other homologies. The bone (71) may be compared with that wedged into the upper and back part of the orbit in some lizards, between the frontal and post-frontal, and by Cuvier regarded as a dismemberment of the latter element; only in *Scelidosaurus* it is extended forward to the pre-frontal, excluding the frontal from the orbit. In *Ichthyosaurus* the post-frontal has a forward extension to junction with the pre-frontal; it also passes backward to join the mastoid, leaving to the bone at the back of the orbit (Pl. 20, fig. 1, 12) a simple post-orbital function. In *Scelidosaurus* the bone which joins the mastoid sends down a post-orbital bar (Pl. 46, 12) to join the malar (ib. 26). The post-frontal holds the same relations to the orbit in *Iguanodon* (vol. i, p 521, Pl. 49, fig. 9, 12). In both genera there is a masto-post-frontal zygoma, as well as the ordinary malo-squamosal one. But the intervening space is not walled over by a supplementary plate as in *Ichthyosaurus* (Pl. 20, fig. 1, 27)¹

The delicate lacrimal bone (Pls. 45, 46, 73) appears to have been

fractured on the left side; on the right side it is entire. The malar bone (26) begins anteriorly, in a pointed form, between the lacrymal and maxillary, increases in depth as it extends beneath the orbit, sends up a process which bifurcates to receive the point of the post-frontal in the cleft, and extends backward and downward as a slightly convex and somewhat roughened plate, which articulates by its lower convex, but somewhat irregular, border with the squamosal (27). The posterior border of the malar presents a regular and well-defined, concave curve. The chief peculiarity of the bone is its unusual vertical extent posteriorly. The squamosal (Pls. 45, 46, 27) articulates with the lower border of the malar, and expands to be articulated with the outer part of the lower half of the tympanic (ib. 28). This deep and powerful arch of bone, answering to the zygoma in mammals, afforded attachment to large, masseteric muscles operating upon the lower jaw. Similar muscles may have been extended between the ridges of the upper and lower jaws.

The tympanic (partly exposed in Pl. 45, 28) is a long bone, compressed from before backward, almost vertical in position, with a slight forward bend, but firmly wedged between the mastoid and par-occipital above and between the squamosal and pterygoid below. The back part of the tympanic is convex transversely at its inner half, concave at its outer half, where the margin is slightly produced to join the upper part of the squamosal; the inner part of the tympanic is more extended where it is overlapped or abutted on by the pterygoid. Below this expansion the tympanic becomes contracted and thickened, forming a kind of neck to the transversely extended convex terminal condyle.

In the vertical position and length of the tympanic, Scelidosaurus resembles the Lacertia; in its fixity and extent of its connections it resembles the Crocodilia.

The lower jaw includes in each ramus an articular (29), a surangular (30), a coronoid (30'), an angular (31), a splenial (32), and a dentary (33) piece.

The articular (Pl. 47, fig. 2, 29) is situated in the inner side of the surangular (Pl. 45, 30), and is thickened and projects inward to form the cavity for the major part of the tympanic condyle, the outer border of which rests on the surangular. This element, convex externally, presents a longitudinal ridge near its upper part, which rises to join the posterior angle of the dentary element in forming a low coronoid process. The angular (ib. 31) does not extend beyond the surangular, but makes with it the angle of the lower jaw; it grows in vertical extent as it advances, is convex externally, unites with the dentary, and sends forward from its lower part a pointed process between the dentary and splenial elements. The splenial (Pl. 46, 32) makes a small appearance on the outer side of the ramus, between the angular and dentary (33), but is chiefly visible as a broad, smooth plate (Pl. 47, fig. 2, 32), applied to the inner side of the dentary. The
dentary (Pls. 45, 46, 33) is a very powerful bone, with the outer surface divided into an upper and lower facet by a longitudinal ridge paralleling that of the upper jaw. The ridge, commencing near the base of the coronoid process, descends, describing a slight curve to the middle of the outer surface of the dentary. Below the ridge the bone is convex, above it is concave; the lower facet has the kind and degree of roughness observable on the exposed surface of most of the cranial bones; the upper facet has a smoother surface, corresponding in that respect with the surface below the ridge of the maxillary.

The foregoing character of the lower jaw has, hitherto, been observed only in a fossil one, which has been referred to the Dinosaurian order; by Mantell,¹ originally to Iguanodon, and afterwards, when it had been shown to be more probably part of the Hylæosaurus,² to a genus which he called Regnosaurus.³ In this specimen the outer surface of the dentary is divided into an upper and lower facet by a longitudinal ridge, which, commencing near the upper margin, probably at the base of a coronoid rising, descends as it advances to midway between the upper and lower border. It is, however, more obtuse than in Scelidosaurus, but the upper facet presents a like smoothness and vertical concavity.⁴ In size the specimens closely correspond, and also in the close arrangement of the series of teeth. But these were relatively smaller and more numerous in the Wealden fossil; for whereas in Hylæosaurus ten teeth, or their sockets, occupy an extent of 1 inch 8 lines of the alveolar border, the same extent includes only seven and a half teeth or sockets in Scelidosaurus. In this genus, moreover, the ramus of the mandible presents a curve convex downwards, to about the same degree as the opposite curve is presented by the corresponding part of the jaw of Hylæosaurus, in which this peculiar bend is noticed in Vol. i, p. 366. In the mandible of Scelidosaurus a ridge, corresponding, perhaps, to the lower ridge in Hylæosaurus, is situated further back and higher up upon the surangular; and the facet, concave vertically between the lower ridge and the beginning of the upper ridge, is peculiar to the mandibular fragment referred to the Hylæosaurus. Thus, with corresponding Dinosaurian character, imparting robust strength to the mandible, there are well-marked generic distinctions in the specimens here compared, both in the conformation of the jaws and teeth.

The mandibular rami of Scelidosaurus describe a slight sigmoid curve from the angle forward, horizontally, at first concave, then convex, towards the median line, where they meet without blending at the part fractured. It is not probable that the symphysis would be much prolonged beyond this point. The degree of convergence of the contour lines of the whole skull, both median and lateral, with

¹ 'Wonders of Geology,' 1838, vol. i, p. 393.
² "Report on British Fossil Reptiles," 'Trans. of Brit. Association,' 1841, p. 120.
³ 'Philos. Trans.,' 1848.
⁴ Vol. ii, pl. 39, fig. 1.
the decreasing size of the anterior teeth, makes it more probable that but a small proportion of the muzzle is wanting in the present specimen.

Removal of matrix from the hinder interspace of the mandibular rami exposed a ceratohyal, 3 inches in length, 4 lines in breadth, of a slight sigmoid flexure, the hind part bending up to between the angle of the mandible and the atlas vertebra; as no trace of basihyal was found, this element was probably cartilaginous, like that broad one in the tongue-skeleton of the crocodile.¹

The specimen of Scelidosaurus here described has been buried and petrified with the mouth shut; there has been no dislocation of the under jaw, and the skull shows that the teeth of the upper jaw overlapped and concealed those of the lower. The crowns of both series were a little inclined inward, as shown at the fractured fore part (Pl. 46, fig. 2, a  Canucks); there is a similar inclination of the alveolar plates.

The teeth are small, or of Lacertian proportions to the jaws; they are numerous and close-set, implanted in sockets (ib. a) forming an uninterrupted series along the alveolar border. The fang is simple, and longer than the crown, presenting a full ellipse in transverse section, and projecting a little beyond the socket. In the upper jaw the crown (Pl. 46, fig. 3, magn,) begins by bulging outward, with a smooth convexity subsiding as it gradually expands, and dividing to be continued along the middle and the margins, with intervening concavities, producing an undulated surface across the broadest part of the crown. The marginal convexities or ridges terminate each in a point at the broadest part of the crown; whence, the plate-shaped tooth having thinned off to an edge, this is divided on each side into five or six smaller points; these denticulate margins converge straight, at an angle rather less than a right one, to the apex of the tooth, which is formed by the pointed termination of the median convexity. The crown is coated by a polished enamel, of jet blackness in the fossil, smooth under the lens upon the convexities, finely punctate in the hollows of the expanded part of the crown. The whole tooth in the upper jaw is very slightly bent backward, with as slight an oblique twist, making the hinder angle overlap, in some, the front angle of the crown of the tooth behind.

The inner surface of the hind teeth exposed in the right ramus of the jaw (Pl. 47, fig. 2) shows similar configuration of the crown to that of the outer surface of the teeth above; but with a larger proportion of the serrated part, and with the borders less equal, the anterior one showing as many as nine points.

On the left side, in an extent of the alveolar border of the upper jaw measuring 4 inches, there are nineteen sockets, and only one tooth missing. On the right side, in an extent of 3½ inches, there are sixteen sockets, and three teeth missing. The fractured part of the jaw yields evidence of the usual

¹ 'Archetype of Vertebrate Skeleton,' Svo, 1848, p. 121, fig. 22, 40.
reptilian provision for successional teeth in reserve alveoli, containing tooth-germs, at the inner side of the base of the teeth in place (Pl. 46, fig. 2, c). The teeth gradually increase in size from the hindmost to the fifth in advance, continue of about the same size to the tenth, and then gradually decrease in size to fractured fore part of the jaw.

Were the serrated borders of the terminal half of the crown to be worn down, the teeth of *Scelidosaurus* would be like those referred to *Hylæosaurus* in Vol. i, p. 377, Vol. ii, Pl. 39. There is no evidence, however, that any of them have been so worn down; in this respect they resemble more the teeth of *Echinodon*, the upper teeth in *Scelidosaurus* differing chiefly in the proportions of length to breadth of the crown. Whether the anterior teeth had the simple laniariform character at the fore part of the jaws in *Scelidosaurus*, as in *Iguanodon* and *Echinodon*, remains to be proved. The finely and sharply serrated and pointed teeth of the *Scelidosaurus* glided upon each other, the upper on the outer side of the under, like the blade-shaped crowns of the carnassials of feline mammals; and yet the similarity of the teeth, in their number and uniformly small size, to those of the modern Iguanas suggests that they may have been put to like uses. The compressed, serrate crowns in those herbivorous lizards worked obliquely upon each other, in a similar scissor-blade way. In *Iguanodon* the dentition is obviously modified more decidedly for mastication of vegetable substances. In *Scelidosaurus* it is adapted for division of such substances, but it would be equally effective in piercing and cutting or tearing through animal textures.

If this Dinosaur occasionally went to sea in quest of food, it may be expected to present in the fore part of the jaws, wanting in the present specimen, laniariform teeth, as in *Iguanodon* (Pl. 49, fig. 9, i), for the prehension and retention of living prey. Should these prove to be absent, and the dental series to begin as it ends, it will incline the balance of probability to the phytophagous nature of the Liassic *Scelidosaurus*.

Following in the track opened out by the discovery of the skull, about twelve successive blocks of Lias were secured, with more or less evident indications of included bones, all of which, together with the skull, were secured and transmitted to the British Museum. Subsequent complete exposure of the included organic remains has brought to light the entire vertebral column of the trunk and tail, to very near the termination of the latter; the scapulo-coracoid arch and part of one fore limb being associated with the thorax, and the iliac bones and both hind limbs with the sacrum; all were parts of the same individual Dinosaur.

In the operation of clearing off the matrix, scattered dermal bones first presented themselves, and these were removed, with a note of their position, when it became plain that they did not touch or rest upon any part of the endo-skeleton. This
being reached, the dermal bones in contact with it were left, save where they concealed some joint, process, or other light-giving or characteristic part of the framework. In the course of these operations it soon became evident that the whole vertebral column, in a series of consecutive and but slightly disturbed and mostly coarticulated segments, from the axis to the thirty-fourth caudal vertebrae inclusive, had been raised from their place of deposit; all the parts, save the centrum and a small and low coalesced neural arch, having ceased to be developed, in the terminal caudal vertebrae, the last of which in the recovered series was reduced to dimensions so small as to indicate that but very few remained to complete the tail of the Scelidosaur. The first vertebra of the neck was adherent to the back part of the skull above described.

Of the liassic masses following that which included the skull the first four contained twenty vertebrae, extending from the axis to the mass including the sacrum, and they were clearly consecutive save at one part of the neck.

The back part of the mass containing the skull includes the atlas vertebra in connection with the occiput, and surmounted by a pair of dermal bones (Pl. 48, fig. 1, a). The block which fits to the fractured surface including the body and the neurapophyses of the atlas contains the axis and third cervical vertebra. The next piece revealed one nearly entire cervical vertebra (ib., figs. 3 and 4) and part of a second vertebra. The third, larger, piece included ten coarticulated vertebrae (PIs. 49, 50), but the continuity of the fore part of this mass with the last mentioned could not be clearly made out. The fourth block fits to that containing the ten dorsals, and included the five consecutive vertebrae with part of a sixth (Pl. 51). The block which contains the sacrum has also two vertebrae in advance of it (Pl. 53), part of the first of which lies in the preceding block.

Thus there was evidence of at least twenty-two "true" vertebrae; but there may have been one or two vertebrae from the region of the neck which had not been recovered. The vertebra attached to the first sacral seems not to have supported ribs: the one in front of it has a pair of long, freely articulated ribs, and may be reckoned the last dorsal. Including this, there may be assigned sixteen vertebrae to the dorsal series, if we include therein the ten vertebrae in Pl. 49, leaving six or seven to the cervical series. The lumbar series seems thus reduced to one vertebra. The sacrum includes four vertebrae. Of the caudal series thirty-five vertebrae were preserved, in five consecutively fitting blocks of matrix, leaving parts of two terminal ones, so small and simple as to show that very few are wanting in the present fossil skeleton.

The modifications of the spinal column of the trunk and tail of the Scelidosaur could thus be studied and compared in sixty consecutive vertebrae of one and the same individual.

The fracture of the matrix including the skull has passed through the cen-
trum (Pl. 48, fig. 1, c), the hypapophysis (ib., hy), and the neurapophyses (ib. n, n), of the atlas.

The centrum of the atlas is small, and has been ankylosed with that of the axis (Pl. 48, fig. 2, x). Its vertical section is subquadrate, longitudinally grooved on each side; broader above than below. The hypapophysis (fig. 1, hy) is broader, but less deep, than the centrum, and the bases of the neurapophyses (ib., n, n) extend down the sides of the centrum to articulate with the hypapophysis.

The neurapophyses (ib., n, n) are ununited above, as they are below, and have yielded to the oblique pressure; but the slight dislocation seems to have taken place without fracture of an upper union. There is no trace of spinous process; but above the neural arch of the atlas is a pair of large, thick, transversely oblong, dermal bones or scutes; the fractured surface of the most entire one, to the right (ib., r), is 2 inches in length by 1 in depth; it exposes a compact peripheral texture of 4 or 5 lines in thickness at the upper and outer part, and about 1 line at the under or inner part, with a fine cancellous structure between. To the broad hypapophysis of the atlas was articulated a long and slender rib (pleurapophysis) (ib., fig 2, pl, a).

In the foregoing constitution of the vertebral segment succeeding the skull we have the reptilian condition of the atlas, with modifications most closely repeated by the Crocodilia amongst the existing members of the class. The Crocodilia alone show the transverse extension of the hypapophysis or "pseudo-centrum" of the segment, associated with the presence of articulations for the pleurapophysial elements. In lizards free pleurapophyses are not developed from the atlas or from the axis, rarely from the third cervical vertebra. But in Scelidosaurus the atlantal hypapophysis is relatively broader than in Crocodilia, and there is no trace of the detached representative of the neural spine which characterises the atlas in Crocodilia.¹

In Plesiosaurus and Ichthyosaurus the true centrum of the atlas progressively acquires its form and proportions as such, and in the same degree resembles, in its relations to the basi-occipital, and to its own neural arch, the centrum of the first trunk-vertebra in fishes. The hypapophysis is proportionally reduced in size, and forms the first of the "sub-vertebral wedge-bones" in the Ichthyosaurus.²

The second block of Lias (Pl. 48, fig. 2) includes the bodies of the axis (x) and of the third cervical vertebra, with parts of the pleurapophyses of the atlas (pl. a) and axis (pl. x); it includes, also, large, massive, dermal bones external and superior to the vertebral elements. The centrum of the axis is 1 inch 3 lines in length, from the line of adhesion of that of the atlas, part of which remains connected as the "odontoid process;" the proper body of the axis is subcarinate

¹ 'Annals and Magazine of Natural History,' vol. xx, pp. 217—225.
² Ichthyopterygia, pl. xix, fig. 5, hy, a; pl. xxiii, fig. 2.
below; gently concave lengthwise at the sides; compressed in the same degree at the middle, and slightly expanded at the extremities. The rib which it supported \( \left( \text{fig.} \ 1 \right) \) is shorter than that of the atlas, but, like it, is slender and straight; about 3 inches of the atlantal rib is preserved, and about 2 inches of that of the axis.

The body of the third vertebra presents a general increase of size; it is 1 inch 8 lines in length, 2 inches 3 lines across the parapophyses at the fore part of the vertebra, 1 inch 6 lines across the posterior articular surface, and 1 inch 2 lines in depth. It is subcompressed at the sides, and more obtusely ridged below than the axis. The fore part of the body is articulated by an almost flattened surface with that at the back of the axis.

The characters of the terminal articular surfaces were worked out more completely in a consecutive cervical vertebra detached from the third block, and which, from its size, is probably the sixth. The part of the front surface \( \left( \text{fig.} \ 4, \ a \right) \) which is preserved is flat with a convex periphery; the hind surface \( \left( \text{fig.} \ 3, \ c \right) \) is slightly concave, with a narrower and better defined circumference. The body of this vertebra is 1 inch 10 lines in length, 2 inches 3 lines across the parapophyses \( \left( \varphi \right) \); 1 inch 8 lines across the hinder articular end \( \left( \sigma \right) \). The under part of the centrum presents near its fore end a hypapophysial tuberosity; it is constricted at the middle, and a small venous canal opens into that concavity on either side. The rib articulates by a bifurcate end with both par- and diapophyses; the upper transverse process \( \left( \text{fig.} \ 4, \ d \right) \) extends nearly 1½ inch from the neural arch; the neural canal \( \left( \alpha \right) \) is of a full oval form, with the small end downwards; it is 9 inches in its longest diameter. The breadth of the neural arch, below the diapophyses, is 1 inch 7 lines.

In the portion of the succeeding cervical vertebra, from the same block, the rib is directed more outwardly than in the antecedent one. The length of the neck of the rib is 1 inch 2 lines; its thickness 6 lines, which increases after the development of the tubercle, where the fracture shows a subtriedral section. The portion of the articular surface which is preserved of the centrum of the second vertebra indicates the same feeble concavity as in the preceding cervical vertebra \( \left( \text{fig.} \ 3 \right) \).

Supposing the vertebra \( \left( \text{Pl.} \ 48, \ \text{figs.} \ 3 \text{ and } 4 \right) \) to be the sixth of the cervical series, it shows that the rib has more speedily resumed its normal character than in the Crocodilia. In these large existing Saurians the pleurapophysis, slender, straight and rather long, in the atlas and axis, becomes shortened and expanded in the third, fourth, fifth, and sixth cervical vertebrae, assuming in them a hatchet-like shape, with an overlapping arrangement; the posterior production of the "blade" lengthens in the seventh cervical; but the ordinary rib-shape is only resumed in the eighth vertebra, regarded as the first dorsal by Cuvier.
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I infer, therefore, from the size and proportions of the two vertebrae just described that they correspond with the sixth and seventh in the Crocodile, and that the Scelidosaurus, with probably other Dinosauria, differed from Crocodilia and from most Lacertilia in the long and slender form of most, if not all, of the cervical ribs; but that these manifested their more essential Crocodilian affinity in their twofold articulation, by a bifurcate head, with distinct upper \( \delta \) and lower \( \rho \) transverse processes.

The fourth block included, with the scapular arch, ten of the anterior dorsal vertebrae (Pls. 49, 50). The hinder fracture of the block has detached the anterior articular surface from the eleventh dorsal, the rest of which is the first of the series of the five following dorsals in the fifth block of Lias (Pl. 52, figs. 1 and 2). The hinder fracture of this block has pretty equally bisected the last vertebra, which bears free ribs, viz. the sixteenth dorsal, the hinder half of which remains in the fore part of the block (Pl. 53), including the lumbar and sacral series of vertebrae. The section of the eleventh dorsal thus exposed near the anterior articular surface of the centrum is represented of the natural size in Pl. 52, fig. 1, \( \delta \) 11. That through the middle of the sixteenth dorsal vertebra is similarly represented in fig. 2, \( \delta \) 16.

The spinous process of the first dorsal vertebra (Pl. 45, \( \delta \) 1) is 1¾ inch in height and 8 lines in fore-and-aft extent; the spine increases in both directions to the fifth of these vertebrae \( (\delta) \), which is 2 inches ⅝ lines in height and 1 inch 10 lines in basal extent. The spines continue of about the same height to the tenth vertebra, \( \delta \) 10, with summits obtusely rounded, almost truncate. In the eleventh to the sixteenth dorsals, Pl. 51, \( \delta \) 11—\( \delta \) 16, the spines acquire their greatest fore-and-aft extent, with truncate summits, but no increase of height. Although these spines in the last six vertebrae are nearly 2½ inches in antero-posterior extent, their summits do not come into contact, but leave interspaces of from 5 lines to 8 lines.

The prezygapophyses in the anterior dorsal vertebrae look inward and a little upward, the postzygapophyses in the reverse directions, but as the vertebrae recede in position the aspect of the surfaces becomes more nearly horizontal (Pl. 52, fig. 1 z). The diapophyses are subdepressed, 10 lines in breadth in the second vertebra, and gradually increasing to a terminal breadth of 15 lines in the ninth and tenth dorsals (Pl. 49, \( d, d \)). The parapophyses, as in the Crocodile, gradually pass from the centrum to the neural arch, and are seen at \( p \), fig. 1, Pl. 51, upon the under and fore part of the diapophysis \( (d) \) in the eleventh of this series of dorsals, where the length of the diapophysis from the base of the neural spine is 2 inches 9 lines. No trace of parapophysis, or of the "head" of the rib, remains in the last three dorsals; the diapophysis is entire, as at \( d \), fig. 2, Pl. 51.

The ribs of the twelve anterior dorsal vertebrae show both the head and the tubercle, the neck becoming gradually shorter in the last three. In the seventh
vertebra the extent of the rib from the head to the tubercle is 2 inches 9 lines. In the tenth vertebra it is 1 inch 7 lines. The rib presents a shallow canal along its posterior surface; it is nearly an inch in thickness. An extent of upwards of 10 inches of the body of the rib (pl., Pl. 49) is preserved on the right side of this portion of the thorax of *Scelidotherium*.

The anterior dorsal vertebrae have been partially dislocated, especially the fourth from the fifth, apparently by pressure acting through the scapula (51) upon the diaphysis and spine of the fifth dorsal. Beyond the scapula the vertebrae have retained their natural position and connections, which seems to indicate the action of pressure whilst decomposition of the soft parts was going on in the carcass. Nine of the consecutive vertebrae in the fourth block occupy the extent of 1 foot 9 inches. The breadth of the last of these vertebra (Pl. 49, d 10), across the diaphyses (a), is 5 inches 4 lines. The total height of the eleventh dorsal vertebra (Pl. 52, fig. 1) is 6 inches. The breadth of the centrum at the fractured part, near the anterior surface, is 1 inch 6 lines. The depth of the centrum, from the floor of the neural canal, is 2 inches. The breadth of the neural arch across what are called the "pedicles" is 1 inch 8 lines. The height of the neural spine is 2 inches 6 lines.

As the vertebrae approach the sacrum the bodies gradually increase in depth, without gaining in breadth, until at the last dorsal the centrum, near its middle part, measures 2½ inches in vertical and 1 inch 7 lines in transverse diameter; a slight longitudinal impression on each side produces the contour of the transverse vertical section figured in Pl. 52, fig. 2. The neural canal here gives a triangular section, with the apex downward and sinking into the substance of the centrum, but the sutural limit between centrum and neural arch are indiscernible. The diaphyses decrease in breadth and also in length, and now support the rib by a terminal, slightly notched, articular facet. The ribs, here with simple heads, become shorter and less curved; a few, as in Pl. 51, fig. 1, pl, have suffered fracture, with very little displacement. In different parts of the matrix of the blocks (Pls. 49 and 51) are portions of long and slender bones, which are, most probably, abdominal ribs.

In the sixth block the hinder half of the last dorsal and one lumbar vertebrae are associated with the pelvis; the lumbar vertebra (Pl. 53, l) had been dislocated downwards from its articulations with the sacrum.

The four vertebrae of this part (Pl. 53), with the iliac bones (62), are preserved almost in their natural relative positions, the sacral vertebrae having their neural spines and transverse processes exposed. Those of the first sacral (s, 1, d, pl) stand out horizontally and transverse to the axis of the body; a slight swelling (d), about one inch from their origin, may indicate the point of confluence of the pleurapophysial (pl) with the par- and diaphysial elements of this part. It is 4½ inches in length; at its base it is 1 inch in thickness and 2 inches in depth, expanding in
that direction to fully 3 inches at the truncate extremity, and in breadth to 2 inches 2 lines. Towards its end the process is excavated anteriorly, so that the rough terminal surface (fig. 2, pl.) abutting upon the iliac bone is reniform. Fracture of an angle at this surface in the left transverse process shows a medullary cavity of 10 lines in diameter by 6 lines in the section as exposed, surrounded by a fine cancellous, almost compact, osseous texture, of from 2 lines to 4 lines in thickness.

The transverse processes of the other sacral vertebrae gradually become shorter, with corresponding decrease of breadth at their origin, but with equal or greater expansion of their termination, that of the last (pl. s 4) measuring 2 inches 7 lines in fore-and-aft breadth; the transverse processes thus touch each other, or nearly so, at their ends, and offer a continuous longitudinal surface for the ligamentous or fibro-cartilaginous attachments of the iliac bones (62). The total length of the articular "sacro-iliac" tract, so formed, is about 10 inches; a very slight lateral twist or dislocation makes it rather longer on the left than on the right side; this appears to have been due to great pressure after imbedding, and is accompanied by fracture or dislocation of the pleurapophysial part of the transverse process of the last two sacral vertebrae.

The spinous process, in each of the four sacrals, is about 2 inches high and 2 inches 3 lines in fore-and-aft extent; they touch each other by their rough, flattened summits; these are narrow anteriorly, gradually expanding to a breadth of 8 lines at their posterior third, with a thick, rounded termination; the position of these spines is over the interspaces of the origins of the transverse processes, through the backward inclination or extension of the neural arches. The articular processes are faintly indicated at their base, the posterior processes overlapping the anterior ones of the succeeding vertebra. The longitudinal extent of the truncated summits of the four sacral spines is 9 inches.

The hinder fractured surface of the block containing the sacrum exposes part of the first caudal vertebra, the rest being associated with the four consecutive caudals in the seventh block of Lias (Pl. 54, figs. 1 and 2).

The first caudal vertebra has been dislocated from the last sacral, and twisted half round, so that its spine lies upon the sacral transverse process; the fracture has passed through the spine and part of the neural arch. The length of this spine (Pl. 54, fig. 1, ns) from the upper part of the neural canal is 3 inches 6 lines, the transverse process (d) is 2 inches 3 lines in length, but its vertical thickness is reduced to 5 lines at 2 inches from its termination. The neural canal is 6 lines in breadth and 10 lines in depth. The bases of the neural arch seem to show that the ankylosis with the centrum had not here been complete.

The length of the first caudal centrum (Pl. 54, e 1) is 2 inches, the depth or vertical diameter of its articular end is 2 inches 5 lines; the surface is moderately
concave, with the circumference bevelled off convexly; between the two expanded ends the centrum is moderately and uniformly concave lengthwise. There is no trace of hæmal arch in the first caudal. In the second that arch (Pl. 54, fig. 2 h) is articulated to the posterior part of the under surface, and is produced into a spine of nearly 4 inches long. In the third caudal (ib., k, e 3) and succeeding ones the hæmal arch has been dislocated, showing its articular surface, which, by mutual union of the hæmapophysial bases, is single, sub-reniform, transversely extended, lightly concave across, and convex from above downward. The hæmal canal, thus circumscribed, and well shown in the fourth caudal vertebra, is about 2 lines in breadth and 1 inch 3 lines in length; too narrow, it would seem, for the protection of the trunks of the blood-vessels supplying so long and so powerful an organ as the tail of the Scelidosaurus. This form of the hæmal canal or slit has every appearance of being natural, and not due to any posthumous compression. The hæmapophysial surface external to it is convex transversely, slightly concave lengthwise; the laminæ slightly contract to their union in the spine, which becomes compressed, and a little expanded from before backwards near its termination. The articular surface, after the second hæmal arch, is afforded in equal proportions by the two conjoined centrum beneath their terminal junction. The transverse process of the second caudal (ib., d) arises from the anterior two thirds of the vertebra, over the junction of the centrum with the neural arch; a trace of the suture indicating the pleurapophysial character of this process is discernible in this and some following caudals. The length of the centrum is 2 inches 2 lines; the fore-and-aft breadth of the base of the transverse process is 1 inch 5 lines; its length is 2 inches 5 lines; its terminal breadth is 10 lines, ending obtusely. The transverse processes progressively decrease in all these dimensions in the following vertebrae. The anterior zygapophyses (Pl. 54, fig. 1, z) are twice the length of the posterior ones (z'), by which their extremities are overlapped. The fore-and-aft breadth of the neurapophyses between these processes is 1 inch 2 lines; that of the summit of the neural spine is 1 inch 6 lines; the height of the spine from the base of the prezygapophysis is 3 inches 4 lines. These dimensions are taken from the third caudal vertebra. The five consecutive and coarticulated anterior caudal vertebrae in the present block of Lias give a collective longitudinal extent of 12 inches. The distal half of the right femur (Pl. 55, fig. 2, 6), and parts of the right tibia (ib., 66) and fibula (ib., 67), are cemented to the vertebrae by the matrix. Figure 1 in this plate gives a side view, fig. 2 an oblique under view, of the first five caudal vertebrae.

The succeeding (eighth) block includes the five vertebrae (Pl. 55, fig. 1) next in succession. In these the length of the centrum continues to be a little over 2 inches, but they gradually decrease in other diameters, and especially in the size of their diverging parts. The neural spine, in the ninth, is reduced to 2 inches 5
lines in length; the transverse process (ib., fig. 1, d) to 1 inch 3 lines. The hæmal arch and spine retain a length of 3 inches 3 lines. That of the seventh vertebra (fig. 1, h) has a basal diameter of 1 inch 1 line, decreasing to 6 lines at the end of the neural canal, and thence to a terminal diameter of 2½ lines, the fore-and-aft diameter being here 10 lines. The centrums progressively become more concave and compressed between the articular ends. The prezygapophyses (ib., fig. 2, z) have their articular surface turned more inward, and grasp, as it were, the shortening rudiments of the postzygapophyses, the neural arch progressively contracting in breadth. The collective length of the five vertebrae in this block is 11 inches.

The ninth block of Lias contains the five succeeding caudals (Pl. 55, fig. 3). The centrums, exposed at their under and lateral parts, are singularly crushed, the sides of each having been pressed into the substance; yet, where the cracks of the matrix expose the texture of the centrum, as in the fifteenth caudal (Pl. 52, fig. 3), it shows a fine, compactly cancellous structure throughout; there is no trace of any such vacuity or unossified nucleus of the centrum as is met with in the vertebrae of Poikilopleuron, for example. The centrums retain their length of 2 inches. The hinder articular end of that of the tenth caudal (e) adheres to the fore part of the present block. In the next coarticulated vertebrae, which is the eleventh of the caudal series (Pl. 55, fig. 3, 11), the prezygapophysis (ib., fig. 4, z) is 10 lines in length and 3 lines in breadth; the neural spine, measured from the base of the zygapophysis, is 2 inches in length; the transverse process (fig. 3, a) is 1 inch in length, with half an inch of basal breadth. Nearly 2½ inches of the hæmal arch (ib., h) are preserved.

The pressure crushing the centrum of the eleventh vertebra has been applied to the middle of the under and lateral part; the articular ends have withstood, if they have received, it. The same is the case with the twelfth caudal. In the thirteenth the pressure has been more laterally applied, and the outer wall, which has been driven in, preserves its vertical convexity. The diapophysis of this vertebra is 10 lines in length. In the fifteenth caudal (ib., 15, d) the diapophysis is reduced to 6 lines in length, with corresponding decrease of thickness. The five caudal vertebrae from the eleventh to the fifteenth inclusive occupy a longitudinal extent of 11 inches 6 lines.

The tenth mass of Lias, fitting on to the foregoing, includes a consecutive series of nine vertebrae, viz. the sixteenth to the twenty-fourth caudal inclusive (Pl. 56, fig. 1). In this series there has been a dislocation of the eighteenth from the nineteenth, and a similar one between the twenty-first and the twenty-second vertebrae, with an interval of nearly an inch between the separated articular ends of the centrums. These elements continue to decrease in vertical and transverse diameters, and also, but in a minor degree, in regard to their
length. The transverse process has subsided to a tubercle upon the eighteenth (ib., fig. 1, \(d\)), and the postzygapophysis to a notch at the back part of the base of the neural spine, but the prezygapophysis (\(z\)) continues long and slender throughout this series. The neural spines progressively narrow and shorten, with a backward inclination. The base of the hæmal spine (\(i\)) of the sixteenth caudal measures 9 lines; its articular surface is transversely oblong. The surface for the articulation of the hæmal arch, from this part of the tail onward, is chiefly afforded by the hinder and under part of its own vertebra, as in fig. 3, \(h\). The hæmal arch and spine becomes reduced in the eighteenth caudal to the length of its centrum; and in the twenty-third becomes shorter than the centrum, with a greater degree of antero-posterior expansion of the spine in proportion to the length of that part (ib., fig. 1, 23, \(h\)). The transverse diameter of the anterior articular surface of the nineteenth caudal is 1 inch 6 lines. The middle of the centrum has been reduced by pressure, attended with some fracture of the outer surface, to a diameter of 7 lines. In some of these vertebrae the middle, crushed parts of the centrum have been severed from the terminal articular expansions. I conclude, therefore, that they have been subjected to a general compressive force, probably connected with the change in the vertical relative position of the stratum. The compact layer of osseous tissue forming the articular end has resisted the pressure; the intervening, intermediate, cancellous structure has yielded to it.

From three smaller portions of the matrix, succeeding the ninth block, eleven consecutive caudal vertebrae were wrought out, as in Pl. 56, fig. 2, making us acquainted with a total of thirty-five caudal vertebrae of Scelidosaurus. In the last of this series the centrum (ib., 35) is reduced to the length of 1 inch, and the breadth of its front articular end to 6 lines. In the twenty-fifth caudal vertebra the centrum (ib., fig. 3) is 1 inch 10½ lines in length, 1 inch 3 lines across the articular end, 7½ lines across the middle, the longitudinal concavity of the sides exceeding that of the under surface. At the fore part of this surface the hæmapophysial articulation is barely indicated; at the back part it is marked by two surfaces (\(h\)), towards the most prominent part of which short, low ridges diverge. The low neural arch has coalesced with the upper three fourths of the centrum; the prezygapophyses (\(z\)) overhang the free fore part of the centrum, and extend beyond it to clasp the back part of the preposed neural spine. This is represented by a short, compressed ridge projecting above the part clasped by the prezygapophyses. The hæmal arch of the twenty-fourth caudal (ib., fig. 2, 24, \(i\)) underlies the centrum of the twenty-fifth; it presents a length of 1 inch 6 lines. Its closed base (ib., fig. 4) has a breadth of 7½ lines; its presents a sub-bilobed form, concave transversely, convex from before backward. At the sides of the hæmal canal or rather slit, the arch has a fore-and-aft breadth of 4 lines; the
spine expands to twice that extent, with an obtusely rounded termination. In the twenty-seventh caudal vertebra the hæmal arch and spine are reduced to a length of 1 inch 2 lines; the spine progressively decreases to the thirty-second vertebra, beyond which the hæmal element ceases to be developed.

The centrum of the twenty-seventh caudal (Pl. 56, fig. 5, 27) is 1 inch 10 lines long; the anterior surface is 1 inch in depth, 1 inch 2 lines in breadth. The coalesced base of the neural arch has an extent of 1 inch; the prezygapophyses (z) are 9 lines in length; the neural spine (ns) is 1 inch in length above the zygapophysial surfaces, its summit penetrates the base of a superincumbent dermal bone, and the hæmal spine (h) has a similar relation to the dermal bone below. But both dermal bones may have been pressed nearer to the vertebra than in the living animal as the soft parts became dissolved away. The thirty-second caudal vertebra is 1 inch 4 lines in length, with a terminal breadth of 9 lines and a middle breadth of 6 lines. Its neural surface, showing the coalesced neural arch (n), from which the processes have been broken away, is figured in Pl. 56, fig. 6, the hæmal surface is represented at fig. 7, with the last hæmal arch (h), which is not quite closed above. The thirty-fourth caudal vertebra (ib., fig. 8), is 1 inch 2 lines in length; the breadth of its front articular end is 7 lines. The ankylosed neural arch has a basal extent of 9 lines; it is convex across the middle, like a saddle, rising into a short pyramidal process (ns) behind, like its peak; and still giving off the pair of long and slender prezygapophyses (z) from its fore part, which clasp the spine or peak of the antecedent vertebra.

The thirty-five caudal vertebrae, of which the principal distinctive characters have been above described, give a total length of 5 feet 8 inches 3 lines. The extent of dislocation between a few of these vertebrae would make a deduction of about 2 inches from the above extent; but the few vertebrae missing from the end of the tail, and reduced, as shown by parts preserved, to slender centrums, may, probably, have carried the length of the tail to about 6 feet.

The trunk-vertebrae include, as has been shown, four sacral, one lumbar, sixteen dorsal, and seven, or at least six, cervicals, and these vertebrae average each a length of 2 inches; the total length of the vertebral column of the trunk, estimated as including twenty-eight vertebrae, would be, on the above average, 4 feet 8 inches, or, allowing for intervertebral soft parts, 5 feet at the utmost in the recent animal.

The length of the head can scarcely have exceeded, more probably fell short of, 1 foot.

Thus we obtain an approximate estimate of the total length of the individual affording the before-detailed osteological characters of Scelidosaurus as not exceeding 12 feet from the snout to the end of the tail. But detached frag-
ments of the fossilized skeleton of other individuals from the lower Lias of Charmouth indicate a larger size, and that the present is not that of a mature Scelidosaur.

In the general osteological characters of the vertebral column we find this genus agreeing with *Hylæosaurus* and *Teleosaurus*.

None of the anterior vertebrae present the opisthocoel an modification characteristic of the Crocodilian genus *Streptospondylus* and in a minor degree of the Dinosaurian genera *Chondrosteosaurus*, *Cetiosaurus*, and *Megalosaurus*; in this respect they come nearer to the vertebral type of the *Iguanodon*.

Not any of the anterior dorsal vertebrae develops the spinous process of so disproportionate a length as they present in the carnivorous *Megalosaurus*. Although the neural arch becomes loftier than that of *Crocodilia* in the dorsal region of the spine, the exterior of the peduncles or neurapophysial laminæ does not present the complex configuration produced by the strong, oblique ridges underpropping the diapophysis in *Iguanodon* and *Chondrosteosaurus*. Certain vertebrae have a small unossified central part, relatively less than in *Polyptychodon*; none show the extent of permanent chondrosal tissue characteristic of *Chondrosteus*. Upon the whole, I find the closest agreement to be between Scelido- and *Hylæosaurus* in the characters of the vertebral column; and I infer for both, but especially for *Scelidosaurus*, a greater aptitude for swimming than in the larger Dinosauria.

The scapular arch has been compressed transversely to a degree which has produced fracture of the right coracoid (Pl. 49, 52'), without material displacement in its relations to the left (Pl. 50, 52 and 52'), but with corresponding approximation of the two scapulae (Pl. 49, 50, 51 and 51'), which have squeezed together, with some fracture and more dislocation, the interposed parietes of the thorax. The right scapula (Pl. 49, 51) is least displaced; it extends along the first seven dorsal vertebrae, overlapping the spines of the last two. It is long and rather narrow; thickest above the humeral articulation, narrowest at its middle part, becoming broader and thicker towards its free end or dorsum, the margin of which describes a moderate and regular convex curve. The length of the bone to the fore part of its coracoid end is 13 inches; its least breadth is 2 inches; that of the base is 4 inches 10 lines. The body of the scapula describes a slight convexity outward in its course to the humeral joint, the expanded portion in front of which is gently excavated for a triangular space 4 inches long; the apex being upward, with a well-defined boundary, indicative of the attachment of a muscle to this part. The anterior border is almost straight through three fourths of its extent from the base, then becomes slightly concave to the anteriorly produced angle of the coracoid end. The posterior border is more deeply concave, through the production of the thickened part of the bone to form the
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humeral articulation (Pl. 50, b). So much as is exposed of this surface is slightly concave transversely, slightly undulating in the opposite direction, 2 inches in breadth. The articulation (c) with the coracoid (Pl. 49, 52') is a straight harmonia. At the upper part of the humeral articular process there is an oblong notch, with slightly raised borders. The left scapula (Pl. 50, 51) has yielded in two places to the external pressure, but without separation of the broken parts. It gives the same indication of the triangular muscular surface on the outside of its distal end as does the right scapula, the apex being defined by a better preserved, slightly raised, obtuse border. The fore part of the acromial end of the scapula (a), though fractured like that on the right side, is here better preserved, and gives a breadth of nearly 6 inches to this end of the bone. The humeral articulation (h) measures 2 inches 6 lines, the coracoid one (c) 4 inches. A small, oval, dermal bone (d), 1 inch 6 lines by 1 inch 3 lines, overlies the fore part of the scapulo-coracoid harmonia. It is flattened, slightly convex externally, like some others that seem to have defended the skin of the under surface of the trunk.

The coracoid (ib., 52) is an almost circular, flattened, discoid bone, 5 inches in antero-posterior diameter and 4½ inches in transverse diameter; the margin is most modified where it is expanded in two inches of its extent to contribute the coracoid portion (h) of the humeral joint. The scapular articular border (s) presents less thickness. The mesial or sternal border (m), continuing the circular curve, touches its fellow (52) by only a small part of its circumference. The average thickness of the coracoid plate is 7 lines. About 1 inch 3 lines from the scapular surface there is a foramen, 5 lines in diameter. The free border of the entire coracoid appears to be raised, but this may be due to the included surface having been crushed in and cracked by external pressure.

In the hinder interspace of the coracoids there is a flattened mass of a rhomboidal form, composed of scattered portions of thin, dark, osseous substance, cemented together by matrix, which is discoloured by carbonaceous material. No part shows the continuous roughened, but compact, structure of the dermal bones. It appears rather to be the remains of some partially ossified element of the endoskeleton. In its position it corresponds with the sternum. There is a fainter trace of the same kind of material, or discoloration of the matrix, at the anterior interspace of the coracoids.

The humerus, which is preserved on the left side (Pl. 50, 53), has been singularly crushed and flattened; the side of the middle of the shaft being broken away, exposes a small medullary cavity. The distal end (d) is broken off, and slightly overlapped by the shaft (53). The length of the humerus is 11 inches 3 lines. It presents a sigmoid flexure, the distal end slightly bent downward or forward; the proximal articulation, moderately convex, is 3 inches 8 lines in the long diameter;
the fore part is produced into a strong ridge, here partly broken away. The distal end is 5 inches across, and is moderately concave transversely behind. An osseous tubercle, 1 inch 4 four lines by 10 lines, is cemented to the anconal surface; a second similar bone is attached to the interspace between the inner condyle and the slightly dislocated ulna. These are more probably parts of the scattered dermal skeleton than tendinal sesamoids of the extensor of the forearm.

The acromial end of the ulna (Pl. 50, 55) presents a convex border 2 inches 2 lines in breadth. The mutilated head of the radius (ib., 54), preserving its natural relations to the outer condyle of the humerus, is 1 inch 6 lines in length.

The shafts of the radius and ulna, with the rest of the bones of the fore limb, have been broken away.

Four oval, dermal bones, like those overlying the humerus and ulna, are attached to the matrix in front of the humerus and radius.

Behind the fractured sternal end of the right coracoid (Pl. 49, 52) is the dislocated head (53) and anterior expanded pectoral process (p) of the right humerus (ib.), showing a thickness of 7 lines where it has been broken off. The transverse diameter of the humerus at this part is 6 inches, with a thickness of the shaft not exceeding 2 inches 9 lines, showing that the humerus in *Scelidosaurus* was more expanded and compressed proximally than in any existing reptile, and in this respect resembling the same bone in the Dicynodonts.¹

The proportions of the entire fore limb of *Scelidosaurus*, as indicated by the length of the humerus, would be those of the same limb in *Telesaurus*. The humerus is shorter than the scapula, barely equalling the extent of four coarticulated middle dorsal vertebrae. There is no trace of clavicle in the present specimen; the functions of the fore limb seem, therefore, to be less important in regard to locomotion on land than in Iguanodon, Megalosaurus, and modern Lizards. Yet the shape and proportions of the coracoid, as I pointed out in regard to the *Stagonolepis* when the remains and impressions of that reptile were submitted to my inspection by Sir Roderic I. Murchison, at Leeds, during the meeting of the British Association, September 24th, 1858,² show the distinction from the Crocodilian order and the affinity to the Thecodontion order and to modern Lacertilia, or give evidence of a more generalised reptilian character, in these extinct reptiles with dermal bones and scutes of the Lower Liassic and Upper Triassic deposits.

² Art. "Palæontology," 'Encyclopædia Britannica,' vol. xvii, p. 130, in which, in reference to the Elgin matrix of *Stagonolepis*, it was stated that "no characteristic Devonian or Old Red fossils of any class have been discovered associated with the foregoing evidences of reptiles, which, according to the determination of strata by characteristic fossils, would belong to the secondary or mesozoic period."
Pelvic Arch and Limb. Pls. 53, 57, 58.

The left iliac bone (Pl. 53, figs. 1 and 2, 62) retains almost its natural relations with the sacrum. The right iliac bone (ib., 62) has been obliquely dislocated. It is a long bone, with a sigmoid flexure (ib., fig. 2, 62), convex upward and outward in its anterior two thirds, more slightly concave in the rest of its extent. Of the left ilium an extent of 18 inches is preserved, a part, apparently a small one, being wanting from both extremities. The narrowest portion of the bone is that which is produced anterior to the first sacral rib (ib., 61); this portion is 6 inches in extent, trihedral in form, 2 inches 6 lines in breadth where it joins the obtuse, expanded end of that rib. Beyond or behind the first sacral abutment the ilium progressively expands to a breadth of about 5 inches opposite the fourth abutment (s. 4). The thickness of the bone, as exposed in the fracture of the left ilium, is from 2 inches to 2½ inches. The middle third of the substance of the bone shows a rather open, cancellous structure; external to this the texture is much closer, with a compact, peripheral layer of from 1 to 2 lines in thickness. The articular cavity for the femur is on the under and outer side of that part of the ilium which is opposite its symphysis with the first two sacral vertebrae (s. 1 and s. 2).

The fore part of the right ilium (62') has been thrust away from that junction, and the femur (65) is dislocated, passing beneath the ilium, with the head abutting against the sacrum. The summit of the great trochanter terminates rather more than an inch below the articular head of the bone. The breadth of the femur across this part of the trochanter is 3 inches 6 lines. The length of the femur (Pl. 57, fig. 1, 65) is 1 foot 4 inches. The inner process or ridge (t) begins to be developed about 5½ inches from the head of the bone, and is 2 inches in extent. The shaft of the bone at this part is rather flattened, both anteriorly and posteriorly, and is most convex externally. It assumes a rounder circumference about 1 inch below the inner process, where the bone is 2 inches 4 lines in diameter. Thence it expands to the condyles (a and b), becoming flattened anteriorly and concave posteriorly. The condyles are but feebly indicated by a shallow notch on the fore part, but more distinctly behind, where they are produced backward. The hind extremity of the outer condyle (a) is marked off by a notch from the rest of its articular surface lying anterior and external to it. This posteriorly defined part articulates with the outer condyloid production of the head of the tibia, the fibula articulating with the rest of the outer condyle. The transversely convex fore part of the shaft of the femur is divided on each side by a low ridge from the flattened surfaces converging towards it, the one from the outer side, the other from the inner process (t). The exterior of these ridges is continued further down the bone.
than the opposite one. This femur, being broken across about 6 inches from its upper end, shows a medullary cavity of about 1½ inch in diameter, with a compact and finally cancellous wall, which is nearly an inch in thickness next the base of the inner process, and is about 3 lines in thickness on the opposite side of the shaft (Pl. 57, fig. 2). The transverse breadth of the shaft here is 2 inches 7 lines, the fore-and-aft breadth is 2 inches. The transverse breadth of the distal end is 4 inches 10 lines; the fore-and-aft breadth of the outer condyle is 3 inches 3 lines, that of the inner condyle 3 inches 8 lines; the depth of the posterior inter-condyloid notch is 1 inch 3 lines.

The proximal ends of the tibia and fibula are crushed below their articular surfaces; most so in the right leg, with fracture of both bones. The medullary cavity of the right tibia has been obliterated by this violence, and the strong, compact wall broken and crushed in upon it. The fibula, with a smaller cavity and thicker, compact walls, has better resisted the pressure, especially in the left limb.

The length of the tibia (Pl. 57, 66) is 12 inches 10 lines, that of the fibula (ib. 67) is about an inch shorter. The expanded upper end of the tibia passes over the outer and part of the front surface of the head of the fibula;¹ the expanded lower end of the tibia passes, in part, behind that of the fibula, showing a kind of twisted, terminally, overlapping relation between the two bones. There is a distinct interosseous space (φ) between the upper three fourths of their shafts. The breadth of the proximal end of the tibia, which may be a little increased by compression, is 5 inches 6 lines. The breadth of the distal end is 4 inches 6 lines. The tibia, which, on the left side, has suffered least compression at its upper end, and has been partially dislocated from the femur, shows a coadapted surface of very similar shape to that of the femur, convex from before backward, slightly concave transversely at the back part of the joint. In both bones the articular surfaces are rough, as if they had been connected together ligamentously. The tibial articular surface divides posteriorly, as before noted, into two condyloid processes, with an inter-condyloid space of about 2 inches breadth: one condyle is for the inner condyle of the femur, the other is adapted to the posterior prominence of the outer femoral condyle. The back part of the proximal end of the fibula next the outer condyle of the tibia is similarly produced into a convex protuberance. The fore and outer part of the tibia is produced into a strong procnemial tuberosity or process.

The shaft of the fibula contracts to a diameter of 1 inch 10 lines, and then expands transversely, but without corresponding fore-and-aft enlargement, to the distal breadth above recorded.

¹ In their natural relative positions, the fibula has been slightly dislocated outward in the left leg. (Pl. 57.)
To the major part of the distal end of the tibia, at least to two thirds of its inner or tibial side, is articulated the tarsal bone (a), including the coalesced homologues of the astragalus, naviculare, with the ento- and meso-cuneiform bones, of the mammalian tarsus. This bone (Pl. 57, fig. 1, a) presents an anterior surface of an elongated, irregular, triangular form, with the apex tibiad or toward the inner side of the tarsus. It becomes narrower as it proceeds backward beneath the tibia (ib., fig. 3, a), its articular surface with which is concave from before backward, favouring flexion and extension, or motion of the foot to and fro. Its distal surface is convex in the same direction, and is sinuous transversely.

The calcaneum (ib., figs. 1 and 3, l) articulates with the distal end of the fibula (fig. 1, 67) and with the outer third of the same surface of the tibia (fig. 3, l).

The next most intelligible tarsal bone is that (figs. 1 and 3, v) which articulates with the calcaneum (l) and with the two outer metatarsals (i, v and v). Its largest surface is turned forward or upward; its posterior surface is a smaller convex protuberance; this bone answers to the cuboides.

At the back part of the tarsus there projects the base of a wedge-shaped bone, (fig. 3, e) seemingly partially dislocated backward, which mainly supports the middle metatarsal (iii), and extends partly over the fourth (fig. 3, iv). The apex of this bone appears on the front side of the tarsus (fig. 1, e) in the interspace between the astragalus (a), cuboides (i), the third and the fourth metatarsals. I regard this bone, therefore, as answering to the ecto-cuneiform; I cannot discern any trace of other cuneiform bones, the fibro-cartilage by which the interspace between the bone (a), and the first and second metatarsals, was most probably occupied held partly the place of the meso- and ento-cuneiform bones. From this it appears that the tarsus of Scelidosaurus includes but four bones, as in the Crocodile (Pl. 58, fig. 4.) In the Lizard (Varanus), fig. 3, an ossification in the fibro-cartilage at the base of the second metatarsal establishes the “meso-cuneiforme,” and leaves the “ento-cuneiforme” to combine with the naviculare and astragalus in the bone (a).

The metatarsus of Scelidosaurus consists of five bones. Of these, the fifth (Pl. 56, figs. 1 and 3, v) is abortive, and adherent to a rough ridge on the outer part of the base of the fourth metatarsal, with its proximal half extending over the interspace between that bone and the cuboid to articulate with the latter. It was not, however, flattened and expanded, as in the Crocodile (Pl. 58, fig. 4, v), but was slender and styliform, if we may judge by the proximal end which fortunately remains attached in the left hind foot of Scelidosaurus (Pl. 57, fig 1, v). It most probably did not support a toe, or make any distinct appearance in the entire foot. The other four metatarsals support each a fully-developed toe, with the progressive increase in the number of phalanges characteristic of saurian Reptilia; the first having 2, the second 3, the third 4, and the fourth 5 phalanges.
The metatarsal of the first or innermost toe (Pls. 57 and 58, i), is 2 inches 9 lines long. With its proximal end laterally compressed, and abutting against the corresponding end of the second metatarsal, which is much expanded in that direction. The distal end of the first is 13 lines in breadth, with a convex articular surface. The first phalanx of the toe (i) is 2 inches long, 14 lines across the base, convex transversely towards the dorsum of the foot, flattened transversely and slightly concave lengthwise, towards the sole. The ungual phalanx is 1½ inch in length, and 1 inch in basal breadth; is sub-depressed, and curved downward. About 3 lines in advance of the joint, its breadth is increased by two lateral ridges. The apex is subacute. The under surface is marked by many fine, wavy ridges. There are two obtuse longitudinal prominences on the under surface near the joint, for the advantageous insertion of the flexor tendons, and there is a rough prominence at the middle of the dorsal surface, near the joint, for the insertion of the extensor tendon. The dorsal surface near the margins and apex, is sculptured by vascular grooves. The total length of the first digit (i) is 6 inches.

The second metatarsal (ib., ii) is 5 inches in length; with a proximal articular surface 1 inch 6 lines in breadth, sinuous but almost flat: this surface presents almost double the transverse extent in the antero-posterior direction. The inner and anterior part of this surface is produced inward, or tibiad, apparently to afford an abutment or attachment, at least in part, to the proximal end of the first metatarsal. The outer or fibular side of the second metatarsal is almost straight, the inner or tibial one concave, the expansion at both ends taking place chiefly in that direction. The distal articular surface is convex from before backwards, with a median groove producing a transverse concavity between the two convexitites or condyles, at the posterior half; and these slightly project backward. The first phalanx of the second toe is 1 inch 3 lines in length, 1 inch 7 lines across the proximal, and 1 inch 6 lines across the distal end; the diameter from before backward at the middle of the shaft is 6 lines, the phalanx is consequently broad and sub-depressed. The posterior or plantal surface at the proximal end is slightly produced. The distal articular convexity extends a little way upon the middle of the dorsal surface, and slightly swells out into two condyles at the opposite surface. The second phalanx is much shorter in proportion to its breadth, which at the base is 1 inch 6 lines; the length being 1 inch 7 lines; the tibial border is short and concave; the fibular one is straighter and one third longer. The ungual phalanx (ii) differs chiefly from that of the first digit in its superior size, being 2 inches in length and 1 inch 4 lines in its greatest breadth; the fibular margin is convex, the tibial one slightly concave. A side view of the bone, of the natural size, is given at fig. 4, Pl. 57.

The length of the third metatarsal (ib., iii) is 5 inches 4 lines. It is more symmetrical in shape than the rest. The transverse breadth of the proximal end is
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1 inch 8 lines; the fore-and-aft breadth is 2 inches 1 line. The thickness in this direction diminishes rapidly towards the distal end; the transverse dimension decreases in a much less degree; this, at the middle of the bone, being 1 inch 2 lines, whence it increases to a distal transverse breadth of 1 inch 11 lines. The configuration of this articular surface resembles that of the second metatarsal; the fore-and-aft breadth of the condyle is 1 inch 6 lines. The proximal phalanx of the third toe (ib., iii, 1) is 1 inch 2 lines in length, 1 inch 10 lines across the base, and 1 inch 3 lines across from before backwards. On the middle of the outer border is a tuberosity; each side of the distal end is deeply impressed; the distal articulation resembles that in the second toe. The greatest transverse breadth of this phalanx is 1 inch 7 lines. The second phalanx (ib., 2), with a basal breadth of 1 inch 6 lines, is only 1 inch 7 lines in length. The distal articulation is 1 inch 5 lines in breadth. The third phalanx (ib., 3), with a basal breadth of 1 inch 3 lines, is 1 inch 2 lines in length, with a distal breadth 1 inch 1 line. The ungual phalanx (ib. 4) is more depressed in proportion to its breadth than that of the preceding toe; in other respects it resembles it in shape.

The fourth metatarsal (ib., iv), is 4 inches 5 lines in length, of an unsymmetrical figure, receding from the middle metatarsal along its distal half, which is concave lengthwise on the tibial side; the fibular side presents a general but slighter concavity; this metatarsal is trihedral, the fore and back surfaces converging to an obtuse, narrow, outer border, significant of its terminating that side of the foot beyond the representative style of the fifth digit (v). The fourth metatarsal measures 1 inch 9 lines across the base and 1 inch 7 lines from before backwards, at the tibial side of the base; the fibular side being reduced to the narrow rough ridge for the ligamentous attachment of the fifth abortive metatarsal. The breadth of the shaft of the fourth metatarsal at its lower third is 1 inch 1 line; that of the distal articular surface is 1 inch 5 lines. The first phalanx of the fourth toe is 1 inch 11 lines in length; the basal breadth is 1 inch 8 lines and the distal breadth is 1 inch 5 lines. The tibial angle of the proximal surface is most produced. The fore-and-aft dimensions of the shaft do not exceed 6 lines. The second phalanx is 1 inch 2 lines in length, and 1 inch 8 lines in basal breadth. The third phalanx is 1 inch in length, 1 inch 4 lines in breadth; the fourth phalanx is 9 lines in length, 1 inch 2 lines in breadth. The ungual phalanx is 1 inch 6 lines in length; 8 lines across its articular surface, 11 lines across its broadest part, caused by the aliform expansions of the bone beyond the articulation. It curves downwards and inwards, or towards the tibial side, to a subacute apex; the characters of its surface correspond with those of the larger ungual phalanges of the preceding toes.

From the abortion of the fifth digit, and the disproportionate shortness of the first, we have in Scelidosaurus the example of a reptile manifesting a tendency to the tridactyle type of the hind foot, and this is effected in its remote successor of
the Wealden period—the Iguanodon—by the suppression of the first, and by a similar atrophy of the fifth digit. The foot-prints of Scelidosaurus would terminate forward by the marks of four claws, the innermost falling short of the base of the second, this and the fourth reaching the same line, and the intermediate third claw extending farthest. The hind foot-prints of Iguanodon are tri-dactyle.¹

The total length of the foot of Scelidosaurus is 1 foot 1 inch 6 lines; the length of the leg ("cnemion") is 1 foot; the length of the thigh is 1 foot 4 inches; consequently the total length of the hind limb is 3 feet 5 inches; and, allowing for the fibro-cartilaginous matter of the joints and the terminal claws, the limb may have been 3 feet 8 inches long in the recent animal.

The femur equals the length of about seven co-articulated dorsal vertebrae, and, with the leg, manifests longer proportions to the body than in the Crocodilia; but the foot presents shorter and broader proportions, although it has the same number of toes. Scelidosaurus, however, differs from Teleosaurus and modern Crocodilia, in retaining the ungual phalanx of the fourth toe, as in modern lizards (Pl. 58, fig. 3, iv); although it differs from these and resembles the Crocodiles in the non-development of the fifth toe. The interesting evidence of this intermediate relationship afforded by the bones of the hind foot, as by some other parts of the skeleton, is illustrated by the outline figures of the skeleton of the hind foot (Pl. 58) in Varanus, fig. 3, in Crocodilus, fig. 4, and as similarly restored in Scelidosaurus, fig. 2.

In the same plate is figured, of half the natural size, the bones of the right hind foot of the skeleton of the Scelidosaur which has yielded the subjects of the present Monograph; showing the effects of pressure in fracturing and partially dislocating the metatarsal segment, after all the joints of the toes had been cemented by the surrounding hardened matrix in their respective varied numbers and co-adjustment in each toe.

**Dermo-skeleton.**

The bones belonging to this system were extensively developed in Scelidosaurus, and are for the most part of a massive character. They have been much displaced in the present specimen, partly during the decomposition of the carcass, and partly by subsequent pressure due to movements of the imbedding stratum; but retain their most intelligible natural relations to the endo-skeleton in the caudal region: in which part, therefore, I shall begin their description, as they were found, on exposing the vertebral characters on the left side, from the end of the tail forwards; and were either removed, or left in situ, as the case required.

¹ Ante, Vol. i, p. 374, Pls. 43, 44 (Dinosauria).
At the thirty-first caudal vertebra, for example, there was attached to the back part of the neural arch, and pressed rather obliquely to the left side, an elongated triedral dermal bone, with the narrowest side or surface forming the base, and the two broader or larger lateral surfaces converging at an acute angle to an upper ridge. Much of this ridge on the fore part of the bone had been broken away in the original exposure of the specimen; the length of what remained was 1 inch 2 lines, with a basal breadth of 6 lines. The sides of the bone seemed as if worm-eaten, by narrow curved grooves with intervening small, oblong, and circular pittings. The texture as exposed by the fracture was compact, reflecting a lustre. Between the twenty-ninth and thirtieth vertebrae there was the basal part of a similarly shaped dermal bone, 1 inch 9 lines in extent, with a basal breadth of 9 lines. It lies upon the right side of the co-adapted halves of the neural arches of these vertebrae, but may have been displaced from the median line, and this is more probable as the base of a dermal bone crossing the articulation between the centrums of the same caudal vertebrae has also been pressed towards the right side, on which the carcass of the reptile appears to have rested in the matrix. But any doubt as to the relations of the dermal bone above indicated was dissipated by the better preservation of those found in connection with the twenty-seventh and twenty-eighth caudal vertebrae (Pl. 56, fig. 2), and which are represented of the natural size in figure 5 of the same plate.

The dermo-neural bone (d n), was found fractured, with a slight displacement of the back part of its base: when entire, it had a longitudinal extent of 3 inches 6 lines, and a vertical one of 2 inches. The base is hollow, and has been crushed by the lateral pressure; but seems to have had a breadth of nearly an inch. The sides converge to the upper margin, which describes a bold convex curve from before backwards, along two thirds of the contour, and then descends in a straighter line obliquely backward to the hinder angle of the base. This dermal bone extends from above the prezygapophyses (z) of the twenty-seventh caudal vertebra to the fore part of the spine of the twenty-eighth. On removing part of the side of the base of the dermo-neural bone the spine (n s) of the twenty-seventh vertebra was seen to have penetrated the basal cavity, as far as that extended into the substance of the dermal bone; but I incline to think that fibrinous or other soluble tissue intervened in the living reptile, and that the position of some of the more anterior dermo-neurals, situated at a higher level above the neural spines, was the more natural one.

The dermo-hæmal bone (ib., d h) presents a longitudinal extent of 2 inches 3 lines, with a vertical one of 13 lines, and a basal breadth of about 9 lines. The hæmal spine of the twenty-seventh vertebra (h) seems also to have entered a hollow in its base, where it was exposed by removal of part of the left wall of the basal cavity. But this had been pressed up to the under part of the
centrums, almost touching the posterior half of the twenty-seventh and the contiguous two thirds of the twenty-eighth caudal vertebra; obliterating an interspace which should have been occupied by muscle, tendon, ligament, and other soft parts in the recent animal.

The dermo-hæmal spine below the twenty-fifth and twenty-sixth caudals differed only in its larger size from the succeeding one. Part of the base of the corresponding dermo-neural was preserved.

In the series of nine consecutive caudal vertebrae (Pl. 56, fig. 1), the number and disposition of the dermo-neural and dermo-hæmal bones were more fully and satisfactorily exhibited. Three consecutive dermo-neurals extended over a series of seven vertebrae, from near the fore part of the first to near the hinder half of the last of these seven, each extending over the interspaces of two vertebrae. The corresponding dermo-hæmals are of smaller size, cross only one intervertebral space, which is the second or posterior of those so crossed above, and their hinder end is a little further back than that end of their homotype above. But, in working out these vertebrae, indications of a third series of caudal dermal bones were first met with. There extended over the articulation between the twenty-first and twenty-second caudals the base of a dermal bone, 3 inches long, crushed, with its apical ridge broken off. On its removal, the vertebrae it crossed were seen to have been displaced to the extent of nearly an inch. The position of this bone, and the ascertained relations of the neural and hæmal dermal bones to their vertebrae, made it improbable that it was one of either of these series displaced; and attention was quickened, which led to the detection of a similar appearance further in advance, to be presently described.

The best preserved dermo-neural, in the series of nine caudal vertebrae (Pl. 56, fig. 1, a n), presents a basal longitudinal extent of 3 inches 5 lines, with a basal breadth of 1 inch 9 lines; its quasi worm-eaten, rugose sides, converge to an upper margin, not quite entire, but with apparently a contour resembling the dermo-neural in fig. 5. The present larger bone overlies the twentieth and contiguous portions of the nineteenth and twenty-first caudal vertebrae. The corresponding dermo-hæmal bone (a, h), with a longitudinal basal extent of 2 inches 6 lines, and a basal breadth of 1 inch 3 lines, underlies the twentieth and twenty-first caudals, extending along a greater proportion of the former. Its sides, similarly but more finely sculptured than the dermo-neural above, converge to a convex inferior border; the depth of the side being not less than 1 inch 6 lines. The next dermo-neural in advance overlies the eighteenth and contiguous half of the seventeenth caudal vertebrae. It presents a basal extent of 3 inches 6 lines, with a basal breadth of 1 inch 6 lines. The base of the corresponding dermo-hæmal spine is preserved, which underlaps the hinder two thirds of the eighteenth and the front third of the nineteenth caudal. Its base is
2 inches 7 lines in length, with a moderate contour. The apical ridge and left side of this bone have been broken away.

Between the above-described dermo-neural and dermo-hæmal bones there was the base of a lateral dermal bone, 3 inches 5 lines in length, applied over the eighteenth and part of the nineteenth caudal vertebrae, like that between the twenty-first and twenty-second. The portion preserved in exposing these vertebrae is figured in the interspace produced by their slight dislocation, into which it had been wedged by pressure. I conceive it to have been the direct instrument of the dislocation, receiving and transmitting the extraneous pressure; and at a period when the vertebrae in front and behind were sufficiently free in their bed to allow of being pressed close together, with obliteration of their natural interspaces originally occupied by the soft inter-articular material; the extent of such interspace is probably shown between the twenty-second and twenty-third caudals (Pl. 56, fig. 1). From the evidence of the dermo-neurals and dermo-hæmals, in situ, in the present series of vertebrae, the dermal bone above described could not be one of these series displaced; and I infer from it, and the evidence of a similarly situated bone in a remoter part of the tail, that this appendage was defended by a series of lateral as well of upper and lower dermal ossicles, though, perhaps, in less number, and of a flatter figure, along the sides.

The next dermo-neural in advance overlaps the sixteenth and the contiguous half of the fifteenth caudal vertebrae; but its hinder end, as well as a part of its summit, are broken away. What remains, measures 3 inches 4 lines in length with a basal breadth of at least two inches. The margin of the base of all the above-described dermo-neurals describes a gentle convexity.

As the dermo-neurals advance in position, they progressively acquire increase of basal breadth, to near the base of the tail, retaining the average length of 3½ inches, with a small increase of height. Three dermo-neurals range along an extent of the five vertebrae (eleventh to fifteenth caudals) figured in Pl. 55, fig. 3; and the same relative number and position are shown in the five antecedent caudals (ib., fig. 1, d n). On the right or imbedded side of the vertebrae, overlying the centrum of the fourteenth, and contiguous parts of the thirteenth and fifteenth vertebrae, is the base of a dermo-lateral bone, 3 inches 3 lines in length, 2 inches 2 lines in breadth, the sides converging at an open angle, but with their terminal ridge broken off. This representative of the lateral series of dermal bones would seem to show that they had greater breadth and thickness than either those of the upper (neural) or lower (hæmal) dermal series. The right side, where these additional indications of a lateral series of dermal bones are preserved, was that which was left imbedded in the matrix; the left side being that which was exposed by the original quarrying operations. It is probable, therefore, that the dermo-lateral bones of the left
side, with the exception of the few remains above noticed, were in the matrix so detached. The characters of the caudal vertebrae figured in Pls. 55 and 56 were displayed by careful removal of the matrix left adhering to the parts originally exposed; during which operation the portions of the dermo-lateral bones which had been pressed inward, and contributed to the dislocation of the twenty-first from the twenty-second, and of the eighteenth from the nineteenth caudal vertebrae, were brought to light.

A dermo-neural bone overlies the ninth and tenth caudals (Pl. 55, fig. 1); another over the seventh and eighth (d n); a third over the sixth and fifth. The fracture through the middle of this latter bone (Pl. 54, fig. 3), shows the form and depth of the angular excavation at its base, which rested, probably with interposed ligamentous substance, upon the summit of the neural spine of the caudal. The corresponding dermo-hæmal bones, displaced so as obliquely to overlap the hæmal spines on the right side, are also preserved; and on this side there are as many dermo-lateral scutes, but more fragmentary and dislocated.

In the block of lias with the first caudal vertebrae (Pl. 54, figs. 1 and 2), is the anterior half of the dermo-neural overlapping the fifth and sixth of that series. Two similar bones with a basal excavation exposed by fracture in one of them, are situated to the right side of the fourth and third caudals, which may be dermo-laterals or displaced dermo-neurals. A portion of a massive dermal bone lies upon a part of the ilium contained in this slab. The rest of the armour of this part of the base of the tail has been removed. The like is the case with regard to the upper part of the block including the sacrum (Pl. 55). At its under part, in which are imbedded dislocated bones of the hind limbs, there are a few scattered portions of wedge-shaped dermal bones, similar in size to those at the base of the tail, but less pyramidal, and with more obtuse summits. A few smaller, flatter, subcircular dermal bones were met with in the course of exposing the parts of the endo-skeleton. One of these (ib., d), lies above the interspace between the left ilium and the third sacral rib (Pl. 55, fig. 1, d).

In the block of lias containing the fore part of the thorax and scapular arch a longitudinal series of eight dermal bones were found on the right side, overlapping the ribs, external to the diapophyses. These dermal bones were shorter and thicker than the caudal dermo-neurals, and had been subject to more or less fracture and some displacement. The best preserved was wedge-shaped, with the sides of the excavated base slightly convex, 2 inches in length, 8 inches 9 lines in breadth, the sides converging at a more open angle, but unequally, to a margin which shows a convex ridge. The inferior size and unsymmetrical shape of this bone seem to show that it formed part of a lateral row, which had been situated near a middle one, or had ranged along near the medial line of the back. The margins of these bones were not entire. The summit of a dermo-neural spine remains wedged
between the spines of the second and third dorsals, and another between those of the fourth and fifth dorsals (Pl. 49, d n, d n). On the left side of the thorax (Pl. 50) are preserved some of the upper lateral series of dermal bones (d n t), showing their natural position and intervals. On the same side, beneath the foregoing (Pl. 50, d n), are some larger wedge-shaped dermal bones. Three of these may have been displaced from above the neural spines. They are elliptical, 3 inches long, 2 inches broad at the base, with the sides converging with a slight concavity to the upper ridge, which has been broken off in each, so that its height is conjectural. Other evidences of dermal bones on the under part of this slab are too fragmentary and scattered to throw any light upon their natural arrangement. On the right side (Pl. 49), overlying the ends of the ribs, about ten inches distant from the vertebrae, are preserved three of a series of flattened, sub-ovate, dermal scutes (d a, d a), about 3 inches by 2 inches in the long and cross diameters, and from 2 to 4 lines in thickness. The outer surface exhibits the same character of sculpturing as do the dermal bones of the tail; the inner surface is smooth.

In the block containing the second and third cervical vertebrae the pair of lateral, unsymmetrical, dermal bones have been preserved nearly in their natural position. They are three-sided; the shortest is directed mesiad; the side next in length looks downward; the outer surface, more convex, is directed upward and outward, and is the most extensive. These scutes have been fractured through their centre. They show an external, very compact, layer of bone thickest on the outer or peripheral side. The rest of the bone shows a rather close cancellous structure. Above these, but slightly displaced, is a pair of wedge-shaped bones, which are probably dermo-neurals, indicative of a parial arrangement of these along the nape, contrasting with their single series above the tail. Each of these dermal bones are somewhat unsymmetrical in form, 2 inches 9 lines in the length of the base, 1 inch 9 lines in breadth, with the median surface more extensive than the outer, and both converging to a ridged summit, but which is broken away.

The anterior pair of nuchal scutes is preserved in connection with the occiput, overlapping the atlas (Pl. 48, fig. 1, d n, r). They are similar in shape, but smaller in dimensions, than those last described, and have been broken across.

From the sum of the foregoing observations, it may be inferred that the surface of the Scelidosaur was defended by several longitudinal series of massive dermal bones, those occupying the median and upper surface being arranged in pairs upon the nape and singly along the tail. External to these were a lateral series at least two in number, but probably more, on each side the trunk, having the same wedged and ridged shape as the dermo-neurals. Beneath these were flattened, ovate scutes along the lower lateral part of the thoracic-abdominal region. In the tail we have more decisive evidence of a single median row of large, symmetrical,
cuneiform, hollow-based, superiorly ridged dermo-neurals, with dimensions making three occupy the space of five vertebrae along the base of the tail, and nearly seven vertebrae along the hinder half of the tail. There was a corresponding median series of smaller and less vertically extended dermo-hæmal bones, and also a single series of dermo-laterals, of more depressed and fuller ovate form, on each side.

The accidents attending the decomposition of the carcass of this reptile seem to have had the chief share in the removal and displacement of so large a proportion of its coat of mail. Subsequent cosmical violence has been concerned in the fracture, the crushing, and in a certain amount of displacement of the constituent parts of the skeleton. Lastly, further fracture of the fossil bones has been due to the quarrying operations, by which the specimen was brought to light.

A few remains, including a femur, 5 inches in length, but with both extremities seemingly incompletely ossified, indicated a young Dinosaur; and with characters, as of the inner trochanter, in regard to shape and relative position, which led me to surmise that it might be part of an immature and very young individual of a Scelidosaurus. These remains were from the same liassic locality as the larger, probably adult bones.

To whatever extent the Saurian organization has been modified for terrestrial life, that has been, in no instance, such as to suggest an inability to swim. On the contrary, the disproportionate shortness of the fore limbs, even in Iguanodon, leads to the suspicion that they might be short in reference to diminishing the obstacles to propelling the body through water by actions of the strong and vertically extended tail; and that, as in the living land lizard (Amblyrhynchus), of the Galapagos Islands, the fore limbs might be applied close to the trunk in the Iguanodon, when it occasionally sought the water of the neighbouring estuary or sea. One would suppose that the newly born or newly hatched young of a Dinosaur might be safer on shore than at sea, or at least in waters which, like those of the Liassic ocean, seem to have swarmed with carnivorous Enaliosaurus. If the Dinosauria were ovo-viviparous, and produced but few young at a birth, the remains from the lower Lias, noticed at p. 90, might be those of a foetus borne by a gravid Scelidosaur to sea during an occasional excursion, and which by some casualty had there perished, and become imbedded, with her progeny, in the muddy bottom of the old Liassic ocean. I have not, however, been able to obtain precise evidence of the proximity of the small femur with the larger one of the Scelidosaurus, and bones of more than one small individual might have been expected to occur in juxtaposition if they had perished before birth. The analogy of the crocodile, moreover, would lead us to expect that the newly excluded or newly born Scelidosaur would be of smaller size than the individual indicated by the bones first discovered.
The general condition of the almost entire skeleton of a Scelidosaur organized, as seems by the structure and proportions of the hind foot, for terrestrial rather than aquatic life, or at least for amphibious habits on the margins of a river rather than for pursuit of food in the open sea, led me to infer that the carcass of the dead animal had been drifted down a river, disembooguing in the Liassic ocean, on the muddy bottom of which it would settle down when the skin had been so far decomposed as to permit the escape of the gases engendered by putrefaction. In that predicament the carcass would attract large carnivorous marine fishes and reptiles, and portions of the skin, with prominent parts not too strongly attached to the trunk, would probably be torn away before the weight of the bones had completely buried the carcass in the mud. In this way, perhaps, we may account for the loss of much of the dermo-skeleton and of the two fore feet. The larger hind limbs with their stronger muscles and ligaments, would offer better resistance to such predatory attacks; and they, at any rate, have been preserved. The agitation to which the body must have been subject in its course down the stream, and before it finally sunk and settled out of sight, would be attended, after a certain amount of decomposition of the flesh, ligaments, and other soft parts, with such an amount of dislocation as the ribs and other parts of the vertebral column exhibit along the otherwise well-preserved and completely consecutive series of the bony segments, from the skull to near the end of the tail. But the oblique compression of the skull, the flattening of the thorax, squeezed between the approximated piers of the scapular arch, attended with fracture of one of the coracoids, and other indications in the rest of the trunk, plainly bespeak the enormous pressure to which the fossil has been subject after its imbedding, and which must have been attended with still more injury and destructive obliteration of anatomical characters had it not been for the surrounding uniform support afforded by the matrix, compactly hardened around the petrified skeleton before those cosmical movements commenced to which the change in the position of the old Liassic sea-bottom has been due.
SUPPLEMENT No. II.

MESOZOIC LIZARDS.

Genus—Echinodon, Owen.

Echinodon Becclesii, Owen. ‘Lacertilia,’ Pl. 11, figs. 1—9.

The specimens figured in the above-cited plate were discovered by S. H. Beccles, Esq., F.R.S., in the thin, fresh-water stratum at Durdleston Bay, Isle of Purbeck. They consist of portions of the upper and lower jaws of a Saurian, allied, by the shape of the teeth, to Macellodon (Pl. 11, fig. 10, a—c), but of larger size, and with the thecodont implantation of the teeth. The crown belongs, in general shape, to that type, of which the teeth of Palæosaurus, Scelidosaurus, Cardiodon, Hylæosaurus, and even those of Iguanodon, are modifications. The teeth of the present genus are distinguished by the marginal serrations of the apical half of the crown, which increase in size from the apex to the base of that angular part of the tooth, the two basal points resembling spines, and terminating respectively, or forming the confluence of, the two thickened ridges (ib., r, fig. 2, c) bounding the fore and hind borders of the basal half of the crown.

The crown is supported on a subcylindrical fang, and suddenly expands, both transversely (Pl. 2, fig. 11, c) and antero-posteriorly (ib., b). In the former direction it as quickly begins to contract, and the outer and inner sides converge in almost a straight line to the apex; in the latter direction the crown continues expanding for about half, or rather more, of its longitudinal extent, with a slightly convex contour; it then rapidly contracts to the apex, the converging borders meeting at a right or somewhat acute angle, and being serrated as above described. The thickest mid-part of the crown forms a longitudinal rising, usually more marked on one side of the tooth; at the apical half the crown gradually becomes thinner towards the fore and hind margins; but at the basal half these margins are thickened, and cause the surface between them and the mid-rising to be undulated transversely. At the apical part of the tooth both the outer and inner sides are gently convex, the transverse section giving the thin-pointed ellipse, as in fig. 6, b.

The outer and inner enamelled sides of the crown each describe a curve at their base (fig. 3, b, r), convex towards the fang; these bases are somewhat thickened

1 'Echinodon, hedgehog, and odoos, tooth, "prickly tooth."
and rounded, so as to project from the fang; they converge at the fore and hind parts of the tooth, and unite at an acute angle (fig. 2, a, r), to form the long, basal points (fig. 3, b, s) of the serrated half of the crown. The foregoing characters apply to the majority of the teeth of *Echinodon*.

A portion of the left maxillary bone, with its outer surface exposed, is represented in Pl. 11. fig. 1, and in outline, of the natural size, at a. The anterior, probably premaxillary, part has been detached and broken. Three teeth, more or less fractured, project from sockets in the alveolar border of this part; their crowns are less expanded than in the typical maxillary and mandibular teeth. Part of the boundary of an external nostril is indicated at b, the larger maxillary fragment the first two teeth present a similar form, and the entire crown of the second shows it to be longer, as well as more slender, than the posterior teeth; it resembles a canine tooth in both shape and position, the crown being subcompressed and slightly recurved, as well as sharp-pointed. It would serve well to pierce and retain a living prey. It recalls a dental character of *Iguanodon*.

The tooth succeeding the laniariform one presents the typical characters; In fig. 1 are shown the impressions of four of the teeth preserved in the slab (fig. 2). Above the first impression (a, fig. 1) is the crown of a successional tooth, about to displace the tooth (a, in fig. 2). The outer side of maxillary teeth is shown, magnified, at b, s.

The remainder of the upper maxillary, with part of the palatine and pterygoid bones of the left side, are represented, magnified, in fig. 2, and of the natural size, in outline, at a. The extent of the inner alveolar wall, effecting, with the cross partitions, the lodgment of the teeth in sockets, is here demonstrated. The expanded crowns of the teeth come into contact. The inner surface of the crown is shown at b, in which the middle longitudinal rising is rather less prominent than on the opposite surface. The fore part of the crown is represented at c. The outer side of a portion of the right maxillary, with eight contiguous molars, is represented in fig. 3, and of the natural size, in outline, at a. There is a linear row of small foramina above the alveolar border. The median longitudinal rising of the crown of the teeth is more strongly marked on this, the outer surface. In fig. 4 is represented the inner surface of the posterior part of a right maxillary, containing six contiguous teeth, with a less prominent or less defined median rising of the teeth in this fragment; the last three teeth gradually decrease in size.

The inner surface of a portion of a mandibular ramus, with eight contiguous teeth, is represented at fig. 5, and in outline, of the natural size, at a. The fore part of a right ramus, consisting chiefly of the dentary element, is represented in figs. 6—8, and of the natural size, in outline, at a. Fig. 6 gives the outer side, but the whole vertical extent of the bone is only preserved at the symphysial end. The apex of a young tooth projects from the fifth of the sockets here preserved;
it is represented magnified at a and b. There is a linear series of small nervo-vascular foramina a little below the alveolar border. The crowns of the developed teeth have been broken away; their fangs in the sockets are shown in fig. 7; the anterior teeth are narrower than the rest, as in the upper jaw. On the inner side of the specimen (fig. 8), a considerable extent of the symphysis (s, s) is shown.

The posterior part of a broken dentary element of the left ramus is represented in fig. 9, showing the last eight teeth, and the impressions of the crowns of as many in advance. A portion of the crown, displaced, of the fourth from the last is preserved, and likewise portions also of those in advance, which have been broken in splitting the slab, so that they appear smaller than they actually were. The last three teeth are entire, and show a gradual decrease of size, as in the portion of upper jaw (fig. 4). A magnified view of the inner surface of the last lower tooth is given at a, fig. 9.

The reference of Echinodon to the Lacertians is suggested by its diminutive size and by certain characters of jaws and teeth, but the structure of the vertebrae and limb-bones must be ascertained before the ordinal affinities of Echinodon can be satisfactorily determined. The modifications of the mode of implantation of the teeth in the known limits of the Dinosaurian order affect the value of the thecodont character as a mark of affinity.