lar laterally; frontal lobes rounded.

- a^s. Upper crests of anterior caudal segments more elevated, sides of segments straighter, much less noticeably convex; vesicle narrower *abruptus*, Poc., ♀.
- b^s. Uppercrest of tail scarcely noticeably elevated; sides of segments convexly rounded; vesicle wider *Woodwardii*, Poc., ♀.

The remaining species of this genus, described under the name *Ioctonus*, are:—

Urodacus manicatus, Thorell (Ann. & Mag. Nat. Hist. 1876, xvii. p. 14; id. Act. Soc. Ital. Sci. Nat. xix. p. 261 &c.), from Australia, which, according to Kraepelin, is identical with *U. novæ-hollandiæ*, Peters.

Urodacus orthurus, Thorell (Act. Soc. Ital. Sci. Nat. xix. p. 190), of which the locality is unknown.—Kraepelin suggests that this species may be identical with *Darwini* or *planimanus*, or both. I have no hesitation in saying that with *Darwini* it is certainly not identical, if any value is to be placed upon its description, and that the evidence as to its identity with *planimanus* is stronger on the negative than on the positive side.

IX.—Notes on Palæozoic Fishes.—No. II.*

By R. H. TRAQUAIR, M.D., LL.D., F.R.S.

[Plate I.]

HITHERTO the remarkable plates known as *Psammosteus* have been found only in strata of Upper and Middle Devonian age in Scotland and in Russia. Through the kindness of Dr. Woodward, F.R.S., Keeper, and Mr. A. Smith Woodward, Assistant-Keeper, of the Geological Department in the British Museum, I have now the privilege of describing and figuring a new species from the Lower Old Red Sandstone of the West of England.

Psammosteus anglicus, sp. n. (Pl. I. figs. 1, 2.)

This plate is represented, natural size, in Pl. I. fig. 1. It is oblong-ovate in shape, $3\frac{1}{2}$ inches in length by $2\frac{1}{2}$ in

* For No. I. see Ann. & Mag. N. H. ser. 6, 1894, vol. xiv. pp. 368–374.

$\frac{3}{1}$

4.

3. $\frac{3}{1}$

1

$\frac{5}{1}$

2.

Fig 1, J. Green
Figs. 2, 3, 4 R. H. Traquair.

breadth; one extremity, which we shall assume to be the posterior, is truncated, making a "side" of $1\frac{3}{10}$ inch in extent, the other (anterior) is not quite perfect, but seems to have been evenly rounded. The surface which is here exhibited is the *inner*; it is posteriorly nearly flat, being only very gently concave, but in the anterior half it is more hollowed, there being here an oblong depression, the bottom of which is again slightly convex or raised. On the posterior part slight concentric furrows of growth may be seen.

The inner surface of the plate is composed of dense lamellated tissue, as in other species of the genus, and the vascular structure of the middle layer exhibited in fracture at the anterior part also corresponds, so far as can be ascertained by the use of the lens. A portion of the impression of the outer surface is seen in front, showing that the external ornament consisted of coarse stellated tubercles, which tend to assume an elongated form. The apices of the tubercles are broken off and remain in the matrix of the impression, a small portion of which, magnified five diameters, is shown in fig. 2.

The specimen figured is in the Weever-Jones Collection, British Museum, no. P. 194. It is believed to be from Herefordshire or Worcestershire, but the exact locality is unknown. However, there is also a fragment in the collection from Maindee, in Monmouthshire, which apparently belongs to the same species.

From Goldleps, Monmouthshire, there is also a fragment of a plate of another species, which will be described and figured in my next paper of the present series.

Protodus scoticus (E. T. Newton). (Pl. I. fig. 3.)

Onychodus scoticus, E. T. Newton, Geol. Mag. (3) vol. ix. 1892, p. 51.

This specimen, consisting of an antero-posterior row of eight conical, recurved, sharp, two-edged teeth, united by their bases in the form of an arc of a circle, was correctly described by Mr. E. T. Newton, F.R.S., six years ago, but I think wrongly attributed by him to the genus *Onychodus* of Newberry, which is apparently referable to the *Crossopterygii*. The fractured surfaces of the teeth show that their substance is formed of vascular dentine like those of *Selachii*, and there is no central pulp-cavity, whereas in *Onychodus* the dentine is solid and there is a very large pulp-cavity extending almost to the very apex of the tooth. The teeth of *Onychodus* are also round or oval in transverse section, those of the present specimen have lateral cutting-edges—in fact, each individual tooth in form closely resembles the teeth of *Protodus Jexi*, a *Selachian* described from the Lower Devonian of Canada by

Mr. Smith Woodward some years ago*. All doubt as to the Selachian character of Mr. Newton's specimen is, however, removed from my mind by the occurrence of similar-looking whorls of teeth in a small Selachian head in the Powrie collection in the Edinburgh Museum, this head being also from Turin Hill, Forfarshire, the same locality as that from which the specimen in question is supposed to have been procured.

The only difference which I can see between these teeth and those of *Protodus* is the anchylosis at their bases of the teeth in antero-posterior succession—a difference precisely like that which distinguishes *Pleuroplax* from *Helodus*. A new genus might properly be created for this interesting form, but it may be advisable to defer doing so for the present.

I may also add that I strongly suspect Mr. A. Smith Woodward's *Onychodus anglicus* from Herefordshire† to belong to the same category; certainly the specimen in the British Museum does, though the original type in Oxford requires re-examination.

My best thanks are due to Sir A. Geikie and Mr. E. T. Newton for their kind permission to re-examine this specimen, which is in the Museum of Practical Geology, Jermyn Street.

Farnellia tuberculata, gen. et sp. n. (Pl. I. fig. 4.)

One half of the remarkable specimen on which this new genus is founded was exhibited by the late Rev. Hugh Mitchell at the British Association at Aberdeen in 1885, and is now in the British Museum; the other side is in the Powrie collection in the Edinburgh Museum of Science and Art. It is difficult to say which of the two should be considered as the "counterpart."

Accompanying the British Museum specimen is a label in Mr. Mitchell's handwriting with the name "*Cosmiolepis antiquus*," the locality being given as Farnell. But the name was never published, and, owing to its rather too close resemblance to *Cosmiolepis*, preoccupied in 1858 by Sir Philip Egerton for a Liassic Palæoniscid, it can scarcely now be adopted.

The specimen is a mere fragment, showing a portion of a vertebral column about 2 inches in length, most of the vertebræ, about twenty in number, being seen only in impression; but those which remain show the ring-like centrum which is characteristic of so many Palæozoic fishes, such as *Palæospondylus*, *Chondrenchelys*, &c. Associated with this

* Geol. Mag. (3) vol. ix. 1892, pp. 1-2, pl. i. figs. 1, 1 a.

† Geol. Mag. (3) 1888, vol. v. p. 500; Cat. Foss. Fishes British Museum, pt. ii. 1891, p. 392.

remnant of a vertebral column are a number of impressions of polygonal angular scutes, best seen in the London half of the specimen, three of which are represented in Pl. I. fig. 4, magnified three diameters, and which display the imprint of a characteristic ornament, namely of finely tuberculated ridges radiating from the centre of each plate.

It is difficult to give any opinion as to the true zoological position of this remarkable fish-fragment, though desirable to name and record it, in the hope that additional specimens may at a future time turn up to throw more light on its nature. Meanwhile the specimen is interesting as showing the oldest vertebral centra as yet known. It is also of special interest to geologists to know that the genus apparently existed also in Upper Silurian times, as Mr. Smith Woodward recently kindly showed me a portion of Ludlow "Bone Bed" (T. T. Lewis Coll. Brit. Mus. P. 8929) on which a little scute is seen which, generically at least, cannot be distinguished from the scutes of the Farnell specimen, the principal difference being that the latter are squeezed quite flat, while the Ludlow specimen is elevated in the centre.

I must here also thank Dr. Woodward and Mr. Smith Woodward for their kindness in allowing me to make use of the specimens in the British Museum.

EXPLANATION OF PLATE I.

Fig. 1. *Psammosteus anglicus*, Traq., natural size.

Fig. 2. Impression of sculpture of outer surface of the same plate, magnified five diameters.

Fig. 3. *Protodus scoticus* (E. T. Newton), magnified three diameters.

Fig. 4. Impressions of outer surfaces of three of the scutes of *Farnellia tuberculata*, Traq.

X.—*Descriptions of new Species of Butterflies from South America.* By H. GROSE-SMITH, B.A., F.E.S., F.Z.S., &c.

Heliconius molina.

Male.—*Upperside.* Both wings brownish black, suffused with shining dark blue. Anterior wings with an oblique crimson band at the end of the cell, which it partially invades, crossing the middle of the disk to a little below the lowest median nervule, on which it is rather widest. Posterior wings with the costal margin broadly pale cinereous brown.

Underside. Both wings dark brown. Anterior wings with