

development—by completion of the secondary front wall—of a purely Lepralian form with Steganoporellan structure.

EXPLANATION OF PLATE IX.

(All figures $\times 12$ diams.)

FIG. 1, 2.	<i>Membraniporella thoraciformis.</i>	Shawford, Hants.
„ 3.	„	Portsdown, Hants.
„ 4-7.	„ <i>manonia.</i>	Portsdown, Hants.
„ 8.	„ <i>transligata.</i>	Coltishall, Norfolk.
„ 9.	„	Trimingham.
„ 10-12.	„ <i>pyramidalis.</i>	„

II.—ON THE INTEGUMENT OF *IGUANODON BERNISSARTENSIS*, BOULENGER,
AND OF *MOROSAURUS BECKLESII*, MANTELL.

By REGINALD WALTER HOOLEY, F.G.S.

(PLATE X.)

INTEGUMENT OF *IGUANODON BERNISSARTENSIS*.

THE *Iguanodon* has been known since 1825, when the genus was first described from teeth by Mantell.¹ Odd bones and various associated portions of the skeleton have been found in England, and in 1878 the skeletons of many individuals were discovered in the Wealden of Bernissart, near Mons, Belgium.

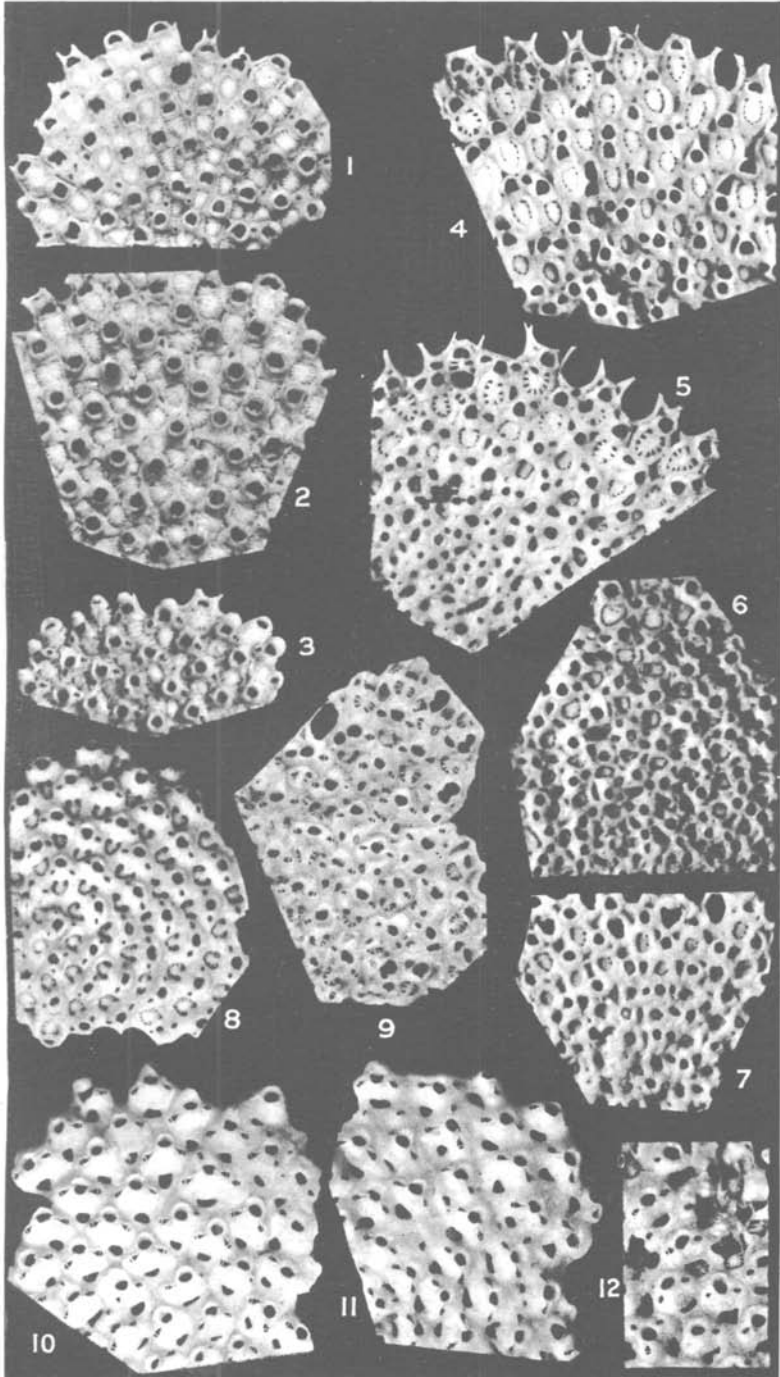
No trace of the dermal covering has hitherto been observed. Owen² in 1885, when describing the bones of a “young *Iguanodon*” from the Wealden of the Isle of Wight, mentions that “some portions of a layer of dark finely granulated carbonaceous matter were found embedded between the ribs, near the middle of the side of the trunk”, which he queried as the integument of *Iguanodon*, but these remains were proved later to belong to *Hypsilophodon*.

In 1914 I obtained from the Wealden Shales of Brighstone Bay, Isle of Wight, nearly the entire skeleton of a young individual of *Iguanodon bernissartensis*, with the exception of the greater part of the tail.

In July last, while clearing away the matrix from the preacetabular extremity of the left ilium, a portion of the epidermis (Fig. 1) was exposed. It covers an area 90 mm. long by 40 mm. wide. The impression of the integument is also discernible on another block 78 mm. long by 57 mm. wide, found in close proximity to the other. Fragments of skin were also discovered underlying two of the left thoracic ribs. On these latter specimens carbonaceous matter is to be seen. No scutes or dermal ossifications were found. The skin is remarkably thin, and covered with small convex tubercles varying in diameter from 5 mm. to 3 mm. On the largest specimen there is an area, 8 mm. by 7 mm., where the tubercles are slightly larger and flatter, and 65 mm. distant occurs another patch with the same measurement, where the tubercles coalesce in such a manner that the tuberculation is almost invisible. The tubercles on the edge of the skin at the top

¹ G. Mantell, Phil. Trans., 1825, p. 184.

² R. Owen, Mon. Foss. Rept. Weald. Form., pt. ii, 1855, p. 51.



R. M. Brudon, Photo.

Benrose, Collo.

Chalk Polyzoa.

of Fig. 1 are also decidedly larger and flatter than the others. One plate-like tubercle, 10 mm. in diameter, occurs on the smaller portion of the skin from the same inguinal region. It appears therefore probable that on those parts of the body exposed to the sun large flat tubercles would be found as in *Trachodon annectens*,¹ and it is evident that the "ground plan" of the epidermis is essentially similar, consisting of small, rounded tubercles, although in *Iguanodon* they are not so rounded or apical. Professor Osborn¹ thought that the iguanodonts from the Lower Cretaceous of Europe would probably be distinct in their "epidermal covering" from the trachodonts of the Upper Cretaceous of America, and it is interesting to find that at least they are alike in ground plan.

INTEGUMENT OF *MOROSAURUS BECKLESII*, MANTELL=*M. BREVIS*, OWEN.

An impression of the epidermis of this reptile (Fig. 2) is well displayed on a block of rock removed from the hollow between the radial crest and the inner border of the left humerus. This humerus, with the radius and ulna, was found in the Wealden beds of Hastings by S. H. Beckles in 1852. These specimens (No. R. 1870) are now in the British Museum. They were referred to by Mantell in a lecture given by him at the Royal Institution in that year. The report² of the lecture records that "A portion of the scaly cuirass which covered the limbs and is composed of hexagonal plates was exhibited". The integument was also noticed by Marsh,³ when examining this fossil while still in the possession of its discoverer. He remarks that he "found attached to the humerus portions of the osseous dermal covering, the first detected in the *Sauropoda*, and known only in the present specimen". It has not been further described, but by kind favour of Dr. A. Smith Woodward I am now privileged to give the details.

The side of the matrix upon which the epidermal markings are shown is convex, well seen in Fig. 2, but this feature is entirely due to the concavity of the particular area of the humerus upon which it lay and not to the natural rotundity of the limb. There was no intervening matrix between the skin impression and the bone, therefore unless this portion of the integument was turned inside out after the decomposition of the muscles and before the matrix was deposited upon it, the under surface of the epidermis is exhibited. The only fact that supports the improbable theory of the reversal of the integument is that there is an apparent ornamentation of very small rounded tubercles displayed on some of the plates. The smallest plates, especially at the upper end of the specimen, are covered with them. It does not appear that they are due to oxidization subsequent to the removal of the block from the humerus. I have observed a somewhat similar result from chemical action after exposure to the atmosphere on matrix which at first had a smooth surface. However, it is more probable that they are papilliform

¹ H. Osborn, Mem. Amer. Mus. Nat. Hist., N.S., vol. i, pt. ii (June, 1912), pp. 46, 47.

² Proc. Roy. Inst., vol. i, p. 34, 1852.

³ O. C. Marsh, GEOL. MAG. [3], pp. 205, 206, 1889.

protuberances of the epidermis into the dermis and that we are looking upon the inner surface of the former.

There is no sign of ossification, although Marsh¹ speaks "of the osseous dermal covering". The extent of the epidermal impression is 210 mm. long by 200 mm. wide. It consists of hexagonal plates, convex and boss-like, which on their outer surface were probably flat. A group comprising eight of the largest plates covers an area 95 mm. long by 68 mm. wide. The central plate of this group has a diameter of 26 mm. The plates surrounding this cluster gradually decrease in size, until they are only 9 mm. in diameter. The plates do not overlap. The integument of *Morosaurus becklesii* was tuberculate and the lessening in dimensions of the tubercles towards the axillary surface of the arm, where they probably became smaller and rounded, is after the manner of *Trachodon* and *Iguanodon*.

EXPLANATION OF PLATE X.

- FIG. 1.—Impression of a portion of the epidermis from the left ilium of *Iguanodon bernissartensis* obtained by the author from the Wealden Shales of Brighstone Bay, Isle of Wight, in 1914.
 ,, 2.—Impression of a portion of the epidermis of *Morosaurus becklesii*, Mantell, found by Mr. S. H. Beckles in 1852 in the Wealden beds of Hastings, now in the British Museum (No. R. 1870).

III.—PICRITE FROM THE AMPWIHI RIVER, MOZAMBIQUE.

By ARTHUR HOLMES, A.R.C.S., D.I.C., B.Sc., F.G.S. (with an Analysis by H. F. HARWOOD, M.Sc., Ph.D.).

(PLATE XI.)

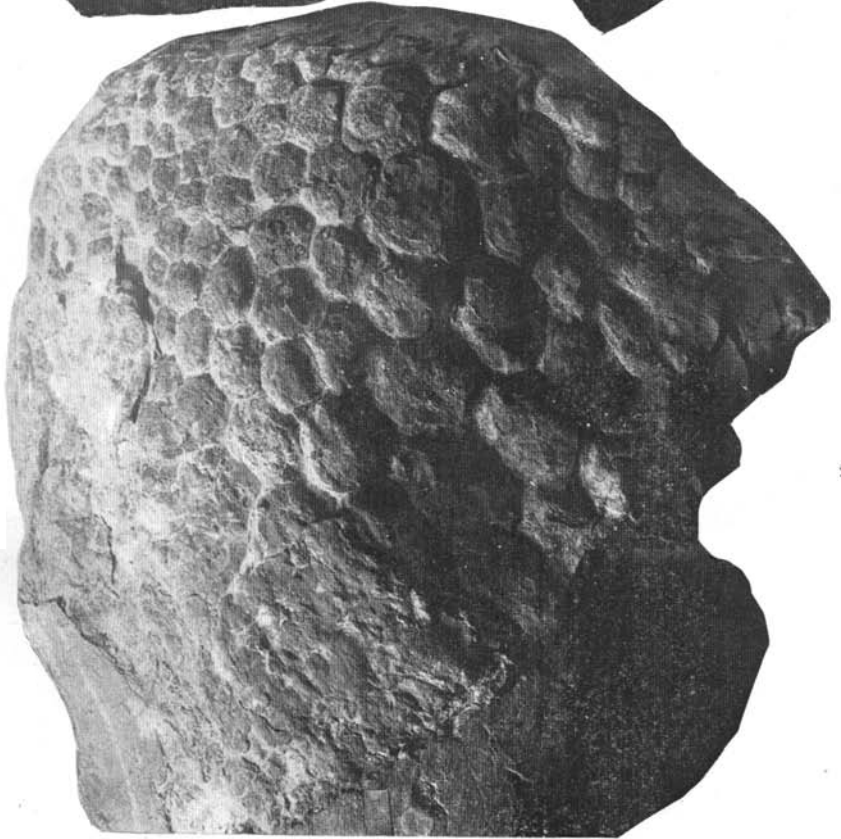
ALMOST due west of Mozambique Island, at a distance of about forty-two miles from the sea, the military road from Mosuril to Nampula crosses the Ampwihi River, an important tributary of the Monapo.² During the dry season the stream is reduced to a string of stagnant pools, separated by long reaches of sand and gravel that here and there are interrupted by outcrops of the underlying formations. Throughout the greater part of its course the Ampwihi flows through a region in which gneisses persist with monotonous regularity, the only variation being that due to occasional intrusions of granite and of still later pegmatite dykes. At the point where the military road crosses the narrow channel a welcome diversion is introduced by the presence of a dark compact dyke about 10 feet in thickness. The dyke appears on the right-hand bank and crosses obliquely to the other side, taking a N.N.W.—S.S.E. course across the strike of the older rocks. Upstream, about seventy yards to the south-east, the Ampwihi bends to the south-west, so that it returns towards the dyke, which is again exposed across its sandy floor. The dyke was traced by Mr. E. J. Wayland in July, 1911, for a distance of altogether 200 yards, and was examined by Mr. D. Alex. Wray and later by myself during the same year. It is clearly the latest

¹ O. C. Marsh, op. cit., p. 206.

² See A. Holmes & D. A. Wray, "Mozambique: a Geographical Study": *Geog. Journ.*, p. 143, Aug. 1913 (Map, p. 112).



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PORTIONS OF INTEGUMENT OF WEALDEN DINOSAURS.