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LXXV.—The holotypes of the fossil scorpions *Palæomachus anglicus* and *Palæophonus caledonicus*

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middle of scutellum shining and impunctate; area of metathorax triangular, plicate basally, and with a long median plica (thus essentially as in *Melitta altissima*); anterior basitarsi with dense orange-fulvous hair within, the other basitarsi with the same, but redder on hind ones; third s.m. shaped as in *Dolicochile* and *Melitta americana*; apical plate of abdomen with basal half finely densely punctured and with no keel. It is doubtful whether the subgenus *Brachycephalapis* can be maintained; the insect really is nearer to typical (European) *Melitta* than is *M. americana*.

LXXV.—*The Holotypes of the Fossil Scorpions* *Palæomachus anglicus* and *Palæophonus caledonicus*. By F. A. BATHER.

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1. *Palæomachus anglicus* (H. Woodward).

MR. R. I. POCK (1911, *Palæont. Soc. Monogr. Terrestrial Carboniferous Arachnida*, p. 16) has founded a new genus of scorpions, *Palæomachus*, for the reception of *Eoscorpheus anglicus*, H. Woodward (1876, *Quart. Journ. Geol. Soc.* vol. xxxii. p. 58), no similar species being known. Further, Mr. Pocock has selected as the holotype of this species the chela from the Coal-Measures of Skegby New Colliery, near Mansfield, Notts, which was the original of Dr. Woodward's plate viii. figs. 3, 3 a (*op. cit.*), and is preserved in the Geological Department of the British Museum (regd. I. 994 a). In relabelling and remounting this specimen for exhibition I had the curiosity to compare it with the figures of those two authors, but the matrix with which so much of the fossil was still obscured, both in the relief and in the counterpart, prevented me from recognizing the structures represented by them. On clearing away the matrix—a delicate and lengthy but not in other respects a difficult task—the whole outline of the chela was brought to view, and proved very different from that hitherto imagined.

The proximal segment preserved—the trochanter, with a width of 4.6 mm. and a length of 3.2 mm.—is much more like the same segment in *Scorpio afer*, as figured by Dr. H. Woodward (*tab. cit.* fig. 4), than it is like that author's representation of it (fig. 3). Its posterior or outer portion is marked by a deep wide groove (appearing as a ridge in the fossil).

The second segment—the humerus,—which is very clearly exposed, has a length of 9·4 mm. and a greatest width of 3·2 mm. On the side of the segment next the observer is a serrate or granular longitudinal crest, nearer to the anterior than to the posterior margin, and dying away distally.

The chela of *Palæomachus anglicus*, drawn, with camera lucida, from the two halves of the holotype (Brit. Mus. I. 994 a) by Miss G. M. Woodward. Where the outline is expressed by a dotted line, the precise limits are not clear in the fossil. $\times 1\frac{1}{2}$ diam.

The third segment—the brachium—is not so clear in the relief, but is better shown on the counterpart. Its length is about 10 mm., its width about 3·3 mm. There is a slight, non-granular, longitudinal ridge, perhaps two, on the side next the observer.

The hand has a length of 8·2 mm., measured from the proximal joint to the groove between the two fingers; it has a greatest width of 6·6 mm. The outline is subquadrate, tending to rhomboidal, with the lobe scarcely defined. The outer portion, leading up to the movable finger, is separated by a longitudinal depression from the main oval portion.

The fingers are long and slender. The outer one appears to have been the movable finger, and the articulation to the hand can be distinguished in the relief; the distal portion is preserved only in the counterpart. The length of this finger is 10·5 mm.; its width in the distal two-thirds does not exceed 1·7 mm.; but at the proximal end is a projection (the finger-lobe) on the inner side. The outer margin has a slight convex curvature. The inner or anterior finger, which does not appear to have been movable, has a length of 8·7 mm.; its width in the distal two-thirds does not exceed 2 mm.; but at the proximal end is a projection on the inner side, as well as a knob, so that between the knob and the projection lies a longitudinal groove, which may have received the finger-lobe. The knob may, however, be merely a piece of the matrix filling the exoskeleton of the finger, the rest of

the finger being preserved only as an imprint ; it is hard to decide, for all these structures have been exposed by the mechanical and chemical removal of matrix, and are therefore not so clear as could be wished. The outer margin of the fixed finger has a slight concave curvature. The distance between the inner edges of the two fingers at their proximal ends is about 2 mm., at their distal ends 6·5 mm. The separation of the fingers at the base, the presence of a finger-lobe, and the considerable width of the hand are characters which, when taken together, suggest that this chela belonged to a male. The relations of the fingers and of the keels seem to indicate that it was the chela of the right side.

This description has been given in some detail, partly because it was high time for the holotype of a genotype to receive a description of some sort, partly because Mr. Pocock in his classification lays great stress on the characters of the chela, and in this particular instance says "the species may be distinguished at once from all other Carboniferous Scorpions in which the chela is known by the shape and proportions of the segments of this appendage." Even if Mr. Pocock had examined the specimen he could not have seen the shape and proportions of the segments, because, like the Spanish fleet, they were not yet in sight.

Since, moreover, Mr. Pocock admits the possibility of the paratypes—the tails from Skegby (I. 994 *b*) and Sandwell Park (I. 5432)—belonging to a different species or even genus, it must be on the characters of the chela alone that he founds his genus *Palæomachus*. Those characters he gives as: "Hand broad and oval, its width greatly exceeding that of the brachium, its length exceeding that of the fingers, which are short and in contact when closed, the length of the immovable digit about equal to the width of the hand." This must now be altered as follows:—Hand broad, sub-quadrangle, twice as wide as brachium, shorter than fingers, which are long and slender [and may or may not have been in contact when closed], the movable finger being the longer and one-quarter as long again as the hand.

It may be added that the toothed inner margin of the fingers shown in the published figures is just as imaginary as the rest of the outline. Whether the margins bore teeth or no I cannot learn from the specimen, but I incline to think that the outline must have been very much like that of the fingers in Mr. Pocock's figure of *Anthracoscorpio dunlopi* (*op. cit.* p. 22).

It might be inferred from the previously published figures that the fossil was meant to be represented as having the movable finger on the inner or flexor side of the chela, thus

differing from all other scorpions recent or extinct. Two other interpretations, however, are conceivable: first, that every segment of the limb was bent backwards into an unnatural position so as to form a reversed curve; or, secondly, that while the trochanter, humerus, and brachium retained their natural positions, the hand was twisted round on its wrist-joint. This last hypothesis, Mr. Pocock tells me, was the one that came naturally to him. Fortunately neither of these rather violent assumptions is now necessary. The chela lies with all its segments in a natural position, and its fingers are perfectly normal.

Reverting to the generic diagnosis, we find that the only diagnostic character unaltered is the relative width of the hand. Whether this possibly sexual character is alone enough to substantiate an independent genus must be left to Mr. Pocock to decide, for on these fossils I cannot speak as one having authority. Indeed, had not Dr. W. T. Calman brought his knowledge to check and confirm these observations and interpretations (a friendly help for which my hearty thanks are tendered), I should scarcely have ventured on publication.

2. *Palæophonus caledonicus*, J. Hunter.

When writing the 'Guide to the Fossil Invertebrate Animals in the British Museum' (1907), I came to the conclusion that the fossil described by Mr. Pocock as *Palæophonus hunteri* (Quart. Journ. Micr. Sci. 1901, p. 291) was more properly to be called *Palæophonus caledonicus*, and that name was used on page 90 of the 'Guide.' Mr. Pocock, in his Monograph (p. 10), says he does "not know where Mr. Peach described it under that name." The facts are these:—Dr. John R. S. Hunter discovered the specimen in June 1883. In December 1884 he was led by Thorell and Lindström's publication of *Palæophonus nunciatus* to announce his discovery to the Edinburgh Geological Society; but the paper in which the name *Palæophonus caledonicus* first appeared was one read by him to the Geological Society of Glasgow in May 1885, but not published till 1886 (Trans. Geol. Soc. Glasgow, vol. viii. pp. 169–170). Meanwhile, on 29th January, 1885, Mr. B. N. Peach had published a figure and description of the fossil in 'Nature,' though without a name. Since the specimen was unique, there could be no question but that Hunter's name and Peach's description referred to the same species. But any possible doubt or objection was removed in 1887 by the publication of Hunter's

paper read in 1884 (Trans. Edinb. Geol. Soc. vol. v. pp. 185-191) : herein the name *Palæophonus caledonicus* was prefixed to a description of the fossil and a comparison of it with *P. nuncius*.

Of the two known Silurian scorpions the holotype of *Palæophonus nuncius* alone remains, one of the most valuable treasures of the Swedish State Museum. The even more remarkable specimen of *Palæophonus caledonicus* has perished, with many another priceless type, in the ashes of Kilmarnock Museum ; but fortunately we have the authoritative description by Mr. Pocock, which must be associated with the name first given by Dr. Hunter.

BIBLIOGRAPHICAL NOTICES.

Figures and Descriptions of the Fishes of Japan, including Riukiu Islands, Bonin Islands, Formosa, Kurile Islands, Korea, and Southern Sakhalin. By SHIGEO TANAKA, Instructor in Zoology, Science College, University of Tokyo, Tokyo, 1911. Gr. 8vo.

OF this, the latest addition to Japanese zoological literature three parts have appeared since April, each part consisting of one sheet of letterpress and five lithographic plates. The text is written in Japanese as well as English. No systematic sequence of the species is adopted, the author being apparently guided in his selection by the materials at his disposal, by the degree in which addition to our knowledge of a species is desirable, or by other similar considerations. Thus in the three parts published he has treated of twenty-four species from fresh water as well as from the littoral and deep-sea fauna. The descriptions are short, shorn of insignificant detail, and, with the addition of the accompanying excellent figures, perfectly sufficient.

The work will be of the greatest assistance to the student of Japanese Fishes, whatever its limitation may be finally ; and we trust that the author will be able to continue it to its completion at a faster rate than he intends at present, viz. at the rate of six parts annually.

British Freshwater Fishes. By C. TATE REGAN.
Methuen & Co.

ANGLERS and naturalists should be most grateful to Mr. Regan. His book gives clear descriptions, lucid keys, and adequate figures of all the species, and admirably epitomizes all that is sound in our knowledge of their life-history. Classification, necessarily technical in language, is restricted to what a systematist would require in