NOTE ON HUMERI OF TASMANIAN LABYRINTHODONTS.

By W. H. Twelvetrees, F.G.S., and W. F. Petterd, C.M.Z.S.

Last year we received from Dr. Hy. Woodward, Keeper of the Geological Collections in the British Museum (South Kensington) the *replica* of a cast in the British Museum Collection which had been obtained from Dr. Joseph Milligan, formerly of Hobart, and was labelled by Professor Owen "Humerus of labyrinthodont reptile from sandstone, probably carboniferous, Tasmania." Soon after informing Mr. Alex. Morton, Curator of the Tasmania Museum, of this circumstance, that gentleman brought to our notice and placed in our hands for examination a fossil bone (in two pieces), found in the sandstone quarry, near Government House, in the Domain, Hobart, and presented to the Museum, in 1856, by Mr. Kay, Director of Public Works. This bone, unnoticed for over forty years, is labelled "Humerus of a labyrinthodont reptile . . . . has been examined by Professor Owen," and on the reverse is written by one of the authorities at the British Museum, "Try Eosaurus of Marsh." Both the British and Tasmanian Museum specimens are left humeri, and unquestionably belong to the same genus, if not the same species.

Geological position.

The precise age of the sandstone beds in the Domain, at Hobart, is not yet beyond question, but the evidence available points to it being either Upper Permian or Lower Trias. The Cascade, Knocklofty, and other sandstones of presumably the same geological horizon have yielded Vertebraria Australis and fish remains referred by Mr. R. M. Johnston and Mr. Alex. Morton to the genus "Acrolepis."* According to these authors, similar sandstones in this part of Tasmania succeed the Upper Permo-Carboniferous marine strata with apparent conformability, and are classed by Mr. Johnston in his latest tabular scheme of Tasmanian formations as the lower sandstone

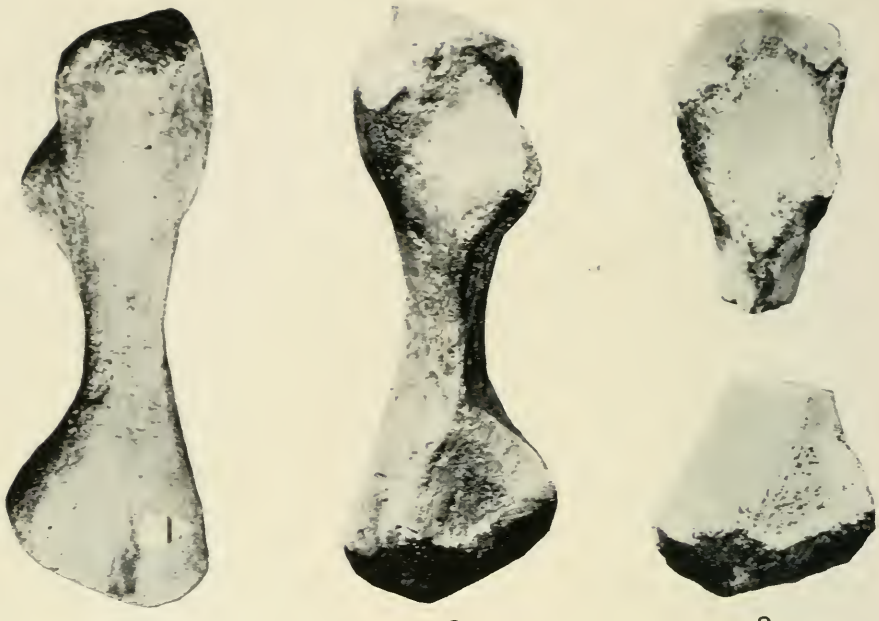
* Trans. Roy. Soc., Tasmania, 1889, p. 102 : 1890, p. 152.

series of the Trias.* They are correlated by him approximately with the Hawkesbury beds and Narrabeen series of New South Wales, and the Burrum coal fields or Mr. R. L. Jack's Lower Trias-Jura of Queensland. We find a difficulty in naming more distant equivalents of these sandstones. The few fossils found in them and named above are consistent with an Upper Permian age. Acrolepis is a well-known Upper Carboniferous and Permian fish; but, so far, we must confess the materials do not exist for placing the beds with any degree of confidence on any distinct horizon in the Gondwana system of India or the Karoo strata of South Africa, though they evidently belonged to the ancient Gondwana land represented by those systems. In a letter received this year from Professor Amalitzky, he refers to his recent discovery of Pareiosaurus, Glossopteris with its rhizome vertebraria, Tæniopteris, &c. in the Upper Permian of the North Dwina, Russia: and we are not yet convinced that an Upper Permian age for the Hobart sandstones is definitely excluded. Be this as it may, the Upper Permian and Triassic stratified rocks all over the world—in England, Germany, Russia, United States, South Africa, and India—are known to include remains of labyrinthodont amphibia as well as the higher reptiles. Investigators are still engaged in working out the correlation of these widely-separated sedimentary formations, the exact horizon of which is not yet altogether settled. There is hardly any doubt that these sandstones, so similar in all the countries just mentioned, were laid down in fresh water, possibly in lakes, though we think more probably they belonged to large river systems.

Description.

The British Museum bone is 66 mm. long, the Hobart one, 62 mm.: the breadth of the distal end in both specimens is 23 mm.: of the proximal end or head, 20 mm. The deltoid crest is developed into a strong bony process, which is prolonged as a ridge distad down the narrowest part of the shaft, where it subsides. The anconal depression at the distal end is sub-deltoidal, being a well-defined, shallow, trochlear groove, widening distad, and separating the extremity into the two condyles, ulnar and radial. The ends are broader across than they are thick, and are fairly expanded, though not so much as is generally the case in Anomodont and Dicynodont reptiles; neither does the bone shew the sigmoid shape of a lacertian humerus.

* Historical Sketch of the Geological Relations of Australia and Tasmania: Trans. Austr. Inst. Min. Engineers, 1895.



1. 2. 3.

x 10.

4.

Labyrinthodont Humeri.

The articular surfaces of both ends are abraded, exposing uniformly cancellous structure of the osseous substance. A transverse section of the shaft shews a loose cancellous character all through : the cancelli are coarser towards the centre, but there is no medullary cavity as in the Onomodontia, Dinosauria, and other extinct reptilia, nor is there any differentiation into peripheral bony wall and spongy cancellated centre, as in some Permian reptiles. It is true, Prof. Owen refers to a femur of Rhombopholis scutulatus as being hollow,* but it is not certain that Rhombopholis was labyrinthodont.† Indeed, very few limb bones of labyrinthodont amphibia have been determined : a glance at the annexed list shews that the species and genera of the order have been always founded on vertebræ, jaws and other parts of the skull. Hence, in discoveries of isolated bones as those under review, caution is needed in drawing conclusions.

Under the microscope the larger cancelli are seen to be filled with opaque earthy material. They are sigmoid, elliptical, branched and otherwise irregular in shape, and often contain grains of quartz derived from the sandstone and confirming the authenticity of the specimen. The osseous substance surrounding the cancelli is sprinkled with ellipsoidal and fusiform cells only faintly and occasionally discernible in the slide. These are, doubtless, bone lacunæ, masked by the balsam of the mount.

The only conclusion which can be legitimately drawn from the form and structure of these humeri seems to be that they belonged to amphibian vertebrates. Although any more definite reference is impossible at present, it, nevertheless, appears to us desirable to place these remains on record, and thus render them available for comparison with future discoveries.

---

* Owen. Palæontology. 1861. p. 215.

† On the remains of Labyrinthodonts from the sandstone of Warwick L. Miall. 2 J. Geol. Soc. 1874. p. 433.

EXPLANATION OF PLATE.

FIG. 1.—Humerus of labyrinthodont amphibian from Lower Mesozoic sandstone, Tasmania. British Museum cast. Anconal (back) aspect. Nat. size.

FIG. 2.—Ditto, ditto. Thenal (front) aspect. Ditto.

FIG. 3.—Humerus from Domain sandstone quarry. Hobart : Lower Mesozoic. Thenal (front) aspect. Nat. size.

FIG. 4.—Microscopical section of shaft of humerus, Nos. 2 and 3, showing cancellous structure of bone. × 10.

More or less well-known LABYRINTHODONT GENERA AND SPECIES, exclusive of the Salamandroid and Serpentine Forms of the Sub-Orders Microsauria, Aistopoda, and Branchiosauria.

GENERA.	LOCALITY.	HORIZON.	FOUNDED ON
Eosaurus acadianus (Marsh)	Coal Measures, Nova Scotia	Carboniferous	2 vertebral centra.
Anthracosaurus Russelli (Huxley)	Ditto, Lanarkshire	Ditto	Skull, ribs, and vertebra.
Loxomma	Gilmerton, near Edinburgh	Ditto	
Loxomma Allmani (Huxley)	Shropshire and Northumberland	Ditto	Skull, vertebrae, ribs, humerus.
Pholiderpeton	Gilmerton, near Edinburgh	Ditto	
Pteroplax	Coal Measures, Northumberland	Ditto	Skulls.
Macromerium scoticum (Lydekker)	Gilmerton, near Edinburgh	Ditto	Jaw.
Baphetes planiceps (Owen)	Picton Coal, Nova Scotia	Ditto	Part of skull.
Ichthyerpetum	Jarrow Colliery, Kilkenny	Ditto	
Dendrerpetum ?	Coal Measures, Nova Scotia	Ditto	
Pholidogaster	Edinburgh	Ditto	
Raniceps (Wyman) ?	Cannel Coal, Ohio, U.S.	Ditto	Skull, vertebrae, fore-limbs.
Actinodon latirostris (Jordan sp.)	Saarbrück	Permian	Skull.
Archegosaurus Decheni (Goldfuss)	Ditto	Ditto	Skull.
Euchirosaurus Rochei (Gaudry)	France	Ditto	Vertebrae.
Nyrania	Bohemia	Ditto	
Loxomma sp. (Fritsch)	Rothliegendes of Bohemia	Ditto	Jaw.
Macromerium Schwarzenbergi (Fritsch)	Bohemia	Ditto	Jaw.
Ditto bicolor (Ditto)	Ditto	Ditto	
Labyrinthodon Bucklandi (Lloyd)	Sandstone, near Kenilworth	Ditto	Skull.
Cochleosaurus (Fritsch)	Gas Coal, Bohemia	Ditto	
Chelyosaurus (Ditto)			
Gaudrya (Ditto)			

Microphonis Stowii (Huxley)	Beaufort Beds, Karoo, S. Africa	Ditto	
Dasyceps Bucklandi	Warwickshire	Ditto ?	
Platyops Rickardi (Twelvetrees)	Kargalinsk Sandstone, Russia	Ditto	Part of skull.
Brachyops laticeps (Owen)	Mangli, Upper Damudas, India	Ditto ?	
Gondwanosaurus bijoriensis (Lydekker)	Bijori, ditto	Ditto ?	Skeleton.
Eryops megacephalus (Cope)	Texas	Reputed Permian	Jaw.
Trimerorachis	Texas	Ditto	
Eryops Oweni (Lydekker)	Karoo, South Africa	Permian or Trias	Jaw.
Bothriceps Huxleyi	Karoo, South Africa	Trias ?	Skull.
Bothriceps australis (Huxley)	Australia	Unknown	Ditto.
Mastodonsaurus (v. Meyer)	Keuper sandstone, Würtemberg	Trias	Skull and vertebrae.
Capitosaurus robustus (v. Meyer)	Ditto, Stuttgart	Ditto	
Trematosaurus Braunii (v. Meyer)	Bunter sandstone, Bernbourg	Ditto	Skull.
Labyrinthodon leptognathus (Owen)	Keuper sandstone, Warwick	Ditto	Vertebræ, sternum, and part of skull.
Ditto pachygnathus (Owen)	Ditto	Ditto	Skulls, humerus, femur, ilium, phalanges.
Diadetognathus varvicensis (Miall)	Ditto	Ditto	Jaws.
Capitosaurus arenaceus (Münster)	Bunter sandstone, Germany	Ditto	
Metoposaurus diagnosticus (v. Meyer)	Near Stuttgart	Ditto	Skull.
Odontosaurus Voltzii (v. Meyer)	Bunter sandstone, Soultz-les-Bains	Ditto	Jaw.
Platyceps Wilkinsonii (Stephens)	Hawkesbury beds, Gosford, N.S.W.	Ditto	Skeleton.
Gonioglyptus longirostris Ditto Huxleyi Glyptognathus fragilis Pachygonia incurvata	Pánchets of India	Ditto	
Rhytidosteus capensis (Owen)	Beersheba, Orange Free State	Ditto ?	Part of skull.
Petrophryne granulata (Owen)	Cape of Good Hope	Ditto ?	Skull.
Rhinosaurus Jasikovii (Fischer)	Simbirsk, Russia	Jura ?	Skull.
Pachygonia incurvata	Maleri of India	Oolite ?	