17. *On two new SPECIES of LABYRINTHODONTS.* By R. LYDEKKER, Esq., B.A., F.G.S., &c. (Read March 12, 1890.)

[PLATE XII.]

A. *Mandible from the Carboniferous of Scotland.*

EXCLUSIVE of the smaller forms like *Ophiderpeton*, *Ceraterpeton*, &c., the Labyrinthodonts hitherto described from the British Carboniferous comprise *Anthracosaurus*, *Loxomma*, *Pholiderpeton*, and *Pteroplax*. Of these the type specimen of *Anthracosaurus* was obtained from the Coal-Measures (Upper Carboniferous) of Lanarkshire *; while the types of the second and third genera come from the ironstone of Gilmerton, near Edinburgh, which is generally considered to represent the upper part of the English Mountain-Limestone (Lower Carboniferous). *Pteroplax* is from the Coal-Measures of Northumberland. Several other generic names have, indeed, been applied by Mr. T. P. Barkas † to remains of reputed Labyrinthodonts from the Coal-Measures of Northumberland; but such of these specimens as are truly referable to the group in question appear to belong to *Loxomma* and *Anthracosaurus*. It is important to observe that a jaw from the Lower Permian (Rothliegendes) of Bohemia has been referred by Dr. Fritsch ‡ to a species of *Loxomma*, thus indicating, if the determination be accepted, the persistence of this generic type from the Lower Carboniferous to the Lower Permian. The Northumberland specimens indicate the occurrence of *Loxomma* in the Coal-Measures; while a specimen in the British Museum leads me to conclude that *Anthracosaurus* dates from the Lower Carboniferous of Burdie House.

Of the four genera mentioned above, *Pteroplax* and *Pholidogaster* are represented by species of much smaller size than the others: and since it is quite evident that they have no affinity with the specimen I am about to describe, it will be unnecessary to make any further mention of them.

In *Loxomma* the teeth are characterized by the large size of the crowns, which are straight and laterally compressed, with very prominent fore-and-aft carinæ, so that they present a striking resemblance to some types of spear-heads. These teeth have a highly polished and nearly smooth surface; and in the lower jaw their arrangement is very irregular. Further, the outer surface of the mandible is entirely covered with a net-like sculpture, and the depth of the ramus is not very great.

In *Anthracosaurus*, on the other hand, the teeth (as described by Mr. Atthey) have subcylindrical crowns, without fore-and-aft carinæ, and with an oval transverse section at the base, of which the

* See Quart. Journ. Geol. Soc. vol. xix. p. 56, note.

† 'Coal-Measure Palæontology.'

‡ 'Fauna der Gaskohle,' etc. vol. ii. p. 16.

larger diameter is placed at right angles to the axis of the jaw. The mandible is readily distinguished from that of *Loxomma* by the slight development of the sculpture on the outer surface, and also by the great vertical depth of the hinder part of the dentary element, which causes the inferior border of the ramus to assume a highly arcuated contour.

Having thus briefly sketched the salient features of the teeth and mandible of *Loxomma* and *Anthracosaurus*, we may proceed to notice the specimen forming the subject of this part of the present communication. The specimen in question is a slab of shale, exhibiting the external aspect of the greater portion of the right dentary bone of a comparatively large Labyrinthodont from the Lower Carboniferous of Gilmerton; it is now preserved in the British (Natural History) Museum, where it bears the register-number R. 310, and was formerly in the collection of the late Earl of Enniskillen. That this jaw belonged to a Labyrinthodont is at once evident from the internal structure of the teeth, as shown by fractured specimens. It is figured on a scale of $\frac{1}{2}$ in Plate XII. fig. 1. The portion of the dentary remaining is about 8 inches in length and contains a number of teeth, some of which are entire, while others are more or less broken. The jaw is of moderate depth at the hinder portion of the dentary, and thereby approximates to *Loxomma*, from which, however, it is at once distinguished by the slight development of the external sculpture; so that in this respect it is more like *Anthracosaurus*. At the anterior extremity of the jaw there is the broken base of a large tusk-like tooth*, immediately followed by an entire tooth of similar type; then we have an interval of about an inch and a half, occupied by the bases of smaller teeth, which are again succeeded by the stumps of two large tusks. The remainder of the alveolar margin is occupied by a regular series of small teeth, many of which are well preserved. The whole of the teeth have a cylindrical section at the base, while their crowns are smooth, with a convex external and a somewhat flattened inner surface, and there are distinct, although not very prominent, fore-and-aft carinæ. Distinct grooves are visible at the base of each tooth, which tend to become obscure as they approach the smooth summit; and there is a more or less marked tendency to a backward curvature of the summit of the crown; while each tooth has a large pulp-cavity and strongly marked labyrinthine foldings at the base.

The above description is quite sufficient to indicate that we have to do with a form which is generically distinct (in the sense in which generic terms are employed in the Labyrinthodonts) both from *Loxomma* and *Anthracosaurus*, and therefore from all British Carboniferous representatives of the Order. Among the numerous forms described by Dr. Fritsch from the Lower Permian of Bohemia, the genus *Macromerion*† (or, more correctly, *Macromerium*), which was probably allied to *Anthracosaurus*, presents, however, such a marked

* These broken teeth are not shown in the figured aspect of the specimen.

† Fritsch, 'Fauna der Gaskohle,' etc. vol. ii. pp. 37-41.

resemblance in dental characters to the specimen under consideration as to lead to the conclusion that the latter cannot be generically separated. The teeth of the several Permian species of *Macromerium* are described as conical, with the crowns smooth near the summit but deeply grooved inferiorly, and bearing distinct fore-and-aft carinæ; while they have a well-marked pulp-cavity, and complex labyrinthic foldings at the base. The figures given by Fritsch, together with a cast of part of the jaw of the typical *M. Schwarzenbergi*, now in the British Museum, show that the outer surface of the teeth was markedly convex; while the summits of the crowns were more or less bent backwards. *M. Schwarzenbergi* was a much larger form than the one under consideration; but the fragmentary upper jaw represented in pl. lxvii. fig. 15 of the work cited, under the name of *M. bicolor*, has teeth agreeing in size with those of the Gilmerton jaw. The magnified views of these teeth, given in plate lxx. of the same volume, show an internal structure which, so far as I can determine, is very similar to that of the Gilmerton specimen. The crowns of the upper teeth are, however, more curved backwards in *M. bicolor*; and if the same condition holds good in the lower jaw, we shall have a character by which the Carboniferous species can be readily distinguished from the Permian one. The lower geological horizon of the Gilmerton jaw is, however, of itself sufficient to indicate its specific distinctness from *M. bicolor*, and I therefore propose to make that specimen the type of a new species, which I refer (at least provisionally) to the genus *Macromerium*, with the name of *M. scoticum*. This species may be defined as agreeing in size with *M. bicolor*, but with the crowns of the lower teeth less recurved than the upper ones of the latter.

If I am right in the generic reference (and, in any case, the Carboniferous form must be closely allied to *Macromerium*), we shall have the same vertical range in the case of *Macromerium* as is given by Dr. Fritsch in that of *Loxomma*.

B. *Mandible and Intercentrum from South Africa.*

Among a series of specimens from the Karoo system of South Africa, presented to the British Museum by Sir R. Owen, is the greater portion of the right ramus of the mandible of a comparatively large Labyrinthodont, together with an intercentrum which, from its size and mineral condition, appears to have belonged to the same individual. The precise locality where these specimens were obtained is unknown; and there is likewise no evidence to show whether they were derived from the Beaufort or Stormberg beds of the Karoo system.

The mandibular ramus is in three fragments, which, when put together, indicate that its entire length was somewhere about 40 centimetres. The portions remaining comprise the entire articular region and the greater portion of the dentary and associated elements, together with a fragment of the missing intermediate portion. The anterior portion of this mandible is represented, from

the oral surface, on a reduced scale in Plate XII. fig. 2. The outer surface of the bone is ornamented with a coarsely reticulate and ridged sculpture, while the broken teeth show the labyrinthic internal structure characteristic of the Labyrinthodonts; so that there is no hesitation in referring the specimen to that group of Amphibians. The unfigured articular region is fairly well preserved, and shows that there was no postarticular process behind the glenoid cavity—a feature in which this jaw agrees with that of the North-American genus *Eryops* and the European *Loxomma*. In the dentary bone the bases of twenty-five teeth now remain, these bases having an ovoid section, with the longer diameter at right angles to the axis of the jaw. Externally to this row of teeth there is a well-marked bony parapet, forming the summit of this border of the jaw. The most remarkable feature displayed by the specimen is, however, the presence of a narrow band of about half an inch in width, situated on the bone of the jaw, immediately on the inner side of the alveolar area, and covered with a number of minute knob-like denticles, much resembling in appearance the so-called “shagreen” of the Elasmobranchiate fishes. Apparently this band of denticles stopped short of the symphyseal region. Each denticle presents the appearance of a veritable tooth, having a distinct pulp-cavity.

The intercentrum, already referred to, is figured of the full dimensions in Plate XII. figs. 3, 4. This bone presents the horse-shoe-like form characteristic of the “rhachitomous” Labyrinthodonts, and shows the presence of a distinct facet (*a*) for the articulation of the capitulum of the rib. The absence of ossification in the axial region of the bone shows that it belongs to a Labyrinthodont and not to an Anomodont, since in the latter group the intercentra always form complete wedges. This is confirmed by the presence of a rib-facet; since the only known Anomodont with an intercentral costal articulation is the American genus *Embolophorus*. I may take this opportunity of mentioning that the evidence appears to be absolutely conclusive as to the correctness of Prof. Cope's identification of the Labyrinthodont intercentrum (hypocentrum of Gaudry) with the Anomodont intercentrum, as may be verified by a comparison of specimens of the vertebral column of the Labyrinthodont *Eryops* and the Anomodont *Embolophorus*, acquired a few years ago by the British Museum.

With regard to the affinities of the form indicated by these two specimens, it may be observed, in the first place, that the only Labyrinthodont hitherto described from the Karoo system, which can be compared in point of size to the present form is the imperfect skull described and figured by Sir R. Owen in the Society's ‘Journal’* under the name of *Rhytidosteus capensis*. Assuming that specimen to be adult, the superior size of the mandible under consideration would of itself indicate the specific distinctness of its owner from *R. capensis*. A comparison shows,

* Vol. xl. p. 333, pl. xvii. (1884).

however, a well-marked generic distinctness in the presence of a postarticular process to the mandible of the latter. The oral surface of the mandible of *Rhytidosteus* is, moreover, characterized by the absence of the parapet externally to the dental series, which forms such a marked feature in the present mandible; while, in place of a band of denticles situated *internally* to the marginal teeth, *Rhytidosteus* has a similar band placed *externally* to the latter*. We have, therefore, decisive evidence of the generic distinctness of the form under consideration from *Rhytidosteus*.

I have hitherto been unable to find among the larger Labyrinthodonts any description of a band of denticles situated as in the figured mandible. In part of a mandible preserved in the British Museum (No. R. 570, *a*, *b*), from the reputed Permian of Texas, which appears to belong to *Eryops megacephalus* of Cope, there is, however, a precisely similar band of denticles. Now, as I have already mentioned, *Eryops* agrees with the present form in the absence of a postarticular process to the mandible, and also in having rhachitinous vertebræ; and since the above-mentioned mandible agrees with the African one in the presence of this band of denticles, and also presents no characters by which it can be generically distinguished from the latter, there is a presumption that the Labyrinthodont under consideration indicates either an African representative of *Eryops* or a closely allied form. The African mandible indicates, however, a somewhat smaller form than the typical *E. megacephalus*; and it also seems to differ from the latter in that the anterior teeth are less enlarged in proportion to the hinder ones. Again, the African intercentrum differs from the corresponding element of the American form in the absence of ossification of the axial region; but it does not seem to me that this feature is necessarily a generic difference. I therefore propose to refer the African form provisionally to the genus *Eryops*, with the name of *E. Oweni*, the mandible being taken as the type.

In conclusion, it may be observed that the reptilian and amphibian faunas of the reputed Permian of Texas and the Karoo system of South Africa are both remarkable for the abundance of more or less closely allied types of Anomodonts; while the first-named fauna also contains numerous forms of rhachitinous Labyrinthodonts. The remains of the latter group hitherto described from the Karoo system are less common; but it is not surprising to find among them a form which cannot at present be satisfactorily separated from one of the American genera. A connexion between the Mesozoic faunas of Africa and America is already known to us by the identification of the Brazilian genus *Stereosternum* with *Mesosaurus* from the Kimberley beds of the Karoo system; and the present form adds further evidence of this community of types. I have recently published† the description of a species of Labyrinthodont from the Karoo system, which is referred to the Australian genus *Bothriceps*;

* No mention of this band of denticles, nor of the similar denticles with which the palate is covered, occurs in Sir R. Owen's memoir.

† Ann. Mag. Nat. Hist. ser. 6, vol. iv. p. 475 (1889).

and this, with the evidence previously recorded, serves to show that the Anomodonts and Labyrinthodonts of the Permian of Texas, of the probably equivalent beds of Brazil, and of the Karoo system of the Cape were closely related, not only to one another, but also to those of the Gondwanas of Central India and the Hawkesbury beds of Australia; while more or less closely allied types also occur in the Upper Permian of the Urals.

[Since the foregoing was written I have been informed by Dr. E. Fraas that the Munich Museum possesses some rhachitinous Labyrinthodont vertebræ from the Karoo system, which are probably referable either to the form described above or to *Rhytidosteus*.]

EXPLANATION OF PLATE XII.

- Fig. 1. Outer aspect of the anterior portion of the right ramus of the mandible of *Macromerium scoticum*; from the Lower Carboniferous of Gilmerton, near Edinburgh. $\frac{2}{3}$ nat. size. (Brit. Mus. No. R. 310.)
2. Oral aspect of the anterior portion of the right ramus of the mandible of *Eryops Oweni*; from the Karoo system of South Africa. $\frac{2}{3}$ nat. size. (Brit. Mus. No. R. 466.)
- 3, 4. Terminal and left lateral aspects of an intercentrum of *Eryops Oweni*; from the Karoo system of South Africa. Nat. size. *a*, facet for capitulum of rib. (Brit. Mus. No. R. 470.)

1.

4.

3.

2.

Mintern Bros. del et lith.

NEW LABYRINTHODONTS