Chapter VI. Order—Dinosauria, Owen.

Genus—Megalosaurus, Buckland.¹

Species—Megalosaurus Bucklandi (Dinosauria, Plate 87).

At the date of the printing of vol. i, pp. 329—354, no other parts of the skull of the Megalosaurus Bucklandi had been discovered or determined save the portion of the dentary element of the lower jaw, with teeth (now in the Geological Museum at Oxford), on which Dr. Buckland, in 1824, founded the genus and species; and a second mandibular specimen, from the same formation and locality, obtained, in 1851, by the Duke of Marlborough, and of which, by His Grace's permission, a description (pp. 348—351) and Plate 34, (vol. i) were taken. I was also able to extend the range of the great carnivorous Saurian by detached teeth, kindly transmitted to me, from the "Corn-brash" of Oxfordshire, to the "Bath Oolite" of Somersetshire, and the "Wealden" of Sussex (vol. cit., p. 351). Results of a study of these specimens are recorded in pp. 348—351.

Some years later, 1868, two portions of an upper jaw were obtained by Professor Phillips, F.R.S., on which he founded the restoration of the skull of Megalosaurus, given in, Diagram lvii, of his 'Geology of Oxford.'²

In 1882 additional cranial and dental evidences of Buckland's genus and species were obtained by Edward Cleminshaw, Esq., M.A., F.G.S., from the "Freestone" of the Inferior Oolite, near Sherborne, Dorset.³

Blocks of this stone were in course of preparation for a building, when indications of imbedded fossils being detected by Mr. Cleminshaw on fractured surfaces of the quarry-stones, he withdrew all such from the building-yard and transmitted them to the British Museum for identification.

Further requisite development of these remains having been there carried out, the following descriptions and drawings, the subjects of Dinosauria, Pl. 87, were taken.

In the section devoted to the genus Megalosaurus, in vol. i, pp. 339—354 of


2 8vo, 1871, p. 199. The same specimen is the subject of a paper by Professor Huxley, F.R.S., in vol. xxv of the 'Quarterly Journal of the Geological Society of London.'

3 'Dorset County Chronicle,' June 15th, 1882; "Report of a Meeting of the Dorset Natural History and Antiquarian Field Club."
the present work, the materials for a reconstruction of the skull were limited to portions of the mandible and divers teeth therein implanted or detached.

The differences shown by the mandibular specimens were limited to size, the vertical diameter of the deepest part of the type mandible being 3½ inches, while that of the Blenheim specimen gave 4½ inches. But as the teeth, retained in these mandibular pieces, were of the same size, as well as form and structure, there was no ground for predating distinction of species.

In the Blenheim specimen I was permitted to expose the germs and portions of the successional teeth concealed in the substance of the mandible.

Before entering on the description of the first of the present series of fossils which demonstrates cranial characters not hitherto determined, I may premise that existing Saurians show differences in the degree of ossification of the outer wall of the facial part of the skull.

In Crocodilia it is entire from the relatively small orbit behind to the smaller single nostril in front; and there is no break in that wall, in modern and Tertiary species, answering to the antorbital vacuity in Liassic genera; but this opening, recalling the antorbital nostril of Ichthyosaurus, is very small and is margined by the maxillary, lacrymal and nasal bones.

In existing Lacertians much difference is seen in this character, but in none is the face so completely ossified as in the Crocodiles. The Monitors (Thorictes, Tupinambis) come nearest thereto, the nostril being divided from the orbit by a broad triangular facial plate of the maxillary, supplemented behind by a narrow mala-lacrymal one. In Lacerta the lacrymal enters in larger proportion into the formation of this part of the bony face, and the external nostrils are relatively wider. In Iguana the facial wall dividing the nostril from the orbit is relatively narrower, and the apex of the maxillary process is further removed by a large interposed lacrymal from the nasal bone. But in the Lacertians with a carnivorous dentition (Hydrosaurus, Varanus) the outer bony nostrils are remarkable for their great relative size, especially length; and the maxillary sends upward and backward a long but narrow pointed plate, which, in Varanus bivittatus, crosses in front of a small lacrymal bone to articulate with the prefrontal.

Here we attain the cranial modification which forms the best guide to the interpretation of the appearances presented by the fossil, the subject of Plate 87, fig. 1, and restored on a Varanian type in the figure 5.

But, before entering on this comparative survey, I may note the corresponding degree of resemblance which the skull of Iguanodon presents to the herbivorous and mixed-feeding Lacertians, Iguana and Thorictes, with correspondingly adaptive shapes of the teeth. In the relative size of the external nostril Iguanodon Foxii resembles more Tupinambis than it does Iguana with the larger nostril; and the side-wall between nostril and orbit is relatively broader and more extensive in Iguana
than in either of the blunt- or thick-toothed Lacertians. I may remark, also, that, as usual in the larger forms, the orbits are relatively smaller than in the dwarfed kinds.

In all the Lacertians here compared, teeth are developed from the whole (*Iguana, Tupinambis*), or nearly the whole (*Hydrosaurus, Varanus*), of the alveolar border of the maxillary; consequently this dental series extends beneath both nasal and orbital vacuities, but for a less extent in the carnivorous than in the herbivorous Lacertians. *Scleidosaurus*, in the degree and kind of its facial ossification, repeats the mammalian character exemplified in *Iguanodon*.

Of the subjects of the present paper the first block of Lower Oolitic Freestone includes a great proportion of the right side of the facial part of the skull (Plate 87, fig. 1). The missing parts are the fore end of the premaxillary (ib. 22') and the hind or suborbital end of the maxillary (21'); the upper and hinder pointed termination of the facial process of the maxillary is preserved in articulation with the prefrontal, f.

The length of this facial fossil is 1 foot 3\(\frac{1}{2}\) inches; its height from the upper angle (a) of the maxillary process to the tip of the longest subjacent tooth, *in situ*, is 9 inches.

Of the premaxillary are preserved part of the nasal process (22") and so much of the alveolar part (22) as lodges two fully developed and protruded teeth and the sockets of two others: an intervening part of the bone has been chiselled away to admit a wedge for the quarrying-operations; the length of the preserved premaxillary nasal process (22") is 4 inches, the breadth of its base is 1 inch: it narrows to its apex, being limited to the fore and under part of the large bony narial vacuity (n,f) in the present specimen.

So much of 22" as is preserved forms rather more than one third of the lower border of the external nostril, the rest of that border with the hinder boundary (a) being contributed by the maxillary (21,a). The suture between these bones is distinct.

The preserved length of the alveolar part of the maxillary (21,21') is one foot: the upper border of this part contributes to the large narial (n) and in a less degree to the orbital (o) vacuities; but these portions of such tooth-bearing part of the upper jaw combine to form the base of the facial process, which is between four and five inches in extent: its breadth, at one inch above the border line (21,21'), is 3 inches; this breadth is nearly preserved to the angle (o), about six inches above the alveolar border, at which angle the maxillary is continued backward, above the fore part of the orbit, gradually narrowing to a point, which joins the prefrontal.

Much of the outer wall of the alveolar part of the maxillary adheres to the block of freestone in which the counterpart of the above-described cranial fossil is
preserved: but this counterpart shows only the impressions of the teeth, which are well preserved in the block containing the chief part of the fossil. Of these teeth four are premaxillary, the rest maxillary.

The teeth closely repeat the characters of those of previously described dental evidences of *Megalosaurus Bucklandi*.

Of the foremost preserved premaxillary tooth, 2 inches of the crown remain, with half an inch of a mutilated base: the next tooth is represented by a smaller protruded apical part of the crown. The socket of the larger intervening tooth is broken away with the implanted tooth-root, exposing the pulp-cavity. The impression of the broken and missing part of the smaller premaxillary tooth gives two inches of length to this tooth, the implanted remainder of both teeth has gone with the supporting bone. In advance of the larger premaxillary tooth is an elliptical cross-fractured basal part of a third (the anterior) tooth showing a long diameter of nearly half an inch.

Ten teeth are preserved in the maxillary bone. Between the foremost, third and fifth, are crowns of successional or undeveloped teeth. Of the foremost of these (second in the series) the apex only of the crown has appeared above its socket, the rest of the tooth is exposed by removal of the socket's outer wall: a length of enamelled crown of 2 inches 5 lines is thus shown. The length of the protruded crown of the first maxillary tooth is 1 inch 9 lines, that of the third tooth is 2 inches 3 lines, its total length is 5 inches. Of the fourth tooth the apical half-inch of the crown is protruded: the total length exposed in the quarrying is 3½ inches. The similarly shown length of the fifth tooth is 4 inches 9 lines, that of the enamelled crown being 3 inches. The sixth tooth shows 2 inches of free enamelled crown, and 2½ inches of the rooted cement-clad part, the latter exposed by loss of the bone. The seventh maxillary tooth is represented by a smaller proportion of the protruded crown. The eighth tooth is a functional fully developed one, but of smaller size than the third and fifth. The apical half of a somewhat smaller crown of a ninth tooth has emerged, and behind this is the indication of a fully developed tenth tooth, not larger than the eighth. I cannot predicate with confidence of an eleventh maxillary tooth. The crown of such exposed tooth on the transversely fractured surface of the block may have come from the lower jaw.

Of the maxillary teeth the four or five hinder ones are suborbital, the three front ones are subnarial; the three intermediate teeth, including those with longest and largest crowns, received the support, in biting actions, of the base of the facial process (a).

At the fore part of the orbital cavity are two thin osseous plates, (e, e) convex outwardly, of subtriangular form, with the apex naturally cut off so as to contribute half the circumference of a protruding circular space, half an inch across, exposing
the matrix; the margin of this circular aperture is slightly raised. These plates show, or have been resolved into, three lamellæ, each less than a millim. in thickness; part of one lamella, and an impression of another, is shown on the slab containing the teeth and bones; parts of three lamellæ of one of the plates adhere to the counterpart block. The matrix near what seems to be the pupillary border is stained of a darker colour than the rest. I deem it probable that we have here an indication of the eye-ball of the Megalosaur, and that the pupillary corneal part of the ball was strengthened by a few large sclerotic plates. The indicated diameter of such eye-ball is two inches. The attention devoted to this part of the fossil was requisite to determine whether it might be part of a lacrymal bone or of the sclerotic.

The orbit in its great relative size and departure from the usual circular form finds, amongst existing Saurians, the nearest approach in the large carnivorous Varanians. The comparatively small size of the eye-ball accords with the hugeness and carnivority of the extinct terrestrial Dinosaur.

An indication that the lower jaw had been inclosed, with the portion of the upper one above described, in the same mass of matrix, is given by the impression of the crown of the mandibular tooth projecting into the interval between the third and fourth maxillary teeth, in the block exposing the upper jaw, the tooth leaving that impression being preserved in the counterpart block. The extent of the mandibular tooth, so preserved, measures 1 inch 8 lines, and includes the upper two thirds of the crown; the breadth of the fracture is 8 lines, and this exposes the termination of the pulp-cavity.

I infer, therefore, that the portions of mandible with teeth next to be described are not only Megalosaurian, but formed parts of the same individual as the preceding fossil. They were worked out of separate blocks of freestone which were in contiguity prior to the masonic operations.

The first portion shows the outer side of the anterior ten inches of the right mandibular ramus, a portion of which, one third the natural size, is shown in fig. 3. The vertical diameter of the bone is 2\(\frac{1}{4}\) inches at 2 inches distance from the fore end, and gives 2\(\frac{2}{4}\) inches at the opposite fractured end. The symphysial profile is obtusely rounded or moderately convex, as shown in the left ramus (Pl. 87, fig. 2). The foremost tooth rises at half an inch therefrom. This tooth gives an' exerted length of crown of 2\(\frac{1}{4}\) inches, with a basal breadth of 9 lines. An interval of nearly one inch divides it from the second tooth, also fully developed, but with the apical half of the crown broken away. The third, fourth, and fifth mandibular teeth rise at similar intervals, and only the fifth falls short of full protrusion, the upper two thirds of the crown appearing above the alveolar border. The base of a sixth tooth, with a large formative cavity is discernible, with the usual interval between it and the fifth. So much of the outer surface of
the bone as remains indicates a shallow longitudinal groove, nearly midway between the upper and lower margins, and disappearing beneath the second tooth in place; anterior to this the bone shows a few irregular shallow pits, some of which, occupied by matrix, indicate nervous or vascular foramina. In the same block are two fragments of, probably, the left ramus of the same jaw, each in connexion with, or lodging, a portion of a fully developed tooth.

A larger portion (fig. 3) which has been freed from another block, consists of the anterior part of the left mandibular ramus of the same skull, 8 inches in length, but wanting the symphysial end. On its outer side it repeats the longitudinal groove here extending backward three inches beyond the part interrupted in the right ramus. In advance of this groove there are similar depressions and indications of the small nervo-vascular foramina. As the lower border of the present fragment begins to bend upward at the anterior fracture, in a degree similar to the fore end of the right ramus, I conclude that not more than an extent of two to three inches are wanted to complete that end. The oblique fracture of the bone here exposes the hollow base of the crown of a functional tooth, and on its inner side is the partially calcified germ of the successor.

The inner surface of the ramus (Pl. 87, fig. 3) is flatter and smoother than the outer. It is traversed by a deeper, narrower, and better-defined longitudinal groove; partially divided at its hinder half by a low linear ridge, indicative of the groove having been traversed by two impressing soft parts, probably a nerve as well as a vessel. The main groove becomes shallower and wider as it advances, inclining from the middle to near the lower border of the inner surface. Part of the suture between the splenial and dentary elements is here seen.

The teeth indicated in the portion of the left ramus have been more or less broken away, but answer in number and relative position to the entire ones in the right ramus. The tooth rising to fill the space between the first and second is more advanced; and on the inner side of the present fragment are seen the crown-tips of other successional teeth, appearing at the inner side of the base of preserved portions of the fully developed teeth. At the intervals of these rising teeth are seen the "series of triangular plates of bone (b, b, fig. 3) forming a zig-zag buttress along the interior of the alveoli, and from the centre of each triangular plate, the bony septum which crosses to the outer parapet, and thus completes the alveolus,"¹ well described in the type example.

As respects the dental characters exhibited in the present series of fossils, I find nothing to add to the Discoverer's original and graphic descriptions and to the supplementary details afforded by the more complete mandible and teeth in the private collection of the Duke of Marlborough at Blenheim. In the restoration of the skull I have been guided by that of the largest existing carnivorous land-lizard

¹ Buckland, loc. cit., p. 395, pl. xi, fig. 1.
(Varanus giganteus) and it may prove that the post-orbital part of the skull is somewhat shorter than in fig. 5. Moreover, the present fossils impress me with the notion that they have come from a rather smaller individual than those yielding the subjects of the undercited plates.¹ But on these data and subsequent materials, I estimate the total length of the skull of Megalosaurus Bucklandi not to have exceeded 2 feet 6 inches; they do not support that of "four or five feet" ascribed to it by Professor Phillips.

In one of the blocks of quarry stone lodging a portion of the skull above described appeared a slender position of an elongate bone, which, on further exposure, suggested its interpretation as a dermal spine. It was 2\(\frac{2}{3}\)rds of an inch in length—68 millims.—with an expanded, seemingly basal half. The narrower part was 28 millims. in length, the broader part 40 millims. in length; this part extended on each side into a low angular plate, giving, between the angles, a breadth of 20 millims. Beyond or below these angles the spine contracts, but thickens. Both ends were broken off; the basal end giving a thickness or breadth of 7 millims.

On the hypothesis that this lamellate spine formed part of the dermal armour or appendages of the Megalosaur, the quest was excited of other palæontographical descriptions of extinct forms belonging or allied to the Dinosaurian order.

In the instructive volume,² issued by the accomplished Professor of Palæontology in the 'Musée d'histoire naturelle, Paris,' a description is given of an extinct reptile, from the Lower Permian of Igornay, France, under the name of Stereorachis dominans;³ and, associated with remains of the skull and humerus, were "écailles en forme d'epines;" they are figured in numbers on the block with part of the skeleton, p. 280; and of the natural size, p. 284; they are smaller but similar in shape to that above described, and referred to the Megalosaur.

Genus—Bothriospondylus, Owen.

Species—Bothriospondylus magnus, Owen (Dinosauria, Plate, nat. size).

In the year 1874 I received portions of vertebrae from Wealden beds represented by blue shaly clay and much lignite, near Barnes' Chine, South Coast, Isle of Wight. They were referred to a genus named Bothriospondylus,⁴ and the centrum of a dorsal vertebra was described and figured, as Bothriospondylus magnus, in a

¹ "Dinosauria," vol. i, pls. 24—32.
³ Ib., pp. 279—284, figs. 281, 282, 283.
⁴ Vol. i, p. 551.

Subsequently I received from a contiguous part of that coast, and, from the character of the contained or adherent matrix, also from a Wealden bed, a larger vertebral centrum of longer proportions.

As this specimen was characterised by the unusual proportion of unossified tracts of the bony substance, which I infer to have been occupied by gristly matter, I proposed for it the name of Chondrostosaurus.

Of this genus the centrum of a dorsal vertebra is described in vol. i, p. 622, and figured in Dinosauria, Pl. 79, affording an instructive subject of comparison with that of Pl. 83 of vol. iv.

Without a vertical diameter of the same dimensions, 7 1/2 inches, the present vertebra has a length of 8 1/2 inches, while that of Chondrostosaurus, from the same part of the vertebral column, is 1 foot, 3 inches in length; which seems to indicate something more than a specific distinction. The side-pit of the centrum repeats the generic characters shown in Bothriospondylus suffossus (vol. i, p. 555, Dinosauria, Pl. 63); and the free surface of the centrum, where entire, shows the same smoothness, as in the type specimens. But it is unnecessary to extend the description of the somewhat mutilated centrum, the subject of Pl. 83, as an almost entire vertebra, with the centrum but slightly mutilated at the borders of the hinder articular concavity, affords the subject of the folding plate, and of the present description.

The following are dimensions of this vertebra:

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<th></th>
<th>Feet</th>
<th>Inches</th>
<th>Lines</th>
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<tr>
<td>Centrum, length</td>
<td>0</td>
<td>8</td>
<td>6</td>
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<tr>
<td>&quot; breadth of fore articular end</td>
<td>0</td>
<td>9</td>
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<td>&quot; of middle</td>
<td>0</td>
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<td>&quot; height of ditto</td>
<td>0</td>
<td>6</td>
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<tr>
<td>Height of entire vertebra</td>
<td>2</td>
<td>4</td>
<td>0</td>
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<tr>
<td>Breath across diapophysis</td>
<td>1</td>
<td>8</td>
<td>6</td>
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<tr>
<td>Height of spine from between pregypapophyses</td>
<td>1</td>
<td>3</td>
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The anterior surface of the centrum, \( e \), is moderately convex: the sides are concave lengthwise, excavated by a cavity, \( e, 5 1/2 \) inches in length, 3 inches in height, with the aperture of a narrow ovate form, \( 4 1/2 \) inches long, 2 inches high, at its fore part, contracting to almost a point behind; situated at the upper half of the side of the centrum. This cavity has a smooth surface, not communicating with or continued into the osseous tissue, and probably having served to lodge an air-cell continued from the lungs in the living Reptile.

The outer surface of the centrum beneath the pulmonic cavity, is continued by
a regular convexity into the under surface of the centrum which is broad, moderately convex across, and concave lengthwise. The border of the front articular surface, c, seems to be naturally bevelled off to a breadth of about half an inch, but becoming narrower near the upper margin of the convexity: this marginal tract may be due to abrasion. The margin of the hind concavity, c', has suffered more obviously from such accidental cause.

The neural arch, N, manifests on a striking scale the dinosaurian complexity. It has coalesced with the centrum, leaving no sign of suture. The fore-and-aft extent of its base is 5 inches, thence it expands in length, breadth, and height, to develop the zyg. 22, and di. d, apophyses, and from this bony platform, five strong ridges rise to support and form the neural spine, Ns. Of these ridges the anterior pair spring from the prezygapophyses, converge and meet eight inches above their origin; and, rising for an inch or more, again divide toward the summit of the spine, which is broken away. The lateral ridges or buttresses are continued with a regular curve from the upper border of the diapophyses, d, and also divide each into a pair of sharpish ridges, the anterior one being lost upon the side of the spine, the posterior division expanding into a broad, sharp plate, which is thickened as it is lost in the summit of the spine. The breadth of the neural spine, here, is eight inches, but does not exceed four inches at its mid-length, or height. The hind surface of the spine is traversed by a longitudinal medial ridge, r, commencing from the fossa between the post-zygapophyses, increasing in breadth as it rises, and again narrowing or subsiding upon the broad, flattened hind part of the summit of the spine, Ns.

The neural canal, Nc, shows the usual reptilian, cold-blooded, contracted area: the anterior aperture, of a full transversely oval shape, has but 2 inches in long diameter, and 1½ inches vertically. Here the breadth of each neurapophysis is barely 2 inches, but they rapidly thicken or expand as they rise and develop the prezygapophyses, 2. The breadth of each of these processes at its upper or articular end is 3 inches; the articular surface looks upward with a slight inclination inward and forward. From the centrum to this surface measures 5 inches; the breadth across both surfaces is 6½ inches. From the outer side of the pedicle or base of the neurapophysis a narrow ridge ascends, increasing in breadth to the base of the platform external to the prezygapophysis; it terminates abruptly before reaching the fore part of the base or origin of the diapophysis. From the fore part of this ridge are sent off two oblique ridges, subsiding upon the front surface of the supports of the prezygapophyses, and dividing the outer portion of that front surface into three smooth depressions, augmenting in size as they ascend. The fore part of the base of the diapophysis begins by a pair of horizontal ridges, one from the outer border of the prezygapophysis, the other from the base of the contiguous vertical ridge, ascending and converging to its
fellow for strengthening the neural spine. The two short ridges converge and unite to form the anterior plate of the diapophysis; a deep triangular pit intervenes between these two anterior converging transverse ridges. From the upper part of the diapophysis a strong and broad compressed plate curves upward to abut upon the side of the neural spine; as it approaches the spine it divides, the shorter and lower division terminates about 6 inches from the summit of the spine, the longer and sharper division attains the outer part of the spine's summit. A deep and large triangular fossa is bounded by the anterior ridge of the neural spine, by the antero-transverse ridge of the diapophysis below, and by the upper diapophysial ridge behind. The depth of this fossa is 5 inches.

The diapophysis derives its origin also from two other plates of bone: one, \( a \), nearly vertical and inferior, commences a little above the base of the neurapophysis, rather nearer the hind than the fore part; it rises and is lost upon the under surface of the diapophysis, which it seems to support. The outer border of this plate is 5 inches in extent, the greatest breadth is \( 3\frac{3}{4} \) inches; it constitutes the hind wall of the large anterior neurapophysial cavity, \( c \). The back part of the diapophysis is formed by a horizontal plate, \( b \), beginning at the origin of the postero-lateral buttress of the neural spine; thence it extends, losing breadth, to the hinder and under surface of the diapophysis. This diapophysial plate is horizontal, and forms the floor of a deep triangular posterior fossa, \( t \), at the base of the neural spine; the depth is 3 inches.

The diapophysis with this four-ridged complex origin extends, measured from the bottom of the anterior interspace between the horizontal and the vertical plates of origin, 10 inches in an almost directly outward course; the triedral form changes beyond the middle of this length to a subelliptic one, which swells out into a large oblong terminal tuberosity, \( d \), with the articular surface for the rib bevelled off obliquely from its upper part.

The four-fold buttress-plates bespeak the size and weight of the rib supported by this process. As there is no parapophysis it may be inferred that the present vertebra has come from a part of the dorsal series behind the anterior ones which have developed their lower process for a double articulation of the rib.

The concavity at the hind part of the centrum, \( e \), corresponds in shape and depth with the ball at the fore part; the margin of the cup is more or less broken away. The outlet of the neural canal, \( N_e \), is more oblique than the inlet, but has a similar small area. Above it is a deep triangular cavity, the side-walls of which, as they ascend and converge, curve backward and unite in a point which slightly overhangs the centrum. The depth of the cavity so formed is \( 3\frac{3}{4} \) inches. Above the roof of this cavity are a pair of smaller fossæ, and above these the broken base of the neural arch from which the post-zygapophyses had been developed. A deep median pit is excavated between the bases of the post-zygapophyses, and
from the bottom of this pit rises the thick and strong posterior ridge of the neural spine.

Measured from the origin of this ridge, the spine rises to a height of one foot; the breadth of the spine at its mid-height is three and a half inches; but it expands as it rises to twice that breadth; and both the sides and summit of this expanded part have suffered loss.

The least injured part of this extraordinarily complex bone is the right side: but sufficient remains of the left side to indicate corresponding ridges, plates, cavities and other sculpturings of the osseous substance, the characters of which I have here attempted to describe.

I may remark that the Saurian vertebrae hitherto discovered, which have the convex and concave terminal surfaces of the centrum on opposite sides to those which they hold in modern Crocodilia, and which have suggested to V. Meyer the term Streptospondylus; also differ from the true Crocodilia by a complexity and development of the neural arch, which indicates their position to be among Dinosauria.

SUPPLEMENT TO CHAPTER II.—Ichthyopterygia.

Ichthyosaurus fortimanus, Owen.

In the pectoral paddle of Ichthyosaurus latimanus (ante p. 83, Pl. XXIX, fig. 1), of which the vertebral characters are described and figured (ib., figs. 2 and 7), five digital series are recognisable by their angular characters, besides the radial and ulnar marginal smaller rounded series. In Ichthyosaurus fortimanus, with a paddle of equal breadth in proportion to the length, there are four digital series according to the relative size and angularity of the phalanges; and, if a fifth series should answer to the fifth (ulnar) digit of Ich. latimanus, its phalanges are reduced to the smaller size and rounded shape of a marginal series; but as they are bordered by a true marginal series of still smaller rounded ossicles, such reduction of the representative fifth or ulnar digit adds a second specific distinction to the pectoral paddle of Ich. fortimanus; the relative breadth of the fin being mainly due to the larger relative size, especially breadth, of the phalanges of the 1—4 digits.

Ichthyosaurus longimanus, Owen.

In the same Plate is represented a well-preserved pectoral fin, as remarkable for its relative length as those of the two above-named species are for breadth; yet the five normal digits and the marginal supplementary series enter into its formation. The phalanges here are notable for their great number in each digit,
especially in the third, fourth, and fifth of the series. The anterior marginal now presents, indeed, the characters of a normal digit, and by its articulation with the radio-carpal ossicle seems to displace the foremost or true radial from its carpal or metacarpal connection. At the ulnar border of the modified paddle are two series of the small rounded marginal ossicles; nevertheless the number of phalangeal and marginal ossicles is such that the chief characteristic of this paddle is its superior length in proportion to its breadth.

SUPPLEMENT TO CHAPTER I.—Sauropterygia.

_Plesiosaurus macrocephalus_, Owen. Enaliosauria, Pl. 17.

For the unique specimen figured in the above plate the British Museum is indebted to the **Earl of Enniskillen**, who, when Lord Cole, obtained it during one of His Lordship's visits to Lyme Regis in quest of the fossils from the Liassic deposits in that locality; and I was favoured by its transmission for determination and description. It was in a rare condition of preservation, as may be conceived by the Plate, and obviously differed from the species, at that date (1838), described and figured by Conybeare and Hawkins.

The first distinction which arrested attention was the greater relative size of the skull. (Compare Pl. 17 with Pl. 1, _Plesiosaurus dotichodeirus_ and Pl. V, _Plesiosaurus homalospondylus_.) In correlation with the weightier head is a relatively stronger and shorter neck, though this retains sufficient of the characteristic proportion of the part in the present singular extinct Order of marine Reptilia: it is twice the length of the lower jaw, and includes twenty-nine vertebrae. Differential characters are also shown in the proportions of individual vertebrae; in the twentieth, counting from the skull, the transverse is to the fore-and-aft diameter as 2 to 1; in a corresponding vertebra of _Plesiosaurus Hawkinsii_ it is as 4 to 3. The short cervical ribs, which, as usual in the Order, are mostly hatchet-shaped, resume the more normal syliform character at the twenty-fifth vertebra; in _Plesiosaurus homalospondylus_. This change does not take place until the twenty-ninth vertebra, the number of cervicals being thirty-one; in _Ples. macrocephalus_ it is twenty-nine. I still adhere to the character defining the cervicals in the present long-necked Reptiles, viz. holding that vertebra in which the costal articular surface has risen from the centrum to the neurapophysis, as the first or foremost of the dorsal series. As many successive vertebrae as show the rib-bearing processes on the neural arch I reckon as "dorsals." Of these there are twenty in _Ples. macrocephalus_, and twenty-three in _Ples.
Hawkinsii. In both species the terminal dorsals may answer to the lumbers in Crocodilia; but no vertebra is ribless in Plesiosaurus until they approach in position towards the end of the tail. There are no sacral vertebrae, the pelvic arch being freely suspended. In Pl. macrocephalus, at the fiftieth vertebra (from the skull), the rib descends from the neural arch upon the centrum; in Ples. homolospondylus the change occurs in the sixty-eighth vertebra; in all kinds the rib disappears in the terminal caudals.

In the skull so much of the parietals are preserved as to show that the medial suture persists, that they diverge, behind, to receive the superocipital, and that they retain the pineal foramen near their suture with the frontals; in these characters is shown a nearer affinity to Lacertilian than to Crocodilian modifications of the skull. The mid-frontals extend forward to between the parial outer nostrils, the interfrontal suture rising, ridge-like, to be continued into that which extends forward along the nasals and premaxillaries. The nostrils open on the upper surface of the skull a little anterior to the orbits, facilitating respiration in the aquatic air-breather. The post-frontal is narrower than in Ples. Hawkinsii, but, as in that and other Plesiosaurs, does not extend to join the mastoid. The tympanic shows the strong proportions characteristic of the genus. The mandible has the usual compound structure, with a coronoid eminence well developed. The broad coracoid and the scapula, in position and shape corresponding with the Plesiosaurian type, are well displayed on the left side of the specimen; the framework of both pectoral and pelvic fins is sufficiently well preserved in the subject of Plate 17 to enable me to dispense with verbal description; it shows well-marked modifications of structure as compared with the same parts in the Plesiosaurus rostratus, which most resembles Ples. macrocephalus (Sauropterygia, Plate 9) in the proportions of head and neck.

Species—Plesiosaurus brachycephalus, Owen (Enaliosauria, Plate 15).

The proportion of the skull to the cervical vertebrae, which are the same in number and relative size to those in the previous species, suggested The nomen specificum. The skull is also shorter in proportion to its breadth. Notwithstanding the difference, the strength of the neck, as indicated by the processes of the cervical vertebrae, must have exceeded that of Plesiosaurus macrocephalus. The fin-bones, as indicated by the humeri, and those preserved of the left pelvic limb, were less powerfully developed. A portion of a Liassic Ammonite is preserved in the mass of matrix on which the skeleton of the contemporary sea-dragon reposes.
SUPPLEMENT TO VOL. I.—CHAPTER I. ORDER—CHELONIA.

Genus—Pleurosternon, Owen.

As a general rule the vertebrate animals of the Mesozoic strata manifest, in the modifications of their structure, a nearer approach to the archetype of their subkingdom than the tertiary and existing Vertebrates do. This rule is exemplified in the present genus of Chelonian Reptiles by the accessory osseous pieces that enter into the formation of the plastron, and which are interposed, as an additional pair of bones, between those more constant parial elements called "hyosternals" (h s, Plate 54) and "hyposternals" (p s, ib.), and which alone articulate with the marginal pieces (m, m) in existing Emydians. At least, if we adopt the general homology of the parial elements of the plastron, indicated by the development of that part, viz. as being hæmapophyses,—an increased number of such pieces, making them to that degree more equal in number with the pleurapophyses of the carapace, offers an obvious tendency to a return to the normal type; and the fact of a genus or family of extinct secondary Chelonia manifesting such increase in the number of parial pieces, gives additional support to the conclusions as to the nature of the plastron arrived at from a study of that part in the embryos of existing species.

By the name Pleurosternon it is desired to intimate the characteristic furnished by the additional number of inferior rib-elements (hæmapophyses, or "cartilagines costarum" of Anthropotomy) composing the under-shell or plastron.

The extent of the ossification of the carapace and plastron, and the firm union of the roof and floor of the bony chamber by the medium of the side-walls, afforded by certain marginal plates, prove the genus not to belong to the marine Chelonia; the presence of the marginal plates, and the impressions of the horny scutes which covered the carapace and plastron, forbid its being referred to the fluvial tribe, represented by the Trionyces; the depressed shape of the carapace excludes it from the terrestrial tribe of true Tortoises; and we arrive, therefore, by the way of exclusion, to the association of the genus in question with the Terrapenes and other members of the family Paludinos.

Pleurosternon concinnum, Owen. Plates 53, 54.

The subjects of the above Plates consist of a nearly entire carapace and plastron. They are from the Purbeck Limestone, Swanage, Dorsetshire.
The carapace (Plate 53) includes the nuchal plate (ch); the eight neural plates (s 1—s 8) which are connate with the neural spines of the vertebrae of the carapace; and the corresponding eight pairs of costal plates, except the eighth on the right side (pls. 1—8). The hindmost neural plates, and all the marginal plates, save the first of the left side connected with the nuchal plate, are wanting.

The length of the carapace, from the anterior margin of the nuchal plate to the posterior one of the eighth neural plate, is 13 inches; the breadth of the carapace, across the third costal plates, is 11 inches. The outer surface of the carapace is very slightly convex.

The nuchal plate (ch) is six-sided; the anterior and antero-lateral borders are of equal length, and are the longest of the six; the hind border is the shortest; the latter is angularly notched for the reception of the first neural plate (s 1). The front border is slightly convex, with a feeble median concavity. The greatest breadth of the nuchal plate, which is across the angles between the antero-lateral and postero-lateral borders, is 3 inches 4 lines; the length of the nuchal plate is 2 inches 3 lines. The outer surface of the nuchal plate is impressed by a triradiate groove, indicative of the junction of the two nuchal scutes with each other and with the first vertebral scute (v 1). The portion of the median series of bony plates answering to the first neural plate in ordinary Chelonia is divided by a transverse suture into two plates,—a circumstance which corroborates the homology of the neural plates with the median dermal bones of the Crocodilia, and opposes their interpretation as the vertebral spinous processes unwontedly expanded. The indented boundary between the first (v 1) and second (s 2) vertebral scutes crosses the first neural plate (s 1) immediately in advance of the dividing suture in question.

The second (s 2) to the eighth (s 8) neural plates inclusive are six-sided, with the antero-lateral sides or borders the shortest, and the postero-lateral ones the longest; the third, fifth, and eighth are crossed by the boundary impressions between the vertebral scutes. They progressively diminish in length to the seventh; the eighth resuming the normal length, unless the indentation between the fourth (v 4) and fifth (v 5) vertebral scutes conceal, as I suspect, a suture dividing the plate (s 8).

The first pair of costal plates (pl. 1) is impressed by the boundary lines dividing the second marginal scutes, the first vertebral scute (v 1), the second vertebral scute (v 2), and the first costal scute (c 1); it unites with the nuchal (ch) and first and second marginal plates, with both divisions of the first neural plate (s 1) with the anterior truncated angle of the second neural plate (s 2), and with the second costal plate (pl. 2); the second (pl. 2) to the seventh (pl. 7) costal plates have the posterior angle of their mesial extremity truncated; they become slightly expanded at their lateral extremity; and, after the third, they gradually decrease
in length. The second, fourth, and sixth costal plates, like the first costal plate, bear the impressions of the lines of union of the costal scutes with each other and with the vertebral and marginal scutes; the third, fifth, and seventh costal plates bear the impressions of the lines of union of the costal with the vertebral and marginal scutes. The eighth costal plate is impressed by the line of union between the fourth costal scute and the fifth vertebral scute, and by that of both these scutes with the fourth vertebral scute mesially, and with the tenth marginal scute laterally.

The exterior surface of all the above-described elements of the carapace is minutely wrinkled and granulated, except near the sutural borders, where it is impressed by numerous close-set fine lines, directed at right angles, or nearly so, with those borders. This two-fold pattern is best marked in the costal plates, in most of which the marginal lineated sculpturing extends over about one fourth of the entire breadth of the scute. There are no concentric impressions indicative of the lines of growth of the horny scutes.

The first marginal scutes meet at the middle line on the forepart of the nuchal plate, and do not leave there any median or nuchal scute in the present species. The first and second vertebral scutes are of equal breadth, the succeeding three progressively decrease in breadth: all are six-sided, and broader than they are long, the length and breadth being most nearly equal in the fourth vertebral scute (c 4).

The following are the dimensions of the principal vertebral scutes:

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Their shape is sufficiently indicated in the figure (Plate 53); as is also that of the costal scutes c 1 to c 4.

In the carapace above described the greater part of the marginal plates, the eighth costal plate of the right side, and the terminal neural plates, are wanting; but sufficient remains in natural juxtaposition to show that the carapace has been of a full oval figure, broadest anteriorly, with a very slight degree of convexity, and without any special elevations along the median line or at other parts.

The plastron (Plate 54) is a long, rather narrow, flat, oval plate; it was probably rounded anteriorly, but this border is fractured: it contracts from the lateral wall (a s, p s) with a gentle sigmoid marginal curve to the hinder apex (x s), which is notched. The middle third of each lateral border of the plastron is connected, through the medium of three marginal plates, with the carapace. The length of the plastron, as far as it is entire, is 13 inches; its breadth, at the fore part of the lateral walls, is 6 inches 6 lines.
BRITISH FOSSIL REPTILES.

The entosternal element (s) is as broad as it is long; its anterior half is defined by two nearly straight borders, which converge at an angle of 45°; its posterior contour is semi-circular; the length of the entosternal is 2 inches 4 lines. The episternal (e s) is bounded behind by two nearly straight lines, which meet at an open angle. The hyosternal is remarkable, as in other species of Pleurosternon, for the excess of its transverse over its antero-posterior diameter, as compared with the same element of the plastron in other Paludinosa: the median suture border is irregularly wavy: the lateral border united by suture with the fifth and part of the sixth marginal plates, the anterior border is united by suture at its median half to the entosternal and episternal bones; its lateral half is free, smoothly rounded, and indented by a deep and narrow notch. The outer surface of the bone is impressed by the line dividing the humeral from the pectoral scute, which line is crossed at right angles by the line dividing both the above scutes from the axillary and submarginal scutes.

The supplementary sternal elements, intercalated between the hyosternals (h s) and hyposternals (p s) and which, from their constancy in the present genus, I propose to denominate, for the convenience of description, the "mesosternals," and which bear the letters (p e) and (a b) in Plate 54, are transversely elongated, quadrate plates of bone, resembling in form the costal plates above, and being their correlatives in the plastron. They are not quite symmetrical in the present specimen, the left one having a greater antero-posterior breadth, and encroaching a little way beyond the median line to the right side of the plastron to join its fellow: at the outer end they articulate with part of the sixth and part of the seventh marginal plates. The mesosternal element is impressed by the line dividing the pectoral (p e) from the abdominal (a b) scutes; and by that dividing both these from the submarginal scutes. The hyposternals (p s) present nearly the same proportions as the hyosternals (h s); they unite externally with part of the seventh marginal plates; they are impressed by the straight transverse line dividing the abdominal from the femoral scutes, and by that dividing these from the inguinal scutes. The xiphi-sternals (x s) present the form of an inequilateral triangle, and are impressed by the line dividing the femoral (f c) from the anal (a n) scutes. The forms and proportions of the perishable horny scutes that covered the bony plastron are indicated by the narrow, well-defined impressions of their boundary lines. The line dividing the intergular from the humeral scutes curves across the entosternal at about one third of the length of that bone from its anterior border. The humeral scutes (h u) covered the rest of the entosternal (s) part of the episternal (e s) and the anterior half of the hyosternal (h s) bones. The pectoral scutes (p e) were transversely elongate, quadrate, and covered the posterior half of the hyosternals and the anterior third of the meso-sternals. The abdominal scutes (a b) presented a similar form, and covered the rest of the mesosternals and less than
half of the hyposternals. The femoral scutes \((f e)\) were longer than they were broad; they joined the abdominal scutes by a straight transverse line; but that between them and the anal scutes \((a n)\) describes a curve, with the convexity backwards, and nearly equally divides the xiphisternals \((x s)\). In addition to the axillary and inguinal scutes, there are three scutes interposed between the outer borders of the pectoral and abdominal scutes, and the under borders of the fifth, sixth, and seventh marginal scutes: these superadded scutes I propose to call "submarginal scutes." The \textit{Platysternon megacephalum}, or Large-headed Terrapene of the Chinese swamps, presents a corresponding, but single, supplementary "submarginal scute" upon the under part of each lateral production of the plastron. The under surface of the fifth, sixth, and seventh marginal plates bears a crucial impression, indicative of the lines of junction between the marginal and submarginal scutes. The head of the left femur is preserved, near the seventh marginal plate, in the specimen above described.

\textbf{Pleurosternon emarginatum,} Owen. Plates 55, 56.

This is a nearly-allied species. It is from the same formation and locality, and differs from the foregoing chiefly in the contour of the free borders of the plastron. The nuchal and first marginal scutes are wanting in the specimen with the upper surface of the carapace exposed \((\text{Pl. 55})\). The neural plate answering to \((s 1)\) in ordinary Chelonia is divided by a transverse suture in this species, as in \textit{Pl. concinnum}, and the impression of the line of union between the first and second vertebral scutes crosses just in front of the suture of division. The second neural plate \((2)\) joins the first costal plate of the left side, but not that of the right; and it is pentagonal, the shortest side or border being that which joins the left first costal plate. The third \((3)\) to the seventh \((7)\), neural plates inclusive are hexagonal, and resemble in shape those in the \textit{Pleurosternon concinnum}; the eighth neural plate is hexagonal, and is broader than it is long; the ninth neural plate answering to that bearing the letter \((s s)\) in \textit{Pl. 52}, is more expanded at its hinder part; the tenth neural plate \((10)\) is triangular, with a truncated apex and a broad rounded base, which articulates with the pygal and adjoining marginal plates. The second and third marginal plates bear not only the impressions of the lines dividing the corresponding marginal scutes from each other, but those dividing the marginal from the first costal scutes. The succeeding costal scutes do not encroach on the marginal plates, which consequently only show the impressions dividing the marginal scutes from each other. Some of the marginal scutes are slightly dislocated, and the posterior ones, from the ninth to the pygal scute inclusive, have their free borders mutilated.
The first vertebral scute (v 1) is narrower than the second and third vertebral scutes, instead of being broader, as in *Pleurosternon concinnum*. The second vertebral scute (v 2) is proportionally broader behind than is its homologue in *Pl. concinnum*. The fifth vertebral scute (v 5) has the three angles of its hinder border sharply produced in the interspaces between the last marginal scutes.

The character of the outer surface of the carapacial pieces resembles that in the *Pleurosternon concinnum*.

The more entire posterior border of the carapace of a second specimen from the Purbecks shows it to be slightly emarginate at the middle of that border; and there is sufficient of the anterior border of the same carapace preserved to show that it is more widely and deeply emarginate at the middle of that end.

With regard to the plastron (Plate 56), the lateral borders of the anterior freely-projecting portion are straighter, and those of the posterior portion more uniformly convex, than in the *Pleurosternon concinnum*; the terminal notch has its sides concave instead of convex. The impression of the line dividing the humeral (h u) from the pectoral (p e) scutes advances at the median plane so as almost to touch the entosternal (s). The mesosternals differ from those of the *Pl. concinnum* by the right extending a little to the left of the median line, but not more than may be expected from the admitted extent of variety in different individuals of the same species. The line between the femoral (f e) and anal (a n) scutes is wavy, instead of being simply convex, as in *Pl. concinnum*. The impressions of the three accessory (submarginal) scutes, between the axillary and original scutes, on the right side of the plastron, are well shown; they have not encroached so far upon the marginal plates as in the *Pl. concinnum*.

The length of the carapace of the *Pleurosternon emarginatum*, in the specimen figured in Plate 55, is 21 inches 9 lines; the breadth of the carapace is 20 inches. The entire length of the carapace is about 17 inches; the breadth about 15½ inches.

**Pleurosternum ovatum**, Owen. Plate 57.

The most perfect example of the depressed Emydiens, with the complex plastron, from the fresh-water Limestone of Purbeck, is that figured in Plate 57.

The entire series of marginal plates is preserved with scarcely any dislocation or fracture, in natural connection with the costal plates: they show the carapace to have been nearly elliptical in figure, but a little more pointed, or less obtusely rounded behind than before; it is not emarginate at the anterior border, and was only very slightly so, if at all, at the posterior border. The *Pleurosternon concinnum* resembles the *Pleurosternum ovatum* in the absence of the anterior emargi-
nation of the carapace, which distinguishes the *Pleurosternon emarginatum*. The first vertebral scute (s 1, Pl. 57) is narrower than the second, instead of being of equal breadth, as in the *Pl. concinnum*: it covers, also, a larger proportion of the first neural plate (s 1), which, moreover, is not divided into two, as in the two previously described species. The place of the fourth neural plate is occupied by the conjoined median ends of the fourth pair of costal plates; ossification having extended continuously from them into the dermal matrix overlying the subjacent neural spine, instead of commencing from that spine or from a separate centre; but this may be an individual variety. It leads, however, to a modification of form of the fifth neural plate (s 5), which is pentagonal, instead of being six-sided, as is usual, and as is the case with the two succeeding neural plates. The eighth neural plate expands posteriorly, and the expansion in this direction is progressive in the ninth and tenth neural plates; the eleventh or pygal plate (p y) is narrower than the back part of the tenth neural plate, is quadrate, and shows, both by its shape, size, and median impression, that it belongs rather to the category of dermal marginal plates, the series of which it completes posteriorly. The costal plates (pl. 1 to pl. 8) offer no modification worthy of notice. There are eleven marginal plates (1, 1', to 10) on each side of the carapace, in addition to the nuchal (c h) and pygal (p y) plates; they increase in breadth after the sixth; the first bears the impression of the triradiate line which marks the division between the first (m 1) and second (m 2) marginal scutes, and the first (v 1) vertebral scute.

There is no nuchal scute. The second, third, and fourth marginal plates are slightly overlapped by the first costal scute (c 1). The antero-posterior breadth, in comparison with the transverse breadth, is greater in the costal scutes of the *Pleurosternon ovatum* than in those of the *Pleurosternon emarginatum*. The number of marginal scutes is twenty-four, twelve on each side (m 1 to m 12).

The fore part of the plastron appears to have projected in advance of the carapace, as is indicated by the plate of bone marked (c s) in Plate 57.

The length of the carapace of the specimen of *Pleurosternon ovatum* here described is 19 inches 6 lines; its breadth is 14 inches 6 lines. It is very slightly convex, with the margins a little raised. The feeble sculpturing of the outer surface of the carapace resembles in general character that of the other species of *Pleurosternon*.

*Pleurosternon latiscutatum, Owen.* Plate 58.

The species represented by the specimen of mutilated carapace, here figured, differs from all the other recognised species of the genus by its distinct nuchal scute (c h), by the small relative size of the first vertebral scute (v 1), and by the
great relative size, more especially the superior breadth, of the three succeeding vertebral scutes (v 2, v 3, v 4). The boundary lines, indicating the forms and disposition of the horny scutes, are proportionally larger and deeper than in the other species of *Pleurosternon* which have come under my observation.

The sutures uniting together the different elements of the carapace are more dentated or wavy, more especially the suture uniting the nuchal plate with the first neural plate and first pair of costal plates. The neural plates, from the first to the seventh inclusive, are similar in form, six-sided, with the antero-lateral sides the shortest; the eighth neural plate is the smallest, is four-sided, and broadest behind; the ninth and tenth neural plates are remarkable for their great breadth.

The transverse extent or length of the costal plates is considerable, in accordance with the great breadth of the carapace: the eighth costal plate, in this respect, differs considerably from its homologue in the other species of *Pleurosternon*. The second marginal scute is not produced backwards between the first vertebral and first costal scute, but, like the first and third marginal scutes, has its antero-posterior diameter much less than the diameter in the direction of the periphery of the carapace. The first (c 1) and fourth (c 4) costal scutes differ considerably in their forms and proportions from those in Plates 53, 55, and 57.

The outer surface of the osseous parts of the carapace of *Pleurosternon latiscutatum* is minutely punctated and rugose, except near the sutural borders of the several pieces, where it is impressed by rather coarse parallel striae, directed at right angles to those borders.

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**Genus—Platemys.**

**Platemys Mantelli, Owen.** Plate 52, fig. 1.

Amongst the Chelonian Fossils from the Wealden strata of the Tilgate Forest, in Sussex, are certain specimens which resemble the flat species of Emydian, or terrapene, discovered by M. Hugi, in the Jura limestone at Soleure. Both the Jura species and the Wealden Chelonites in question are referable to the 'pleuroderal' section of the great tribe *Paludinosa*, as arranged by Messrs. Duméril and Bibron;¹ and, in that section, to the genus *Platemys*.

The most intelligible fragment in the British Museum, is that element of the plastron—the hyosternal, which is figured in the above Plate. The proportions of this bone indicate that the plastron of the *Platemys Mantelli* consisted of the

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¹ 'Erpetologie,' 8vo, 1835, tom. ii, pp. 172, 372.
ordinary nine pieces: where the accessory pair of mesosternal pieces is introduced, both the hyo- and hypo-sternals have relatively less antero-posterior extent than the fossil in question shows.

Platemys, sp. dub. Plate 52, fig. 2.

A second species of Wealden Platemys is apparently characterised by a somewhat broader plastron, and by a greater relative thickness of the bones composing both this and the carapace. Without the latter difference, the proportionally broader plastron might be merely the sexual distinction of the female of the first species. Some difference, in the shape of the axillary notch of the hyosternal further induces me to regard the fragmentary Chelonites in question, of which a hyosternal is figured in Plate 52, as belonging to a second species of Wealden Platemys.

Platemys Dixoni, Owen. Plate 52, fig. 3.

A Platemydian specifically distinct from either of the above is more unequivocally exemplified by the sternal element represented in figure 3; the matrix having been carefully removed from the outer surface of this fossil, the linear impressions which have divided the humeral from the pectoral scute, and this from the abdominal scute, are clearly shown. The positions of these transverse grooves accord with those in the hyosternal of the Emydians, having the usual number (nine) of plastral elements: and the hyosternal character of the fossil is further shown by the oblique border cutting off the inner angle of the anterior end, for articulation with the entosternal element. (This end has been figured downwards in the plate.) The axillary groove is narrower than in the above-described species; and the whole bone seems to have been longer in proportion to its breadth. It is from the Wealden of Tilgate Forest, and formed part of the Collection of the Author of the instructive Work, 'On the Cretaceous and Tertiary Formations of Sussex,' Frederic Dixon, Esq., F.G.S.

Genus—Chelone.

Chelone costata, Owen. Plate 51.

From the Wealden Clays of Tilgate Forest have been obtained many fragmentary Chelonites, indicative of species representing two of the actual families of the order, viz. Paludinosa and Marina; and such, therefore, as might be expected
to be met with in the deposits of a large estuary. I commence the description of these Wealden Chelonites by those which indicate a species of the marine family.

Portions of the carapace and plastron, and bones of the extremities of a large species of Turtle, some of them indicating individuals with a carapace nearly three feet in length, form part of the Mantellian collection, purchased by the Trustees of the British Museum, and now in the Museum of Natural History, Cromwell Road.

After comparison of these specimens I have come to the conclusion that the Wealden species differ from *Chelone imbricata*, *Chelone carinata*, and other recent species, in as great a degree as do most of the Eocene *Chelones*, in the greater extent of ossification of the costal interspaces and of the plastron.

A characteristic portion of the great Wealden Turtle is represented, of the natural size, in Plate 51. It includes the second and third marginal plates, and considerable portions of the first and second costal plates, with the connate portions of the pleurapophyses, or vertebral ribs. These are remarkable for their breadth and prominence, and have suggested the name proposed for the present species.

In the same plate are represented a mutilated right iliac bone (fig. 3) and the right femur (fig. 2) of, probably, the same species of Turtle. These, also, are from the Wealden formations of Tilgate Forest.

Figure 4, Plate 52, gives a view of the inner surface of the left hyposternal, half the natural size of, probably, the same species of *Chelone*. It is embedded in a slab of Wealden stone.

As compared with existing Turtles, the ossification of the plastron is more advanced or more extensive, the rays of bone from the outer and inner free borders of the hyposternal being shorter and their interspaces more filled up. A nearer approach is thus made in this Wealden species, as in some of the Eocene Turtles, to what may be regarded as the more general type of the Chelonian carapace.

*Chelone gigas*, Owen. Plates XXX, XXXI.

In the course of the determination and description of the fossil remains referable to the marine genus *Chelone* (Turtles) fragmentary specimens from the Eocene clay of the Isle of Sheppey indicated the then existence of a species, as shown in fig. 5, Plate 40, much larger than those described in Vol. I, pp. 7—44. Recently, however, have been acquired from that locality, for the Palæontological Department of the British Museum of Natural History, remains of this giant of the Family *Marina*, of which I have selected for illustration the skull, represented in *Chelonia*, Plate XXX, of the natural size, viewed from above; other views of
the same remarkable fossil being given, reduced to one third the natural size, in Plate XXXI, Vol. IV.

By a comparison of these figures with those of the skulls of other extinct species which have left their remains in the same formation and locality it will be seen that besides difference of size, which is sufficiently remarkable, there are also proportional characteristics which compel a reference of the giant of the marine family to a distinct species. The entire skull is more flattened and depressed. This is shown in figs. 1 and 3 of Pl. XXXI. If they be compared with figs. 1 and 3, Pl. XI (Chelone cuneiceps), Vol. II, which offers the nearest approach to Ch. gigas in this character, the difference will be obvious. It is not wholly due to posthumous pressure, although this has produced a partial dislocation, as shown by the slightly bent super-occipital in fig. 3, and the shape of the orbit in fig. 1, Pl. XXXI. The plane of the nostril is wholly upon the upper surface of the skull, and is relatively nearer to the orbits, and further from the anterior premaxillary part. A transverse line across the back part of the nostril crosses the orbit very little in advance of the hind part of the anterior third of that cavity, a rare relative position of the nostril which could not have been induced by mere pressure. The orbits open upon the anterior half of the skull. The premaxillaries are produced beyond the nostril for a greater relative extent than in any of the extinct kinds, in some of which, for example Chelone longiceps (Pl. XII, fig. 2), Vol. II, the plane of the aperture is the same with that of the fore slope of the skull. In the recent Turtles, Chelone mydas, for example, the nostril is terminal, and its plane almost vertical, and it opens wholly in advance of the orbits. These apertures are relatively smaller in Chelone gigas than in any recent and in most extinct species.

All the cranial characters of the marine family of the order Chelonia are present in the gigantic extinct species.

Order—Labyrinthodontia.

Genus—Labyrinthodon, Owen.

A knowledge of the chief character of the present Order and Genus was derived from examination of portions of petrified teeth found in a quarry of the New-red Sandstone at Coton End and Guy’s Cliff, Warwickshire, and transmitted to me for determination and description by Murchison and Strickland. The specimens received indicated a tooth of the common canine character, but straight

and with a subcircular transverse section: the surface was traversed by close-set longitudinal lines, seemingly indicative of fissures. Being at that time engaged in a study of the teeth of Vertebrates, I submitted the fossils to microscopical scrutiny, and great was my surprise to see, in a transverse section, the structure figured in the subjoined Cut, fig. 1.

![Fig. 1.—Section of tooth of Labyrinthodon.](image)

The question which chiefly interested my geological friends was whether the sandstone was, as they suspected, of Triassic age, and might be equivalent to the German "Keuper Sandstone." Now, from this sandstone had been obtained fossils of a large Vertebrate species, referred by Professor Jaeger to a genus he termed Mastodon-saurus. Of this species one of the fossil teeth presented the same conical, transversely circular, shape and longitudinal striation of the Warwickshire fossil. I therefore wrote to the author requesting the favour of a tooth of the Mastodonsaurus, which was promptly and kindly granted. Of this tooth slide-sections for the microscope were prepared and a labyrinthic interblending of the dental tissues was displayed, identified with the structure so unexpectedly brought to light in the fossil teeth from the Warwickshire Trias. Subsequent acquisitions of fossil remains, for which I am indebted to Dr. Lloyd, of Leamington, have enabled me to add the following illustrations of the osteological characters of the extinct form characterised by the labyrinthic structure of its teeth.

Species—Labyrinthodon Jaegeri, Owen.

The first of these fossils here described indicated a species as large as the type of Mastodonsaurus. It consisted of portions of two mandibular rami (Batrachia, Plate 2) from different individuals. One, figs. 1, 1a, includes the angular, articular, and hinder part of the dentary elements of the lower jaw, with portions of a score of relatively small conical, nearly equal-sized teeth. The angle of the jaw terminates obtusely, and is produced about three inches behind the articular surface.

1 'Ueber die fossilen Reptilien, welche in Württemberg aufgefunden worden sind,' 4to, 1828, pp. 35, 38, tab. 4 and 5.
From this the bone gradually decreases in vertical extent to its broken fore end. In the second and larger fossil (fig. 2) the exterior of the lower three fourths of the bone is strongly sculptured by obtuse interrupted ridges, mainly radiating from the lower border below the articular surface (fig. 2). The inner side of the ramus (fig. 2) is comparatively smooth, and shows the termination of the depression which lodged the hind end of the dentary element. Portions of the maxillary bone and teeth of this species are shown in figs. 4, 5, and 6, Plate 4.

Species—Labyrinthodon leptognathus. (Batrachia, Plate 3.)

Of the fossils referred to the above species the most instructive was the portion of skull represented in figures 1 and 2, of the natural size. Careful removal of the stony matrix exposed, on the palatal surface (fig. 2) a broad divided vomer (b), contributing a somewhat larger proportion to the roof of the mouth, than the divided vomer characteristic of existing Toads and Frogs. The position and relative size of the inner or palatal nostril (c) added to the batrachian characters. Anterior to this part of the palate was the base of a tooth, which, compared with the row of maxillary teeth, might be termed a tusk. The labyrinthine structure was instructively shown in a section of this tooth. So much of the upper wall of the skull is preserved as to show the broad, flattened shape of its facial portion; but the extent of the maxillary and nasal bones composing the roof presents a marked distinction from the framework of the similarly shaped skull in existing broad and flat-headed Batrachians. In these the maxillaries have the form of elongate styles, attached by a slightly expanded fore end, and terminating behind in a free point: they are, also, edentulous.

The outer surface of the broad facial part of the skull of Labyrinthodon is sculptured in a degree recalling that of the outer surface of the lower jaw of the huge species above described. Irregular grooves and sinuses are divided by corresponding risings. An angular furrow runs nearly parallel with the alveolar process, a little above it, defining it from the broad upper flat surface of the skull; a second less angular furrow inclines one side as it extends forward.

The alveolar part of the fossil includes thirty-one sockets, the foremost, lodging the base of a tooth three times the size of the next, which commences the series of smaller teeth, gradually decreasing in size as they extend backwards. A side view of the above-described fossil is given in fig. 3, in which a indicates the tusk of the outer dental series and b that of the vomer.

The dental character of the present species is more fully shown in the considerable proportion of the left mandibular ramus, figured in Batrachia, Plate 4, T4.1
The conformity of this character with that shown in the preserved portion of the upper jaw will be appreciated by the side-view of that portion introduced in fig. 7 of Plate 4. In the vacant mandibular sockets, corresponding to the upper teeth in place, are germs of successional teeth, more or less advanced in formation. The number of sockets in the single alveolar series is not less than fifty: to which add a much larger canine or tusk at the inflected symphysial end. A Batrachian mandibular character is exaggerated in Labyrinthodon by the extension of the angular element of the jaw along the under part of the ramus to the short symphysis. The 'harmonia,' or toothless suture indenting the outer surface, indicates the proportions of the angular and dentary elements contributed to that surface. Figures of the best preserved maxillary and mandibular serial teeth, slightly magnified, are given in advance of the views, natural size, of the upper and lower jaws of Labyrinthodon leptognathus.

Labyrinthodon pachygnathus, Owen. (Batrachia, Plates 3 and 4.)

The portions of upper jaw on which this species is founded are represented of the natural size in figures 4, 5, 9, and 10 of Plate 3. The outer surface of the portion preserved of the maxillary shows the characteristic coarse sculpturing; part of the vomerine nostril is indicated at c, figs. 9 and 10. The alveolar and part of the palatal processes of the maxillary afford the subjects of figs. 4 and 5; and the crown of the best preserved maxillary tooth is represented in fig. 6. Figs. 7 and 8 are portions of a mandible, but the characters of this bone and of its teeth are exemplified in figs. 1, 2, 3 of Batrachia, Plate 4, from parts of the right ramus.

The outer surface of the dentary is traversed by a longitudinal groove midway between the upper and lower borders, indicative of the proportions of the dentary and angular elements thereto contributed. The part of the outer surface of the angular in the hinder portion of the mandible of Lab. pachygnathus is broken away. On the inner surface of the fore part of the ramus (fig. 2) is shown the pointed termination of the splenial element, which extends to near the symphysis; an upper view of the same fore end of the ramus is given in fig. 3. The mandibular dentition is instructively shown in the present specimens. The small serial teeth exhibited more or less entire, or indicated by sockets, in the two portions of jaw, are not fewer than forty. The symphysial end of the ramus supports two much larger tusk-like teeth, with indication of a third of less size, but exceeding that of the serial teeth. Of these the crown is best preserved in the posterior portion of the ramus (fig. 1), which had been detached from the rest. The
vacant sockets between the teeth in place show more or less advanced beginnings of successional teeth. The figures of the mandible and teeth are of the natural size.

Vertebræ of Labyrinthodon. (Batrachia, Plate 5.)

The proportions of a vertebral fragment, associated with the above-described mandible, in the Trias of Coton End, lead me to refer it to the species pachygнатthus. Fig. 1, showing a portion of the fore articular surface of the centrum, with the coalesced base of the neural arch, gives the moderately concave character of that surface. The upper view of the same vertebral fragment (fig. 2) determines the fore and hind ends by the bases of the zygapophyses of the coalesced neural arch fortunately remaining. The base of a broad, depressed diapophysis is also shown, and is further exemplified in the side view (fig. 4). The hind articular surface of the centrum has suffered fracture, forbidding determination of its natural shape. The minutely cellular, almost compact, texture of the bone is displayed by the fractured surface in fig. 3.

A better preserved vertebra, in size referable to Labyrinthodon leptognathus, affords the subjects of figs. 5—8. The degree of concavity of the fore surface is shown in fig. 7, in which the centrum is associated with so much of the neural arch as exhibits the position and shape of the prezygapophyses which received the articular ends of the postzygapophyses, unfortunately mutilated, with the corresponding articular surface of the centrum, as shown in fig. 8. In the characters of the vertebra from a part of the trunk, as exemplified in the specimens from two of the British species of the present singular genus, we find the Labyrinthodon superadding modifications to the vertebræ of the highest existing Batrachia (toads, frogs, salamanders), which, as in the dental and osteological characters next to be noticed, manifest an association of Reptilian (Crocodilian, Dinosaurian) features with an essentially Batrachian organisation. The portions of ribs which have been recovered show these bones to have been of greater relative length and curvature than in any existing Batrachians, and in the character of size they accord with that of the articular process and surface developed from the neural arch.

The subject of figs. 9 and 10, in Plate 5, might well have been interpreted, if found alone, as evidence of an extinct Reptile of higher grade than a salamander,— to an Ichthyosaur, for example. It is plainly a sternal bone, showing articular concavities for a pair of clavicles; or it may answer to that part of the complex scapular arch in Reptiles which has been named “episternum.” The locality of the fossil and its associations with unquestionable remains of Labyrinthodont reptiles support its reference to that genus; and, from its size, to the species leptognathus. The stem or body of the bone thins off as it recedes from the
articular process to a flat plate, from which the end is broken away. The advanced thicker end expands and extends into cross pieces, at right angles, each with an articular depression indicative of clavicles. Now, these bones, which are absent in Crocodilia, are present in higher Batrachia, and, in Bufonidae, their mesial extremities rest upon the expanded fore end of an episternal bone; it is not, however, curved lengthwise as shown in fig. 10, in Labyrinthodon, a curvature which indicates a greater vertical capacity of the fore part of the thoracic-abdominal cavity.

**Humerus.**

The fossil from the Trias at Coton End, of which four figures (11—14) are given in Plate 5, is the proximal portion of a humerus. The moderately-convex, proximal, articular end (fig. 14), from which extends the beginning of a well-developed deltoid ridge, and the characters of the shaft shown by the surfaces divided by that ridge, are more like those of the humerus of a toad than in that of any Lacertian, Chelonian, or Crocodilian Reptile. The bone had a medullary cavity of the width shown in fig. 13.

If this limb-bone should belong to the same species as the ilium (figs. 16 and 17) the disproportion of size in the fore and hind limbs would be as in the anourous Batrachians; but I have received evidences of the tail of Labyrinthodon.

Great part of the ilium is devoted to the formation of a large acetabular cavity; this is of an oblong form, extending in the long axis of the bone; its margin, elsewhere sharp, is smoothed away at the base of the iliac body, which becomes narrow and compressed as it recedes. The chief distinctive character is the process above the acetabulum, from which it is separated by a smooth concavity; this process is compressed as it rises, and is bent forward, ending in an obtuse point. A process of a different shape rises in a similar position above the acetabulum in the frog. From the superacetabular process the ilium is continued forward, and terminates in a thick subtruncate surface a few lines in advance of the acetabulum. The extent to which this ilium is articulated to the vertebrae, at least three in number, which may be regarded as sacral, is shown in the mesial view of the bone given in fig. 17; the superacetabular process and the hinder slender production contributing to the vertically concave articular surface.

Of a femur, corresponding in size, in any degree, with the above ilium, I have, as yet, received only the hemispherical head, represented in fig. 18. But in a group of bones of a small, or possibly young, Reptile from the New Red Sandstone (Trias) of Lymington, with the distal articular end of a femur (Batrachia, Plate 6, fig. 1, f), were associated a tibia (t) and a humerus (h), plainly indicating a great disproportion in size between the fore and hind limbs.
I subsequently found that a fossil from Warwickshire Trias, figured in Plate XXVIII, fig. 9, of the above-cited paper by Murchison and Strickland, was a terminal phalanx showing a Batrachian character in the absence of the usual modification for the insertion or attachment of a claw.

*Labyrinthodon (Anisopus) scutulatus,* Owen.

Returning to the group of bones in Plate 6, figs. 1—5, I found them to belong to a small reptile with the biconcave system of vertebrae, but which, from the length, structure, and form of the long bones of the extremities, must have been of terrestrial rather than marine habits, and which had the skin defended by numerous small rhomboidal bony scutes, with a smooth central surface, and with the outer surface sculptured by three or four longitudinal ridges (fig. 5). This reptile had the hind legs twice as long and as strong as the fore. The humerus (fig. 1, h) is convex at the proximal extremity, it is expanded both at this and the distal extremities, and is contracted in the middle. There is a portion of a somewhat shorter and flatter bone, bent at a subacute angle with the distal extremity of the humerus, and which presents the nearest resemblance to the ankylosed radius and ulna of the frog. The proximal extremity is wanting in the femur (fig. 1, f), the remnant of the shaft is slightly bent, and is subtrihedral; its walls are thin and compact, and include a large medullary cavity. Both tibiae exhibit that remarkable compression of the distal portion of the shaft which characterises the corresponding bone in the anourous *Batrachia,* and both likewise exhibit the longitudinal impression along the middle of the flattened surface.

The vertebrae (figs. 2, 4, and 3 magnified) are biconcave, with these surfaces sloping obliquely from the axis of the body, as in the dorsals of a frog, indicative of habitual curvature of the part of the spine formed by them. The aquatic Salamanders, including the gigantic species from Japan, have both ends of the vertebral body concave, but more conical than hemispherical, as in the present fossil, which in this respect resembles the Labyrinthodont vertebrae (figs. 1 and 7) in Plate 5. Portions of ribs associated with the above-described fossils showed them to be longer and more curved than in the existing remnants of the Batrachian type.

The Leamington fossil also exhibits a character, in the small, bony dermal sculptured plates, not yet found in the Warwick or Wirtemberg Labyrinthodonts, which seems to remove it from all *Batrachia*—the naked reptiles, as they are emphatically termed—and to approximate it to the Loricated Order. These scutes (fig. 5) form a suggestive instance of the Crocodilian affinities of the Leamington Batrachian; we have already seen the same affinities mani-
fested in other parts of their organisation by the larger Labyrinthodons. As these detached superficial bones are the most liable to be separated from the fragmentary skeleton of the individual they once clothed, the mere negative fact of their absence, when so small a proportion of the bones of the trunk of any Labyrinthodon has yet been found, is insufficient to prove a difference of dermal structure between the Leamington and Warwickshire species.

No anatomist, indeed, can contemplate the extensive development and bold sculpturing of the dermal surface of the cranial bones in the Labyrinthodontes pachygnathus and leptognathus, without a suspicion that the same character may have been manifested in bony plates of the skin in other parts of the body. And granting that this structure existed, to what extent, it may be asked, does it affect the claims of the Labyrinthodon to be admitted into the order of Batrachia, in which every known species is covered with a soft, lubricous, and naked integument? To this question it may be replied, that the skin is the seat of the most variable characters in all animals; and, if considered apart from the modifications of the osseous and dental systems, is apt to mislead the naturalist who is in quest of the real affinities of a species. Suppose, for example, that the existing Chelonian Reptiles were exclusively mud-tortoises, or with a soft and naked skin, as in the species of Trionyx and Sphargis, would the discovery of the osseous carapace of a true Testudo, in a fossil state, in connection with a skeleton in other respects essentially corresponding with the modifications exhibited by a Trionyx, prohibit the association of the fossil in the same order of Reptiles with the Trionyx, because of the indication of the scutes? It unquestionably ought not to affect such a determination. And so with respect to the Labyrinthodont Batrachia; if all the species have pushed their affinities to the Crocodilians so far as to have had their trunk defended by bony dermal plates, yet their double occipital condyle, their comparatively simple lower jaw, their large vomerine bones and teeth are decisive of their Batrachian nature.

In the "Alaunschiefer of the German Keuper" was found the occipital part of a fossil skull, with a double condyle to which the name Salamandroides giganteus was given by Jaeger. I am of opinion that, with the Mastodontosaurus, it was also a Labyrinthodont.

These extinct forms deviated from existing Salamanders in the crocodilian development and sculpturing of the cranial bones, and in having dermal osseous plates. Finally, I have to offer remarks on the Batrachian affinity indicated by their foot-prints.

Since the above-described fossils were submitted to my examination impressions and reliefs of impressions of foot-prints have been found on slabs of the New Red Sandstone in different British localities, proclaiming the primitive
plastic condition of such stones when so impressed at low water and receiving successive tidal deposits of the same fine sand.

Impressions and reliefs of such prints have been traced for many steps in succession, in one instance of which a portion is represented in the adjoining Cut. They have been noted in Triassic formations of Warwickshire and Cheshire, and in a quarry of whitish quartzose sandstone at Storeton Hill, a few miles from Liverpool. Some are hollow, as they were impressed, others are in relief, being natural casts; always, respectively, on opposite surfaces of the sandstone slabs.

Such impressions or "ichnites" indicate vagrants of different sizes. Those left by the hind foot, in the largest kind, are eight inches in length, five inches in width; and near each, at a regular distance—about an inch and a half in advance—is a smaller print of the fore foot, four inches long and three inches wide. The footsteps follow each other in pairs at intervals of about fourteen inches from pair to pair. The large (hind) as well as the small (fore) steps show the thumb-like outer toe alternately on the right and left side, each step leaving a print of five toes, in which there are no indication of claws.

Foot-prints of this kind were first observed in Saxony, near Hillburghausen, in quarries of a Liassic sandstone. Dr. Kaup, who (1836) described them, gave the name of Cheirotherium to the animal that made them, in reference to their resemblance to the impression left by a human hand. But, led by a like disproportion between the fore and hind limbs in the kangaroo, he conjectured that they might indicate an extinct form of the Marsupial order of quadrupeds. In Didelphys, however, the thumb is on the inner, not the outer, side of the hind foot, and is on a line with the other toes in the fore foot.

Decisive evidence of a species of Mammal being in existence at the Triassic epoch has since been had; but the remains of Tritylodont ¹ have not yet revealed the structure of the feet.

¹ 'Quarterly Journal of the Geological Society,' February, 1884, p. 146, Pl. VI.
The Cheirotherian Ichnites resemble the foot-prints of a Salamander in having the outer toe of the hind foot projecting at a right angle to the line of the mid-toe; they recall the foot-prints of the toad in their unequal size. The fossil remains, above described, from the Triassic deposits and localities exhibiting the Cheirotherian impressions, justify the conclusion that they have been made by a cold-blooded rather than a mammalian Marsupial animal, and by a species of the class which includes Batrachians with a similar disproportion between the hind and the fore limbs. On this hypothesis it is not less evident that the impressing vagrant was quite peculiar and distinct from any known Batrachian or other reptile in the form of its feet. The analogy of the Crocodilian reptiles would indicate the short and freely-projecting digit to be the outer or fifth toe, whilst the closer correspondence of the Batrachian feet would prove it to be the inner or first toe; but the thickness, relative size, and position of the remaining toes are peculiarities of the Cheirotherian footsteps.

Thus, in Labyrinthodon we have a Batrachian reptile, and one that differs very remarkably from all known Batrachia and every other reptile in the structure of its teeth: it is also a Batrachian, which, with strong affinities to the Sauria, appears to have presented the same inequality of size between the fore and hind extremities as does the so-called Cheirothere: and both the footsteps and the fossils are peculiar to certain members of the Triassic formations. May we not then be justified, upon this evidence, in adding the name Cheirotherium to Mastodontosaurus and Phytosaurus among the synonyms of the genus Labyrinthodon?

I have already alluded to footsteps of a different but somewhat allied form, as being probably those of the Lab. leptognathus. These footsteps actually occur associated with those to which the name Cheirotherium has been given on the same slab, in the sandstone quarries at Storeton, but are more Crocodilian in their character.

Since my first acquaintance with this type of reptile I have received and described other specific and generic forms from Hindostan, America, and, as in the instance of the species of Rytidosteus, from a Triassic formation at the Cape of Good Hope.1

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CONCLUSION.

A glance at any summary of the *Reptilia* still maintaining an existence in Great Britain\(^1\) will impress the contrast between them and the numbers, the hugeness, the strange modifications of such cold-blooded air-breathers which lived on the lands and swam by the shores of the Mesozoic and Eocene worlds. These discoveries suggest, also, the most probable correspondence of the climate of the ancient continents at those epochs with that of the countries where the crocodile, the alligator, the ghavial, the boas, and the larger chelonians still find conditions of existence.

Nevertheless, what most impresses the writer is a sense of the fragmentary nature of the present contribution to a restoration of such forms of past life, and the conviction of the extent of the field which, especially in the Mesozoic strata of our island, still remains for the cultivation of the Reptilian branch of Palæontology.

\(^1\) Bell's *British Reptiles*, 8vo., V. Voorst.

THE END.