

basin macula obliqua fusco-nitida notatis; antennis (σ) corpore longitudine æqualibus.
Long. 10, lat. $3\frac{1}{2}$ millim.

Hab. Samburu, Brit. E. Africa (*C. S. Betton*).

Reddish brown, clothed with fulvous pubescence and with long erect setæ. The pubescence on the prothorax, on the sutural borders of the elytra from a little behind the base almost up to the apex, and on a lateral plaga behind the middle of each elytron is of an ashy-grey colour. Each elytron has an oblique nude spot near the base, the derm of this spot, as well as beneath the ashy-grey areas, being black in colour, whereas on the remaining parts of the elytra it is reddish brown. The elytra are strongly and somewhat thickly punctured, the punctures being irregularly spread, except along the middle, where two more or less regular rows may be distinguished.

Sophronica testacea, sp. n.

Testacea; subnitida, dense profundeque punctata; antennis ultra medium infuscatis.
Long. 9, lat. $3\frac{1}{4}$ millim.

Hab. Mpwapwa, E. Africa (*Dr. Kirk*).

Head and pronotum reddish testaceous; elytra, legs, and underside yellowish testaceous. Head, pronotum, and elytra thickly and deeply punctured, with the punctures of the elytra rather larger towards the base, and gradually diminishing in size towards the apex.

This species agrees pretty closely in structural characters with *S. carbonaria*, Pasc., but is relatively somewhat broader in form; the eyes are larger, with the upper lobes more approximate, and the scape of the antennæ is a little shorter and more thickened towards the apex. In colour it somewhat resembles *S. calceata*, Chevr., which is, however, a relatively narrower and more elongated species, having longer and more slender antennæ.

VIII.—*The Australian Scorpions of the Genus Urodacus, Pet.*
By R. I. Pocock.

THE genus *Urodacus* is the sole member of the family Scorpionidæ which is confined to Australia. It may be readily distinguished from the remaining members of the order that occur in this area by the possession of the following features:—

(1) a single, movable, claw-like spur on the articular membrane at the base of the foot; (2) a pentagonal sternum; (3) a pair of lateral eyes on each side of the carapace; (4) a median keel on the lower surface of the first four caudal segments. The pentagonal sternum and the single pedal spur are also found in the genus *Hormurus*; but in the latter there are three lateral eyes on each side of the carapace and a pair of crests or keels on the lower side of the first four caudal segments.

These two genera are the only representatives of the Scorpionidæ that occur in Australia. *Hormurus*, however, is certainly a later immigrant than *Urodacus*, for it is only met with in the north-eastern parts of the country, and belongs essentially to the Indo- and Austro-Malayan area.

Urodacus, on the contrary, has not, so far as I am aware, been recorded from Queensland at all, though it not improbably spreads into the southern parts of that province. Up to the present time, including those described as new in this paper, twelve species have been established, with ten of which I have the good fortune to be acquainted from an actual examination of specimens. The others, described by Dr. Thorell as *Ioctonus manicatus* and *I. orthurus*, were referred by that author to a different genus, owing, according to Kraepelin, to an error of observation with respect to the number of crests on the lower side of the tail. Again, according to Kraepelin, *manicatus* is specifically identical with the type of the genus, *U. novæ-hollandiæ*, which occurs in the neighbourhood of Perth. The identity of *I. orthurus* still remains in doubt. Lastly, the form that I described as *U. Keyserlingii* proves upon the examination of fresh material to be identical with a species previously established as *U. abruptus*; so that the total number of species now to be reckoned with amounts to ten of which the characters are known, and one (*orthurus*) of which the characters are doubtful.

A glance at the species and localities mentioned below shows that two species have been described from Arnhem Land in North Australia; two from the central parts of West Australia; two from the south-western corner in the neighbourhood of Perth; one from South Australia; and from Victoria and New South Wales one species, which spreads as far westward as Adelaide. It is noticeable that, with the exception of the New South Wales species and the two here recorded from the neighbourhood of the Murchison Goldfields, all the species have been met with at various points on the coast of Australia. It cannot be doubted therefore that at the present

time we know but a small fraction of the species of the genus that actually exist.

It may be added that Prof. Kraepelin, in his recent attempt at a "Revision" of the Scorpions, makes a bold effort, qualified by the liberal use of interrogation marks, to reduce the species known at the time he was writing to two. I am unable to find any justification for his opinion; and since he refrains from all mention of the localities whence the specimens he examined were obtained, it is not possible even to suggest whether one or more than one species were described by him under the title *U. novæ-hollandiæ*, Peters.

The species that stand apart from the rest in their structural features are the two from Arnhem Land. One of these, namely *U. Darwinii*, has considerable claims to rank as a distinct genus, as I at first considered it to be before the species named *planimanus* came upon the scene.

Urodacus Darwinii (Poc.).

Iodacus Darwinii, Pocock, Ann. & Mag. Nat. Hist. (6) viii. p. 245 (1891).

Loc. North Australia, Port Darwin in Arnhem Land (*J. J. Walker*).

This northern species, like *U. excellens*, occupies an isolated position in the genus *Urodacus*. It is characterized by its short and slender tail, by the absence of a median keel on the dorsal surface of the flattened hand, &c.

Urodacus planimanus, Poc.

Urodacus planimanus, Poc. Ann. & Mag. Nat. Hist. (6) xii. p. 321 (1893).

Loc. West Australia, 30 miles from Perth (*H. W. J. Turner*).

This species has the hands flattened as in *U. Darwinii*, but in other respects more approaches *U. novæ-hollandiæ*, though easily to be distinguished from that species by its narrow tail, deeply excised frontal border, &c.

Prof. Kraepelin placed this species as doubtfully synonymous with *U. Darwinii*, supposing that it was perhaps based upon a male example of a species of which *U. Darwinii* is the female. Unfortunately for this view, the types of the two species are females, and it may be added that, even if they were of opposite sexes, there could be no justification for the opinion that they are specifically identical.

Urodacus excellens, Poc.

Urodacus excellens Poc. Ann. & Mag. Nat. Hist. (6) ii. p. 170, pl. viii. fig. 2 (1888).

Loc. North Australia, Port Essington in Arnhem Land (Dr. Richardson).

Urodacus novæ hollandiæ, Peters.

Urodacus novæ-hollandiæ, Peters, Mon. Berl. Ak. 1861, p. 511; Pocock, Ann. & Mag. Nat. Hist. (6) ii. p. 170, pl. viii. fig. 1 (1888).

Loc. Western Australia (Freemantle, Perth, Swan River).

In the monograph of the species of this genus published in 1888 I referred to some specimens of what I supposed, and still suppose, to be *novæ-hollandiæ*, Peters, in the British Museum, ticketed "Ceylon." That the locality is erroneous has been to my mind settled conclusively by the subsequent discovery in the Museum of some specimens of a Centipede (*Cormocephalus aurantiipes*, Newp.), which is apparently not uncommon near Perth, also bearing the label "Ceylon," accompanied by the same register number as that under which the scorpions were entered.

I am not acquainted with any evidence that this species ranges far from the south-western corner of Australia. A specimen from Port Lincoln that I at one time referred to it is the young of another species.

Urodacus granifrons, sp. n.

♂.—*Colour* a tolerably uniform ochre-yellow.

Carapace with frontal lobes transversely truncate and separated by a shallowish median emargination as in *novæ-hollandiæ*; the interocular triangle covered with fine close-set granulation.

Tergites finely and closely granular.

Tail nearly five times as long as the carapace, the sides of the segments convexly rounded, the second a little longer than broad, the fifth more than twice as long as broad; the superior crests weakly granular, not posteriorly elevated; inferior crests of segments 1-3 smooth; lateral surface of segments 2-4 very finely granular; vesicle as wide as fifth segment.

Legs with finely granular femora; 5 spines on outer side of protarsus of first and second leg.

Pectinal teeth 16-18.

Measurements in millimetres.—Total length 54, length of carapace 6, of tail 29.

Loc. Chapman River, 10 miles from Geraldton, W. Australia (*E. H. Saunders*).

This species, based upon a single male example, differs from *U. novæ-hollandiæ* in having the anterior portion of the carapace finely granular, instead of smooth and finely punctured.

Urodacus abruptus, Poc.

Urodacus abruptus, Pocock, Ann. & Mag. Nat. Hist. (6) ii. p. 174, pl. viii. fig. 4 (1888).

Urodacus Keyserlingii, Pocock, Ann. & Mag. Nat. Hist. (6) viii. p. 245 (= *novæ-hollandiæ*, Keyserling, not Peters).

Loc. South and South-eastern Australia, Adelaide, type (59.52); Ballarat and Bendigo, in Victoria (*W. W. Froggatt*); Cooma, Bathurst, Maitland, Yass, in New South Wales (*W. W. Froggatt*); New England District of New South Wales (*J. Macpherson*).

Since I described this species the British Museum has received a very fine series of it from Mr. Froggatt and Mr. Macpherson from the localities mentioned above.

Urodacus Woodwardii, Poc.

Urodacus Woodwardii, Poc. Ann. & Mag. Nat. Hist. (6) xii. p. 322, pl. xiv. fig. 8 (1893).

Loc. Darling Range, north of Perth, W. Australia (*B. H. Woodward*).

This species is most nearly related to *U. abruptus*, but is recognizable from all the examples of the latter that I have seen in having the segments of the tail more convexly rounded and lower, with less elevated upper crests, so that the areas between these crests and the superior lateral crests are noticeably narrower than in *abruptus*. Moreover the vesicle is distinctly more globular, its width excelling that of the fifth segment.

Urodacus armatus, Poc.

Urodacus armatus, Poc. Ann. & Mag. Nat. Hist. (6) ii. p. 172, pl. viii. fig. 3 (1888).

Loc. S. Australia, Port Lincoln, on the west of Spencer Gulf.

This species, of which only a single male example is known, is most nearly related to the Perth species, but may be at once recognized from the male of it by the strong armature and greater slenderness of the tail-segments.

Urodacus hoplurus, sp. n.

♂.—*Colour* a uniform ochre-brown, with the digits, the tergites, and the median area of the sternites blackish.

Carapace as long as the first and nearly half the second caudal segments, shorter than the fifth, its frontal lobes coarsely rugose and granular, its lateral portions finely granular.

Tergites closely granular posteriorly and laterally, very finely granular in front, the last with two subdenticulate keels on each side; sterna smooth and polished, with the exception of the first, second, and third, which are irregularly and (?pathologically) tubercular mesially.

Tail long, about five times as long as the carapace; all the segments wider behind than in front, especially the first, second, and third; first more than one third longer than broad, fifth about four times as wide as long; the intercarinal spaces smooth; three inferior keels of segments 1-4 smooth, the superior and superior lateral keels of these segments weakly denticulate, their superior keels ending posteriorly in a large triangularly spiniform tooth; keels of fifth segment denticulate, the inferior more strongly so than the superior; *vesicle* large, its width equal to the width of the third segment, its height slightly greater than width of fourth segment, granular below and strongly bisulcate; *aculeus* slightly curved.

Palpi.—Humerus coarsely granular above, its anterior and posterior crests strong and coarsely granular; anterior surface coarsely but sparsely granular; inferior surface weakly granular at the base; brachium finely granular above and below, smooth in front, and smooth but with coarse scattered punctures behind, the upper and lower keels bounding its anterior surface coarsely granular, with a row of 12 or 13 pores on its lower surface posteriorly; hand with keels normal in number, but not so strong as in *U. novæ-hollandiæ* and *armatus*; covered above externally and below with a reticulation of fine granules; length of hand-back equal to width of hand, shorter than movable digit; lower surface of hand furnished with a series of about 16 pores running along the inner edge of the keel to the inner angle of the movable digit.

Legs with femora and patellæ weakly granular; protarsi of first and second with five external spines.

Pectinal teeth 27.

Measurements in millimetres.—Total length 103; length of

carapace 12; length of tail 60, of its fifth segment 14; width of hand 8.

Loc. Lawlers, East Murchison Goldfields, West Australia (*W. O. Mansbridge*).

The following table may help others to identify the species of this genus known to me:—

- a.* Hands low, flat above, height of their outer surface less than half its length measured along the inferior keel; tail slender, its segments parallel-sided.
 - a*¹. Hands without an upper median keel; carapace widely and deeply emarginate in front, smooth; tergal plates and first four segments of tail also smooth, the superior crests of the latter alone being feebly granular; a row of 11 pores on the brachium below and 14 on the hand; tail about $3\frac{1}{2}$ times as long as carapace, which is longer than its first and second segments; 6 spines on outer side of protarsus of first and second legs and 3 on the tibia *Darwinii*, Poc., ♀.
 - b*¹. Hands with a strong upper median keel; carapace deeply but narrowly emarginate, granular; tergites and tail granular, the superior crests of the latter stronger and posteriorly spiniform; 8-9 pores on brachium and 9-10 on hand; tail a little more than 4 times as long as carapace, which is shorter than its first and second segments; 5 spines on outer side of second protarsus and only setiform spines on the tibia *planimanus*, Poc., ♀.
- b.* Hands high, convex above, height of their outer surface more than half its length.
 - a*². Hands practically keelless; 15 pores on lower surface of brachium and 19 on hand; of large size, up to 114 mm. in length, carapace about 17 mm. long; carapace smooth, deeply emarginate, with rounded frontal lobes; 7 protarsal and 3 tibial spines on first and second leg *excellens*, Poc., ♀.
 - b*². Hands strongly keeled; about 9, rarely 12, pores on lower side of brachium, 9-12, rarely 15, on the hand; smaller, except *hoplurus*, less than 90 mm. in length, carapace not exceeding 12 mm. in *hoplurus*, usually less than that; 4-6 protarsal spines on first and second legs; carapace laterally granular.
 - a*³. Upper keels of caudal segments 1-4

- ending behind in a large triangular spiniform process (true to a less extent of ♂ of *abruptus*).
- a*⁴. Spines on caudal segments directed obliquely backwards and upwards; frontal portion of carapace not roughened with tubercles, carapace as long as fifth caudal segment; vesicle small, its width less than that of fifth segment, its height less than width of fourth; hands smooth above; a single row of about 10 pores on brachium and 10 on hand; 6 protarsal spines on first and second legs .. *armatus*, Poc., ♂.
- b*⁴. Spines on caudal segments vertical; frontal portion of carapace tubercular, carapace considerably shorter than fifth caudal segment; width of vesicle exceeding that of fifth caudal segment, its height exceeding width of fourth; hands granularly reticulate above; brachium with about 12, hand with about 16 pores in a line below, with additional pores near the base of the finger; 5 protarsal spines on first and second legs .. *hoplurus*, sp. n., ♂.
- b*³. Upper keels of first four caudal segments either not elevated or but little elevated, at all events less strongly elevated than in *armatus* and *hoplurus*.
- a*⁵. Tergal plates of abdomen in adult covered with fine granulation.
- a*⁶. Frontal lobes of carapace rounded and separated by a deeper emargination; upper crests of first, second, and third caudal segments more elevated; sides of segments less convex *abruptus*, Poc., ♂.
- b*⁶. Frontal lobes of carapace more squarely truncate, separated by a shallower excision; upper crests of tail not elevated; sides of segments more markedly convex.
- a*⁷. Area of carapace in front of median eyes covered with fine close-set granules. *granifrons*, sp. n., ♂.
- b*⁷. Area of carapace in front of median eyes smooth and finely punctured *novæ-hollandiæ*, Pet., ♂ ♀.
- b*⁵. Tergal plates of abdomen smooth and polished in the middle, the anterior closely and finely granu-

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 *Darwinii* or *planimanus*, or both. I have no hesitation in saying that with *Darwinii* 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, $3\frac{3}{4}$ 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.



Pocock, R. I. 1898. "The Australian scorpions of the genus Urodacus, Pet." *The Annals and magazine of natural history; zoology, botany, and geology* 2, 59–67.

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