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# New and little known scorpions and solifuges from the Namib Desert, South West Africa

by  
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The following contribution represents a description of new and little known scorpions and solifuges from a small batch of material collected in different areas of the Namib Desert by various research workers of the Namib Desert Research Station. The most interesting discovery made is a new species of scorpion belonging to the recently created genus *Protophthalmus* Lawrence, 1969.

I am greatly indebted to Dr C. Koch, Director of the Namib Desert Research Station, for having entrusted me with this material; to him and members of his staff and benevolent helpers who collected these arachnida, I tender my sincere thanks. I am also most grateful to Mr G. Newlands for the loan of material from the Transvaal Museum collection, to Mr E. Holm for donating and lending specimens and Dr R.F. Lawrence for the loan of the types of *P. holmi*.

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## Order SCORPIONES

### Family SCORPIONIDAE

#### Sub-family SCORPIONINAE

Genus PROTOPHTHALMUS Lawrence, 1969

PROTOPHTHALMUS HOLMI Lawrence, 1969  
(Figs. 1, 2, 3a, b, e, and Table 1.)

### Material examined:

Holotype ♀, paratype ♀, Gobabeb, Namib Desert, South West Africa, collected by E. Holm, June 1968 (Albany Museum, no accession number); 1 ♂, on plain, 32 km south of Gobabeb, Namib Desert, South West Africa, collected by K. Schaer, December 1968 (Natal Museum NM 9964); 2 ♀, Gobabeb Namib Desert, South West Africa, collected by E. Holm, April 1969 (1 ♀, Gobabeb Research Station collection, trap 8) (1 ♀ Natal Museum, NM 9965); 2 ♀, Koichab Pan, 56 km NE of Luderitz, Namib Desert, South West Africa, collected by H.D. Brown, May 1969 (Transvaal Museum, TM9387 and 9388); 2 juvenile ♂, same locality data as TM 9387 and 9388 (Transvaal Museum, TM 9391 and 9390); 1 ♂, Tsondeb Vlei, 56 km SE of Gobabeb, Namib Desert, South West Africa, collected by W. D. Haacke, April 1969 (Transvaal Museum, TM 9392). This list represents all the specimens collected to this date. All were examined.

Lawrence's description (1969) of this interesting psammophilous scorpion was based on two females collected near Gobabeb. Additional specimens, as listed above, have since been collected from various localities in the Namib. These include the hitherto undescribed male.

A short description of the males is given below. A few morphological characters exhibited by both sexes, but omitted by Lawrence (1969) in his description of the female, are also included.

### Male:

Unlike most other scorpionids, the males exhibit virtually no sexual dimorphism enabling them to be easily sexed without lifting the genital operculum. In general appearance and colouration the males fit Lawrence's description of the female types, but differ in the following morphological characters:

- 1) The genital operculum of males is elliptical in outline (Fig. 2a), that of females nearly cordate (Fig. 2b).
- 2) In all specimens collected to date, none of the males have less than two pectinal teeth per pectine, whereas some of the females have only one. The greatest number of pectinal teeth per pectine is four in males and three in females (see Table 1.).
- 3) Caudal segments I to V are proportionately longer and wider in males than in females as shown in Table 1 for specimens with approximately the same prosomal measurements.

### Supplementary morphological data:

All male and female specimens examined were found to have a large conical tooth at the proximal end of the inner toothed keel of the movable fingers of the pedipalp hands (Figs. 1a, 1b and 3a). Some species of *Opisthophthalmus* have an equivalent tooth, but that found in *P. holmi* is unusually prominent.

Lawrence (1969:106) in his description of the key characters for his new genus *Protophthalmus* states "inferior surface of all tarsi without rows of spines, these replaced by long setae," and in his description of *P. holmi* reiterates on p. 109 "tarsi without rows of spines below, these replaced by long setae; lateral lobes feebly developed but usually with 4 inner, 2 or 3 outer long cylindrical spines." Examination of all the specimens listed earlier has, however, revealed the presence of a longitudinal row of two (sometimes one) small spines located on the inner inferior surface of tarsi I and II, as illustrated in Fig. 3e. These spines have the same shape and structure as those found on the inner and outer lobes of tarsi I and II, but are shorter. It may be argued that these inferotarsal spines are in fact not spines, but broad and flat modified setae, but this argumentation would then also apply to the spines on the inner and outer tarsal lobes. In view of the fact that Lawrence (1969) considers the marginal vestiture of the lateral tarsal lobes to be spines, this terminology must then apply also to the row of spines found on the inner inferior surface of tarsi I and II. Tarsi III and IV are without rows of spines below, these being replaced by long setae as described by Lawrence.

The colouration of caudal segments IV and V of all adult specimens examined is much lighter than that of the types, while the colouration of these segments in juvenile to subadult specimens matches that of the types.

The Natal Museum has one male specimen (NM 9964) in which the overall granulation of the body and appendages is more pronounced than in other specimens. This coarser granulation is easily seen in Figs. 1a and b.

### PROTOPHTHALMUS JENSENI sp. nov.

(Figs. 3c and d to 6, Table 1.)

**Holotype** ♂, Bethanis farm, 65 km West of Welwitchia, South West Africa (quarter degree reference: 2014AB), collected by R.A.C. and M.K. Jensen, 20th December, 1968. The holotype has been deposited in the Transvaal Museum Arachnid collection (TM 9504).

**Habitat:** Dr and Mrs Jensen kindly supplied the following data: "The scorpion was found absolutely motionless on whitish-yellow sand. It was practically invisible, so good was its camouflage.

The time was about 9 p.m., completely dark, no moon. It was on the surface of relatively flat sand at the base of a range of hills which are covered with sand at the base, but rock emerges  $\frac{1}{2}$  to  $\frac{2}{3}$  of the way up. There are no sand dunes *per se*, and this sand-covered valley is not very extensive. It must connect to other sand areas, however, since it harbours *Palmatogecko rangei* and the endemic beetle *Onymacris langi* (known only from this spot), closely related to coastal *Onymacris brinki* (Torra Bay)."

**Colour** of the preserved holotype, in general yellow. The colouration of the body and appendages is given hereafter using the ISCC-NBS Colour Designation (Kelly and Deane, 1965) with the Munsell notation in brackets. Pedipalps brilliant yellow no. 83 (4.4Y8.7/8.9), with the teeth on the inner keels of the fingers and the ventral area of the joint between the movable finger and hand deep reddish brown no. 41 (1.6YR1.5/8.3); chelicerae brilliant yellow no. 83, with the teeth and distal ends of the fingers deep reddish brown no. 41; prosoma brilliant orange yellow no. 67 (0.1Y8.1/10.5), turning to moderate yellow no. 87 (3.8Y7.1/6.5) towards the posterior margin; tergites moderate yellow no. 87; legs, sternum, genital operculum, pectines and pectinal plate pale yellow no. 89 (4.7Y9.0/3.8); sternites moderate yellow no. 87; metasomal segments and telson brilliant yellow no. 83, with most of the sting deep reddish brown no. 41.

**Carapace** (Figs. 4a and 5a); shiny, covered with minute, granuliform tubercles which are larger in the anterior region, particularly near the lateral eyes; a weak median groove present, but no trace of a Y-shaped fork anteriorly; median eyes  $1\frac{1}{2}$  times their diameter apart, each flanked medially by a sub-cuticular, black crescent, the superciliary ridges very weak; setation as in Fig. 5a; anterior corners acutely rounded, posterior corners angular; anterior margin with shallow median excavation, posterior margin gently rounded.

**Praebdomen** (Fig. 4): Tergites I to VI, almost smooth in anterior one-third, remaining two-thirds covered with minute granules; tergite VII similar but with larger granules, particularly posteriorly in the region of the dorso-median and dorso-lateral keels (had these been well developed), where each keel is only represented by a very weak bulge which bears a single, long, slightly sinuate seta; tergite VII with a weak antero-median bulge and an oval shaped postero-median depression; all sternites almost completely covered with small, closely spaced, shiny granules that occasionally merge and which fade out towards the lateral margins; posterior margins of all sternites with numerous very weak setae, lateral margins with fewer but larger setae; stigmata fusiform.

**Postabdomen:** General shape of caudal segments as in Figs. 4 and 6c, their measurements as in Table 1. Caudal segments without well-defined keels, less well defined than in all male specimens of *P. holmi* seen, except that the infero-

ral keels of V are more prominent in *P. jenseni* and are each represented by a well defined row of 20-25 granules; ventral and lateral surfaces of all caudal segments completely covered with small, round, shiny, closely packed granules; dorsal surfaces of I to IV covered with similar but slightly larger granules; anterior one-third of dorsal surface of V covered with scattered minute granules, posterior two-thirds smooth and shiny; the dorso-median and dorso-lateral keels of I-IV represented by rather irregular rows of granules, only slightly larger than surrounding granules; dorso-lateral keel of V absent, except in anterior one-third; segments I-III without any infero-median and infero-lateral keels; IV with traces of infero-lateral keels, no infero-medians; V without an infero-median keel, but with well-defined infero-laterals. Excepting the slight differences described above, the cauda of *P. jenseni* does not differ strikingly from that of *P. holmi*.

**Telson:** Vesicle distinctly bulbous and swollen with a few small granules on the inferior surface of its base, otherwise smooth and shiny; inferior surface with approximately 40 long, fine setae, some of which occur at the proximal region of the aculeus; aculeus slightly shorter than the vesicle; besides its distinct bulkiness, the telson of *P. jenseni* does not differ much from that of *P. holmi* males.

**Pedipalps:** Brachium with very small shiny, loosely distributed granules above; antero-dorsal crest of brachium, weak, composed of a few granules, slightly larger than those on the dorsal surface; antero-dorsal crest of brachium with three trichobothria, one proximal and two located two-thirds distally; posterior surface of brachium with very small granules among which are scattered 20-22 trichobothria; ventral surface of brachium shiny and almost smooth, with single postero-longitudinal row of 9-10 regularly spaced trichobothria; anterior surface of brachium with few scattered granules, otherwise smooth and shiny, no trichobothria; humerus with small, shiny, loosely distributed granules on dorsal and anterior surfaces; postero-dorsal crest of humerus, weak, composed of a few granules slightly larger than those found on the dorsal surface; humerus with three trichobothria, two located one-third proximally on postero-dorsal crest, one located one-third proximally on anterior surface; ventral and posterior surfaces with a few scattered granules, otherwise smooth and shiny; brachium only slightly longer than humerus; superior surface of hand moderately convex, shiny, but covered with many fairly large, blunt, granuliform tubercles, these being largest proximally and decreasing in size distally; no distinct vestige of finger keel or a keel separating the upper and lateral surface of the hand except for a slight longitudinal convexity on superior surface of hand; trichobothrial distribution of superior surface of hand and fixed finger as in Fig. 3c; ventral surface of hand shallowly concave, smooth and shiny, with longitudinal row of 16-17 trichobothria near the outer margin; ventro-lat-

eral margin of hand on outer side slightly round, demarcated by a row of rounded granuliform tubercles merging half way distally to form a low continuous ridge; inner surface of hand slightly convex, shiny, covered with randomly scattered, broad but extremely flattened and irregularly-shaped tubercles; inferior surface of fixed finger with two trichobothria proximally; inner margin of hand, sharp, its edge defined by an irregular row of 22 fairly large, blunt, granuliform tubercles, which merge distally with the fixed finger; hand-back length equal to hand-back width (Table 1), fingers short (Fig. 3c); teeth of fixed and movable fingers as in Figs. 3c, 5b and d; the hand of *P. jenseni* differs markedly from that of *P. holmi* (see Figs. 3c and 3a).

**Chelicerae:** Differing from *P. holmi* only in shape and size of the different parts (see Figs. 3b and d); no stridulatory mechanism, instead, long unmodified setae along middle region of the inner margin.

**Legs:** Similar to those of *P. holmi*, but differing in the following respects. Legs I and II with the segments from prefemur to protarsus compressed (not as markedly as in *P. holmi*), but only slightly more compressed than those of legs III and IV; setation of anterior and posterior edges of legs I and II as in Fig. 6a, thickened setae of posterior edges of tibia and protarsus not bacilliform as in *P. holmi*, but tapering to a point; dorsal and ventral surfaces of legs I and II smooth with very weak setae; dorsal surfaces of trochanter, prefemur and femur of legs III and IV smooth with scattered, minute granules, other surfaces of these legs smooth with few setae except on anterior and posterior margins. Claws of legs long, slender and almost straight, otherwise as in *P. holmi*, but not as long (see Fig. 6a and b); tarsi of all legs with a longitudinal row of two spines on the inner inferior surface, these being more conspicuous and more robust than those on tarsi I and II of *P. holmi* described earlier; lateral lobes feebly developed, with four inner, three outer, slightly tumid spines which taper to a point distally but are shorter than those of *P. holmi*; post-tarsus obsolete, represented by a small rounded projection lacking a claw (Gehstachel), (see Fig. 6b); ventral surface of tarsi III and IV without long setae.

**Pectines** (Fig. 5c); Much reduced and simplified; body of pectines short and trapezoidal in outline, not divided into lamellae by sutures, except at distal apex; ventral surface with fairly numerous fine setae similar to those described for *P. holmi*; holotype with four left and three right pectinal teeth; sensory areas of pectinal teeth clearly outlined and with more sensory tubules than in *P. holmi*.

This new species is named in honour of Dr and Mrs R.A. Jensen.

**Dimensions:** As in Table 1.

**Distribution:** Fig. 7 illustrates the distribution of the two species of *Protophthalmus* so far discovered.



## REMARKS ON PSAMMOPHILOUS SCORPIONS

From a morphological point of view *P. jenseni* is quite distinct from *P. holmi*, particularly in the distribution and nature of the leg setae. Since these are used as an indicator of the psammophilous habit, it would appear that *P. jenseni* is less well adapted to sand.

As pointed out by Lawrence (1969) the genus *Protophthalmus* is most closely related to the group of *Opisthophthalmus* species centred on *O. wahlbergi* (Thorell). The discovery of *P. jenseni* has certainly added weight to this view and in my opinion, *P. jenseni* is an intermediate between *P. holmi* and the *O. wahlbergi* group.

Lawrence (1969) has given a general account of our present knowledge of the psammophilous habit in scorpions and lists at least ten different psammophilous species from North Africa and the Middle East with sweep-like modifications of the legs and various other characteristics. After examining various species of our Southern African scorpions, it became evident that several of these also have sweep-like modifications on the anterior two pairs of legs. Among these, *Opisthophthalmus adustus longiceps* (Lawrence, 1945), which occurs in the southern Namib Desert, is almost certainly a psammophile scorpion, since it has well developed sweep-like rows of long setae on all segments of legs I and II (except coxa and trochanter). In the family Buthidae, *Parabuthus stridulus* Hewitt, 1914 is almost certainly also a psammophile species. The tibia, and protarsi of legs I and II are dorso-ventrally compressed as in *P. holmi* and bear sweep-like rows of setae on their anterior and posterior edges; the tarsi are not compressed but also bear lateral rows of setae. It is therefore not surprising that all the species of *P. stridulus* collected so far were found on or near sand dunes.

## Order SOLIFUGAE

## Family HEXISOPIDAE

## Genus HEXISOPUS Karsch, 1878

## HEXISOPUS MOISELI sp.nov.

(Figs. 8 and 9a-c)

**Holotype**, 1 ♂, collected on gravel plain 32 km East of Swakopmund, South West Africa, by Mr L. Moisel in June 1969. This specimen has been deposited in the Natal Museum (type no. 1291, accession no. NM 9183).

**Colour**: Colour given using the ISCC-NBS Colour Designation (Kelly and Deane 1965). Dorsal surface of chelicerae and headplate with dark colour patterns as in Fig. 8, with the dark zones of the headplate and proximal end of chelicerae grayish brown no. 61, the light zones light orange yellow no. 70, and the distal end of dorsal jaws of the chelicerae changing from light orange yellow to deep reddish orange no. 36, and eventually to dark reddish brown no. 44, at the tip; tergites light

grayish brown no. 60, their posterior borders with a narrow, darker margination of grayish brown no. 61; whole of ventral surface and appendages (except ventral jaw of chelicerae) pale orange yellow no. 73; ventral jaw of chelicerae same as dorsal jaws; the very long and fine setae ("hairs") found on body, headplate, chelicerae and appendages yellowish white no. 92.

**Chelicerae** (Figs. 9a and c): Inner side of dorsal jaw with a strong granular tubercle at base of fang, similar to, but less well developed than that found in *H. swarti* Lawrence, 1968; inferior margin of dorsal jaw with a slight proximal protuberance (level with the base of the flagellum) bearing three small round teeth; fang of dorsal jaw short, but longer than in *H. swarti*; seen from above, the dorsal jaw at the base of the fang, with an oval chitinized area, its surface slightly concave posteriorly and with 30-35 equal sized granules anteriorly (Fig. 9a); ventral jaw moderately curved, in general shape and dimensions as in *H. swarti*; ventral jaw round in cross-section, without keels but with a slight median protuberance on the superior margin bearing a single small ectal conical tooth; outer and inferior surface of lower jaw with many equal sized granules; proximal half of inner surface of lower jaw with numerous long and stiff setae.

**Flagellum**: As in Fig. 9b and c.

**Setation**: Very similar to that described by Lawrence (1968) for *H. swarti*. Stridulatory area large, the organ similar to that of *H. swarti* but with wider and fewer ridges.

**Dimensions** (in mm): Total length 24.5; headplate width 8.5, length 5.0; chelicera (dorsal jaw) length 9.5, width 4.3; length of abdomen 12.0.

**Remarks**: *H. moisei* closely resembles *H. swarti* from Vegkop (8 km due North of the Brandberg) and to a lesser extent *H. infuscatus* Kraepelin, 1899. *H. moisei* differs quite clearly from *H. swarti* as follows: the shape of the flagellum; the presence of 3 small proximal teeth on the inferior margin of the dorsal jaw and 1 small conical tooth on the superior margin of the ventral jaw, these structures being absent in *H. swarti*; the lack of keels on the outer surface of the lower jaw; the disposition and nature of the spines on legs III and IV. The species is named in honour of its collector, Mr L. Moisel, part-time assistant at the Namib Desert Research Station.

## Family DAESIIDAE

## Genus BLOSSIOLA Roewer, 1933

## BLOSSIOLA SABULOSA Lawrence, 1972 \*

(Fig. 10a-d)

\* This species was described as new by me in the manuscript of this paper but in the meantime Lawrence (this volume) described undoubtedly the same species to which he gave the above designation. I decided to give this new species Lawrence's designation but to let my original description and illustrations stand as they include certain features not considered by Lawrence.



**Material:** 1 ♂, collected on gravel plain near Gobabeb, Namib Desert Park, South West Africa by E. Holm in pit trap on 4th February 1969. This specimen is deposited in the Natal Museum (NM 9186).

**Colour:** Colour given using the ISCC-NBS Colour Designation (Kelly and Deane 1965). Headplate light orange No. 52, anteriorly, becoming paler posteriorly; eyes with black crescent medially (Fig. 10b); chelicerae pale orange yellow no. 73, with the fangs slightly darker; tergites 1-7 yellowish white No. 92, anteriorly, becoming light orange no. 52 towards the posterior margin; remaining tergites yellowish white no. 92; lateral and ventral surfaces of body, legs II, ventral surfaces of pedipalps and legs I, III-IV, dorsal and lateral surfaces of coxae and trochanter of pedipalps and legs I, III-IV yellowish white no. 92; dorsal and lateral surfaces of remaining segments of legs, I, III-IV light orange no. 52.

**Setation:** Chelicerae dorsally and on outer side with long, fairly stout apically cleft setae; headplate (propeltidium) with similar setae becoming fairly numerous laterally and posteriorly, a back-ground vestiture of fine, very short setae; postpeltidium with a regular row of long, stout apically cleft setae along its posterior margin, abdominal tergites with two transverse rows of similar setae, those of anterior row shorter and thicker; ventral surface densely covered with white silky bristles of medium length; first stigma-bearing sternite with three long, curved and pointed ctenidia on each side of the sagittal line (Fig. 10d); femur of pedipalp with two well-separated inner spines, tibia with one inner spine, metatarsus with two well separated inner spines.

**Appendages:** Tibia and, to a lesser extent, femur of pedipalps very long and slender, their combined length slightly longer than total body length; legs I and II comparatively short, leg III as long as pedipalps, leg IV longer than pedipalps; leg IV with unusually long, greatly curved and slender claws, their curvature forming a complete semi-circle; chelicerae with four stridulatory ridges.

**Flagellum:** As in Figs. 10a, b and c, in the form of a stalked capsule; principle seta not thicker than any of the other incrassate setae of the dorsal jaw.

**Dentition:** As in Fig. 10c; both dorsal and ventral jaws very long and slender; fang of dorsal jaw with three inner teeth proximally.

**Dimensions** (in mm): Total body length 9,5; pedipalp length 12,0; leg IV length 18,0 (including claws); length of claws of leg IV 2,0; headplate length 1,6, width 1,4; length of dorsal jaw of chelicera 2,4.

**Remarks.** *B. sabulosa* has its closest affinities with *B. macilenta* Lawrence, 1968 and *B. longipalpis* Lawrence, 1936; its dentition is closer to that of *B. macilenta* than *B. longipalpis*; in the number of ctenidia it is closer to *B. longipalpis* which also has three pairs; *B. sabulosa* differs markedly from these other two species in the great length of the claw on leg IV, the flagellum, the pedipalp spination and body colouration.

#### Family SOLPUGIDAE

Genus SOLPUGA Lichtenstein, 1796.

SOLPUGA BICOLOR Lawrence, 1952

*Solpuga bicolor* Lawrence, 1952, *Proc. Zool. Soc. London*, 122 (4): 967, Fig. 5.

One ♂ from Gobabeb, Namib Desert Park, South West Africa, November 1968, collected by L. Schulze. In Natal Museum collection, NM 9184. This specimen agrees well with the description of the type and as far as can be ascertained is the only other male ever collected. The teeth on the jaws of this specimen are almost completely worn out.

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Table 1. Measurements and pectinal teeth count of *P. holmi* Lawr. and *P. jenseni*

	P. holmi	P. holmi	P. holmi	P. holmi	P. holmi	P. holmi	P. holmi	P. holmi	P. holmi	P. holmi	P. jenseni sp. n.
Reference No.	T.M.9388	Trap 8	N.M.9965	T.M.9387	N.M.9964	T.M.9392	T.M.9390	T.M.9391	Holotype	Paratype	T.M.9504
Sex	♀	♀	♀	♀	♂	♂	juv. ♂	juv. ♂	♀	♀	♂
Prosomal length, mm	8,50	7,90	8,00	8,90	7,00	8,90	5,15	6,20	7,20	7,40	6,90
Prosomal width, mm	6,70	6,00	6,20	6,90	5,50	7,00	4,00	4,65	5,50	6,00	6,50
Distance of median eyes from anterior margin of prosoma, mm	3,60	3,40	3,30	3,70	2,85	3,70	2,15	2,50	3,00	3,10	3,10
Distance of median eyes from ant. margin of prosoma expressed as a percentage of prosomal length, %	42,35	43,04	41,25	41,57	40,71	41,57	41,74	40,32	41,66	41,89	44,93
Hand-back length, mm											
Left	5,00	4,30	4,50	5,20	4,20	5,00	2,90	3,50	4,00	4,20	4,70
Right	5,00	4,30	4,50	5,20	4,20	5,00	2,90	3,50	4,00	4,20	4,70
Hand-back width, mm											
Left	4,20	3,70	3,60	4,20	3,50	4,30	2,10	2,70	3,30	3,50	4,70
Right	4,20	3,70	3,55	4,20	3,50	4,30	2,10	2,70	3,30	3,50	4,70
Length of caudal segments, mm											
I	3,40	3,20	3,10	3,60	3,30	3,70	2,00	2,30	2,80	3,10	2,80
II	3,80	3,30	3,30	3,90	3,60	4,10	2,20	2,60	3,10	3,30	3,10
III	3,90	3,50	3,60	4,00	3,80	4,20	2,30	2,70	3,20	3,50	3,40
IV	4,30	3,90	4,00	4,70	4,40	4,70	2,60	3,00	3,60	4,20	3,90
V	5,80	5,30	5,40	6,00	5,60	6,20	3,50	4,10	4,80	5,10	5,50
Width of caudal segments, mm											
I	3,30	3,10	3,10	3,50	3,15	3,80	2,20	2,50	2,85	3,00	3,10
II	2,90	2,70	2,60	3,10	2,85	3,50	1,80	2,15	2,50	2,60	2,80
III	2,70	2,40	2,40	2,70	2,60	3,10	1,70	1,90	2,20	2,40	2,70
IV	2,20	2,00	2,00	2,40	2,10	2,60	1,45	1,70	1,90	2,00	2,30
V	2,15	1,90	1,90	2,20	1,90	2,40	1,40	1,60	1,70	1,80	2,20
Telson	1,80	1,80	1,70	2,10	1,50	2,00	1,20	1,30	1,50	1,60	1,90

Figure 1. *Protophthalmus holmi* Lawr., ♂ (NM 9964); a, dorsal; b, ventral.

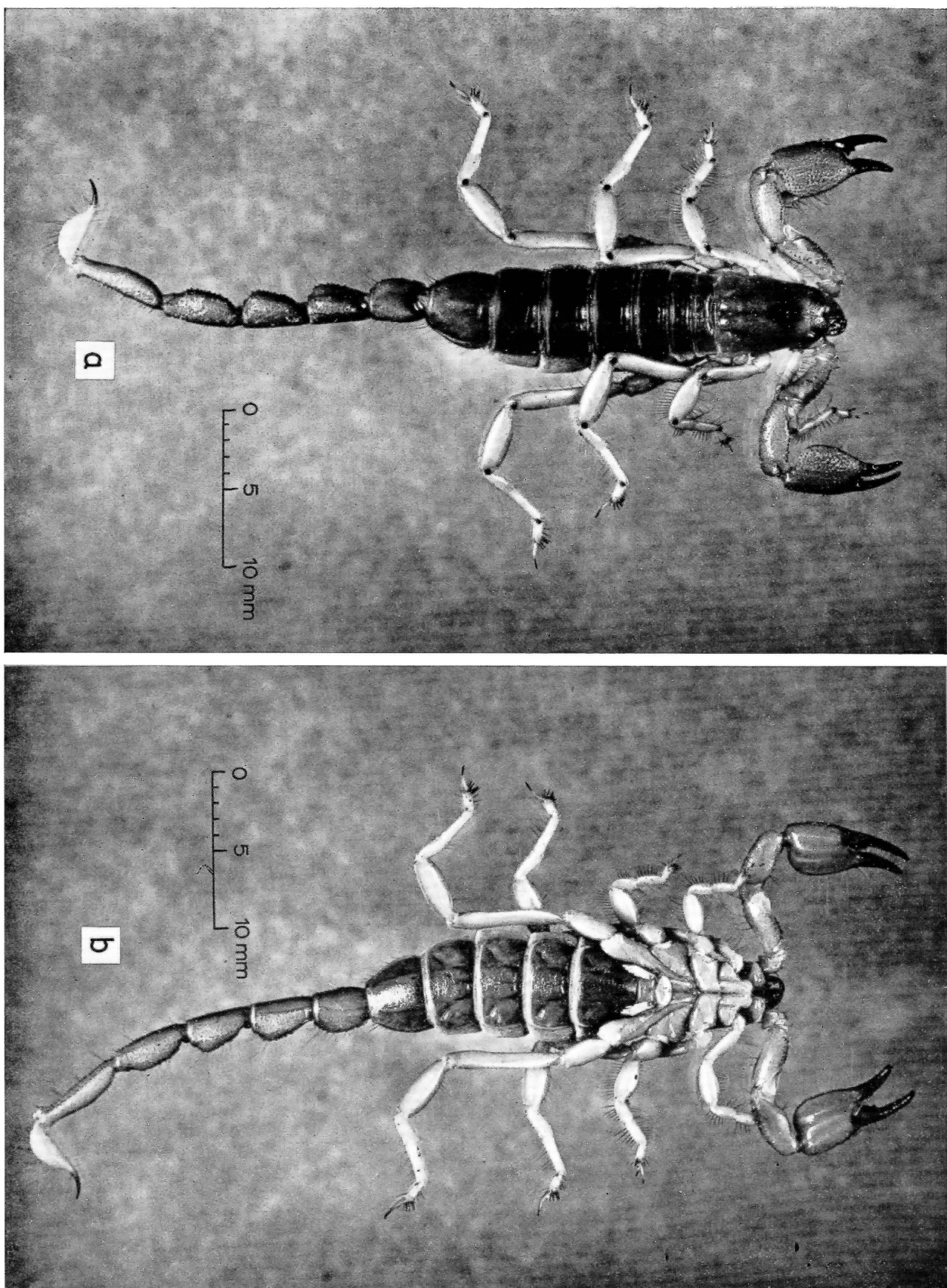
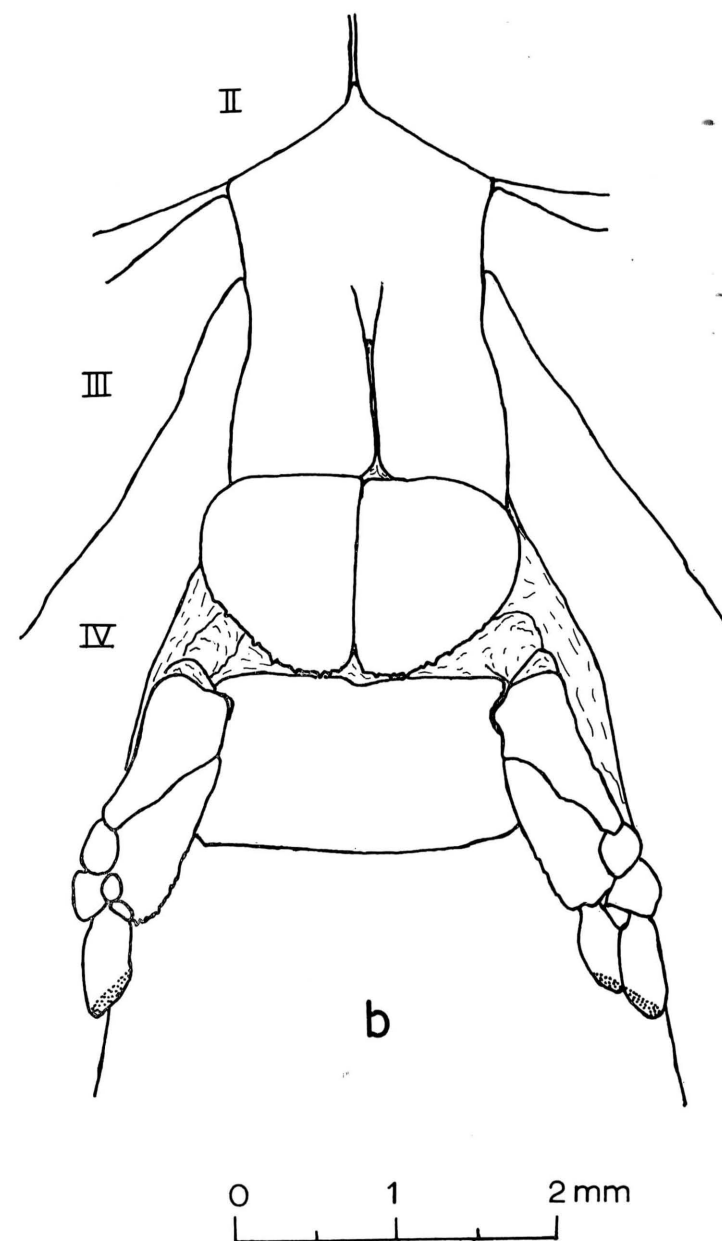
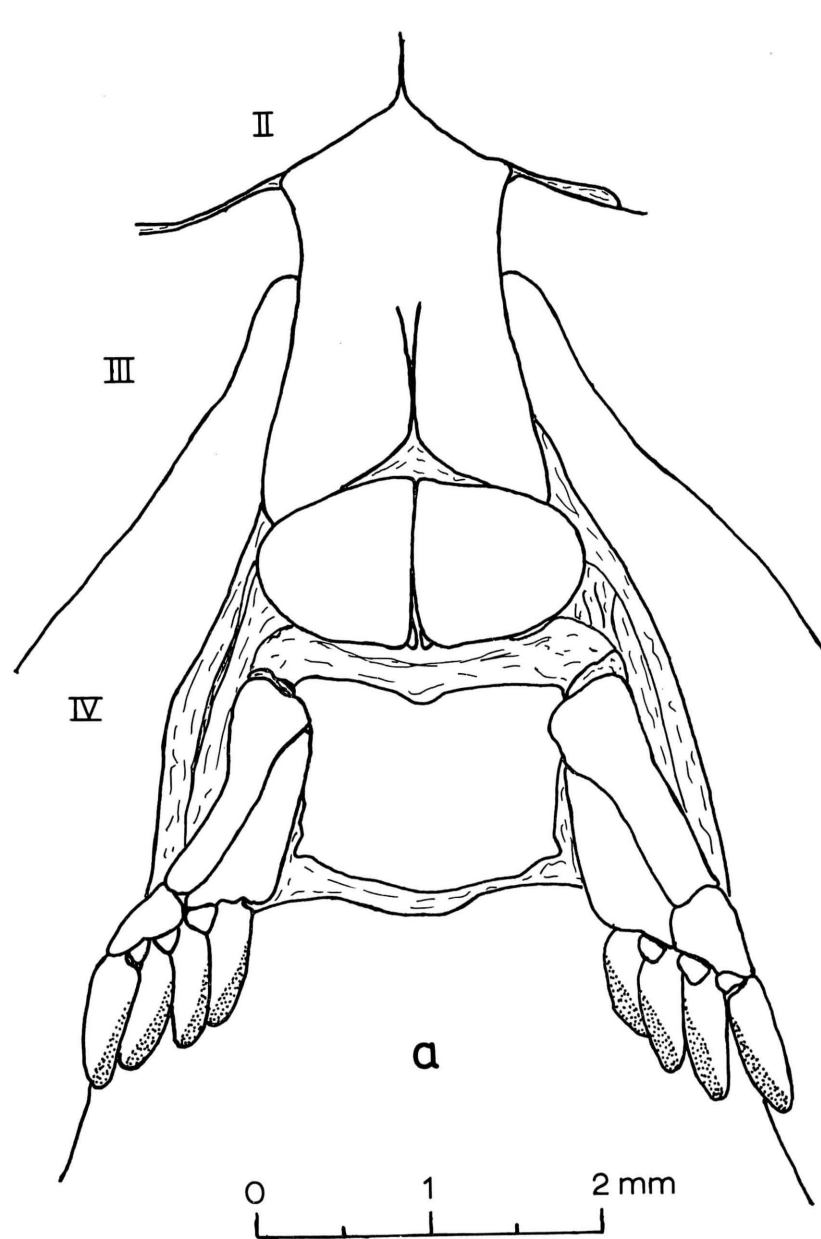




Figure 2. *Protophthalmus holmi* Lawr., sternum, genital operculum and pectines of: a, ♂ (TM 9392); b, ♀ (TM 9387). II, III and IV, coxae of legs II, III and IV.



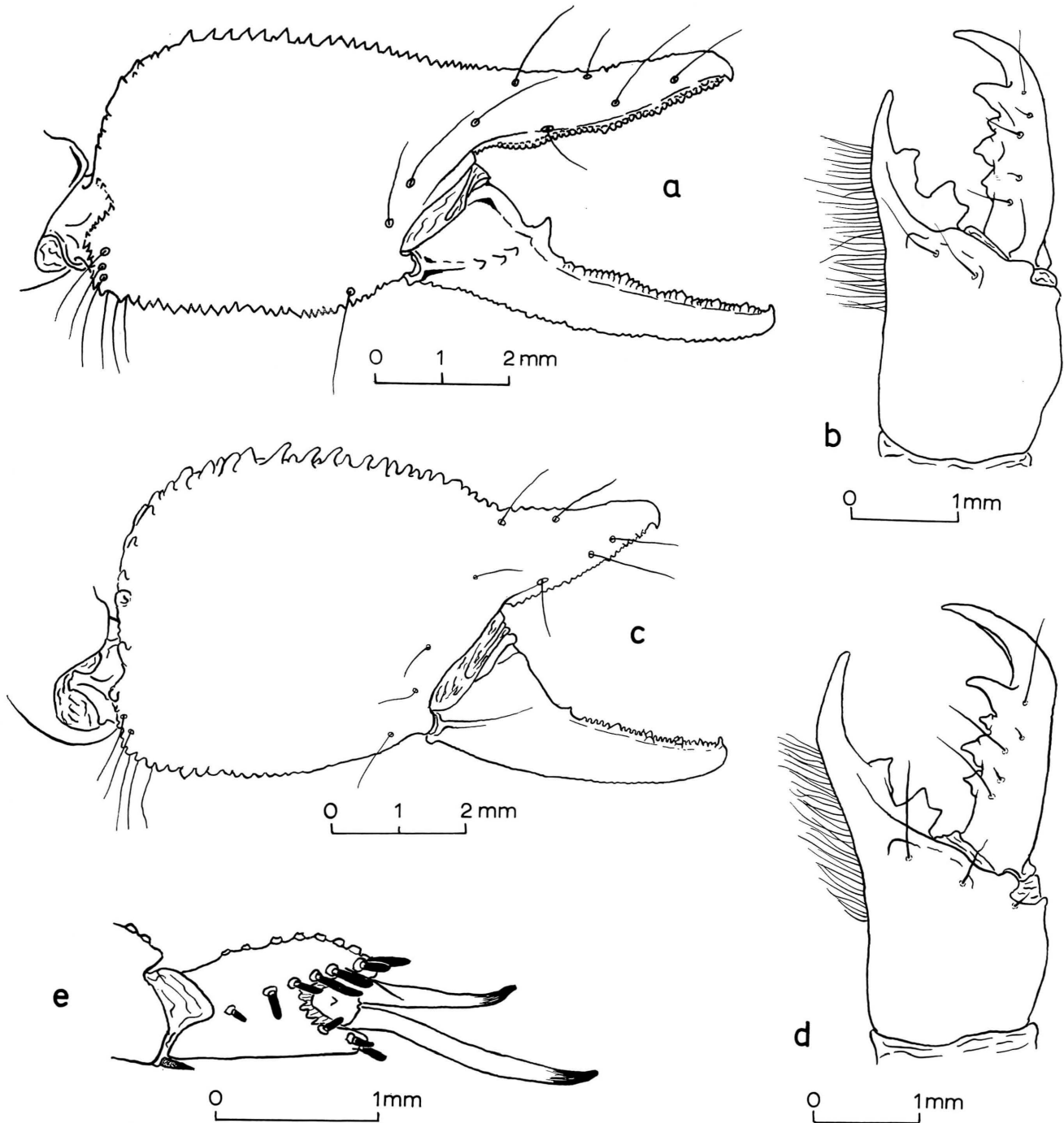


Figure 3. *a*, *P. holmi* (TM 9392, ♂) right hand seen from outer side (surface granulation omitted); *b*, *P. holmi* (TM 9393, ♂), right chelicera, dorsal; *c*, *P. jenseni* sp.n. (holotype) right hand seen from outer side (surface granulation omitted); *d*, *P. jenseni* sp.n. (holotype), right chelicera, dorsal; *e*, *P. holmi* (NM 9965, ♀), right tarsus of leg II, ventral view. In *a* and *c*, only the trichobothria are drawn; in *b* and *d*, complete setation shown, no trichobothria present).

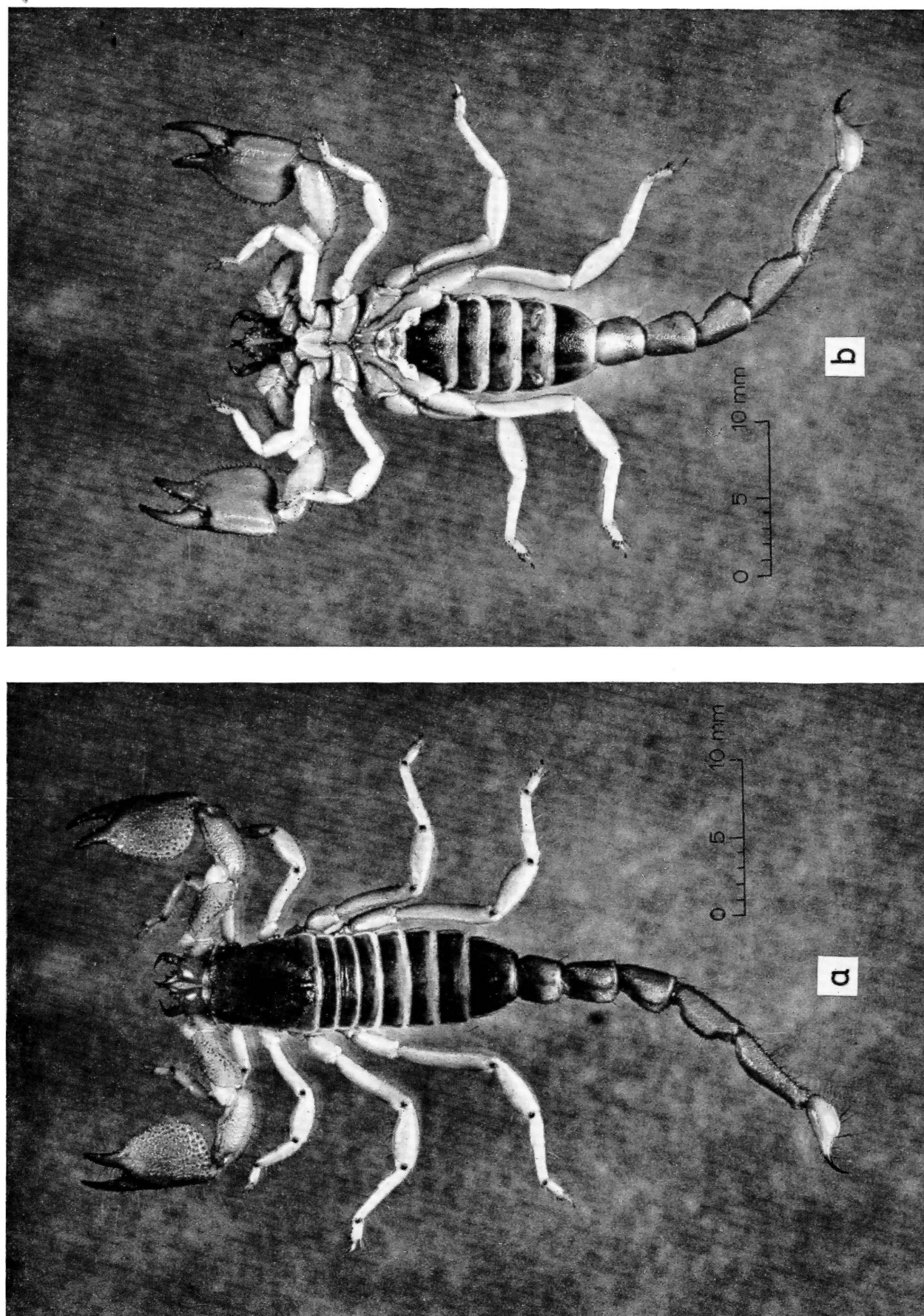


Figure 4. *P. jenseni* sp.n., holotype; a, dorsal; b, ventral.



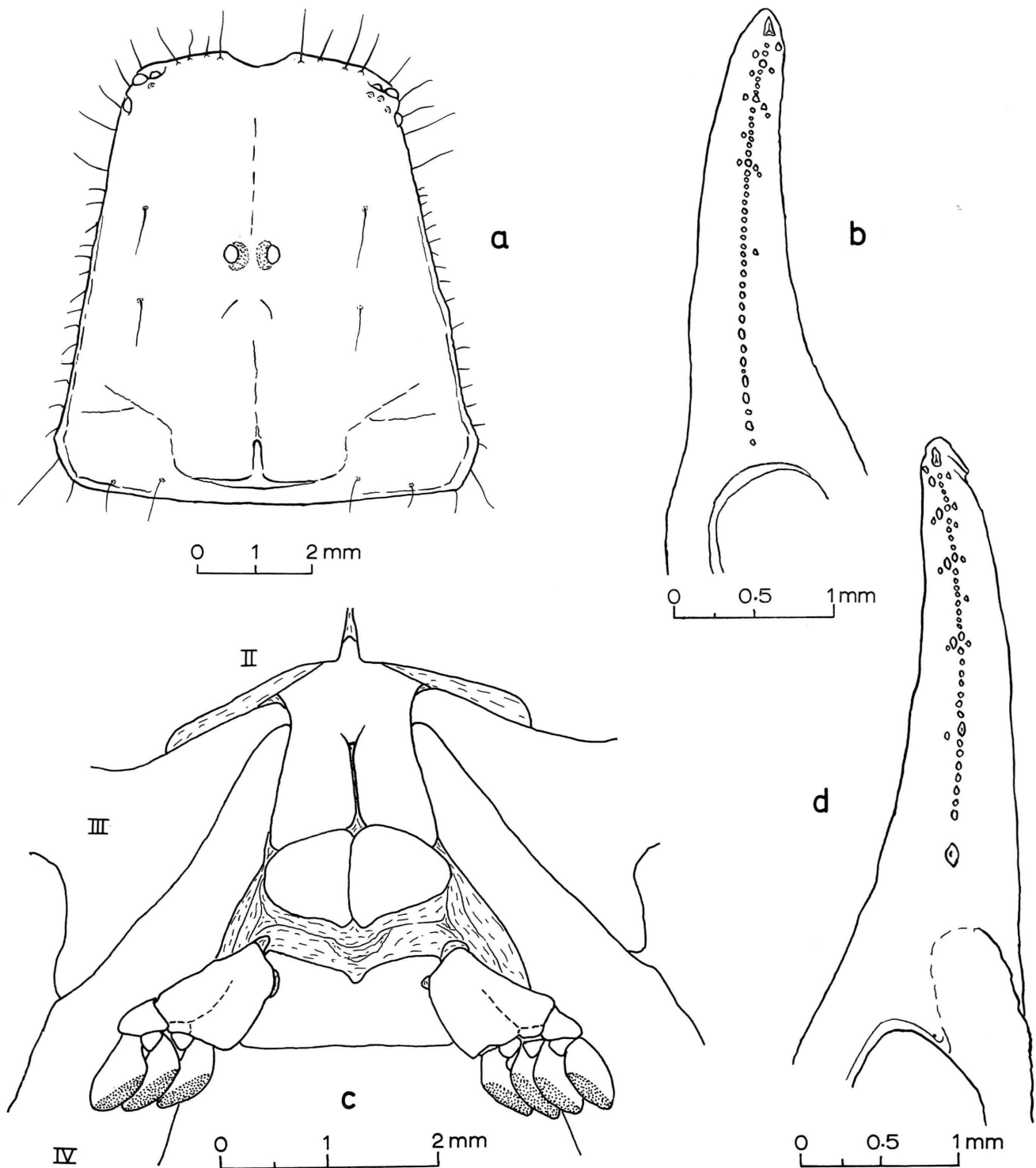


Figure 5. *P. jenseni* sp.n., holotype. a, carapace; b, teeth of fixed finger, right hand; c, sternum, genital operculum and pectines (II, III and IV coxae of legs II, III and IV); d, teeth of movable finger, right hand.

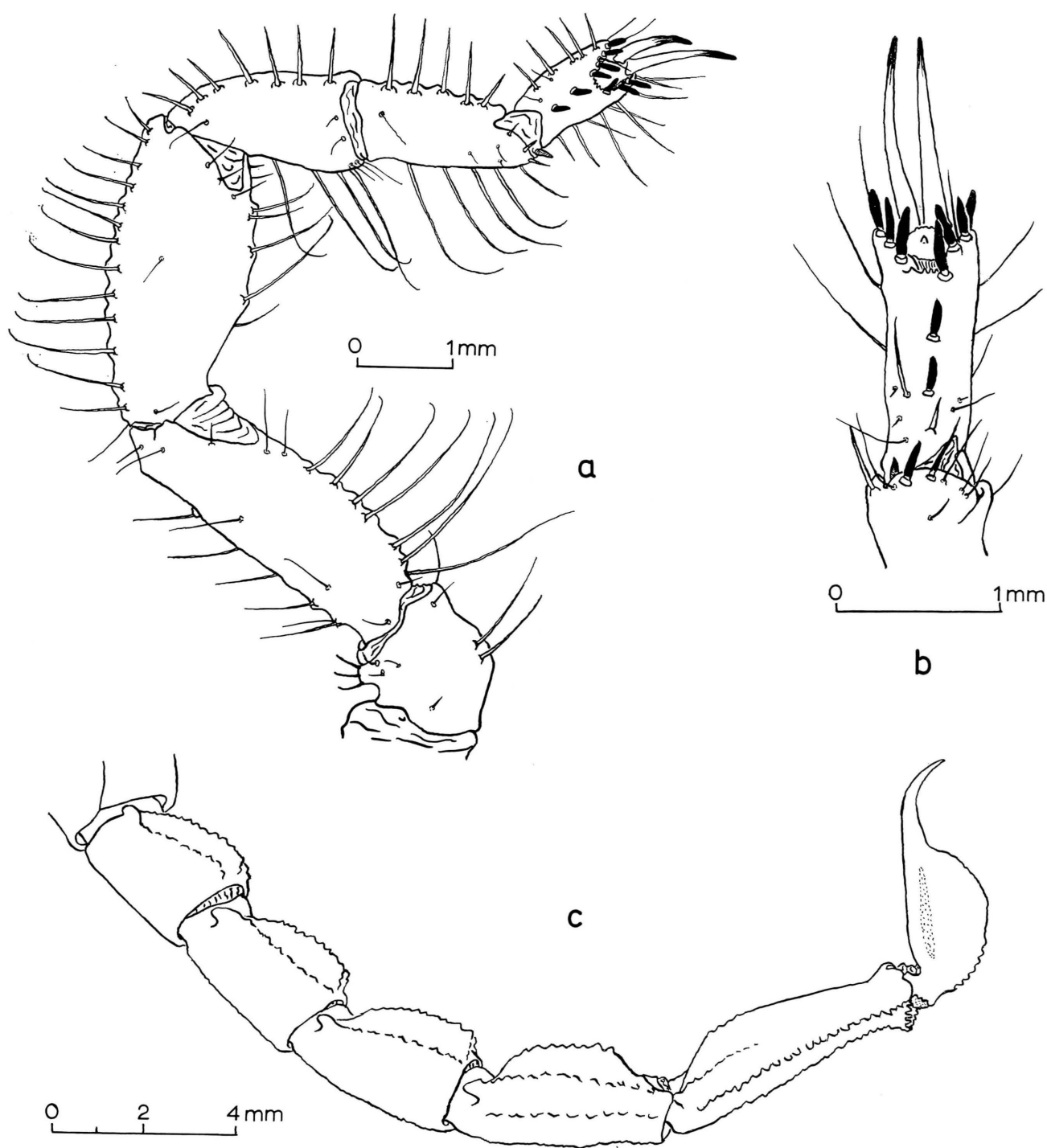


Figure 6. *P. jenseni* sp.n., holotype. a, leg I (right hand side), ventral aspect; b, left tarsus of leg IV, ventral view; c, metasoma, lateral, ground granulation omitted.

Figure 7. Map of South West Africa showing distribution of: *P. jenseni* sp.n. ( $\Delta$ ) and *P. holmi* (O).

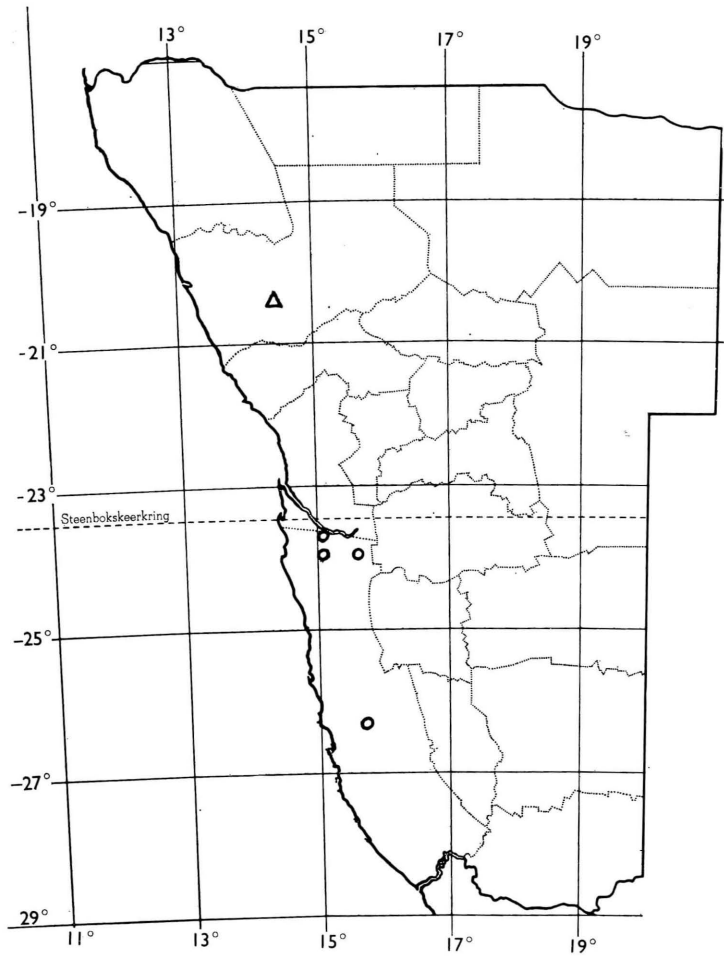
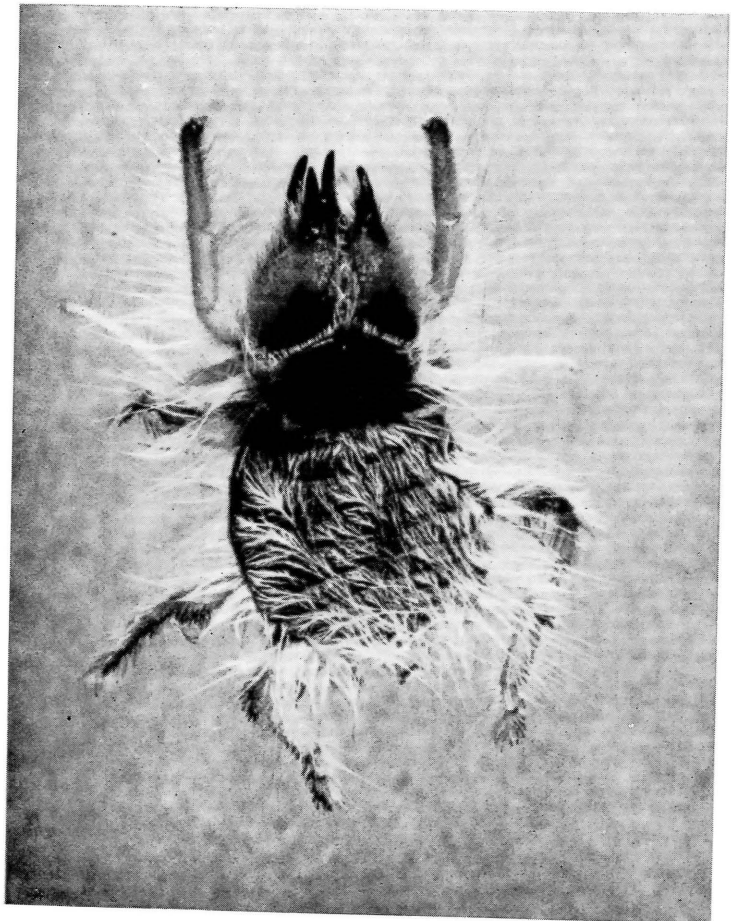


Figure 8. *Hexisopus moiseli* sp.n., dorsal view of holotype ♂.





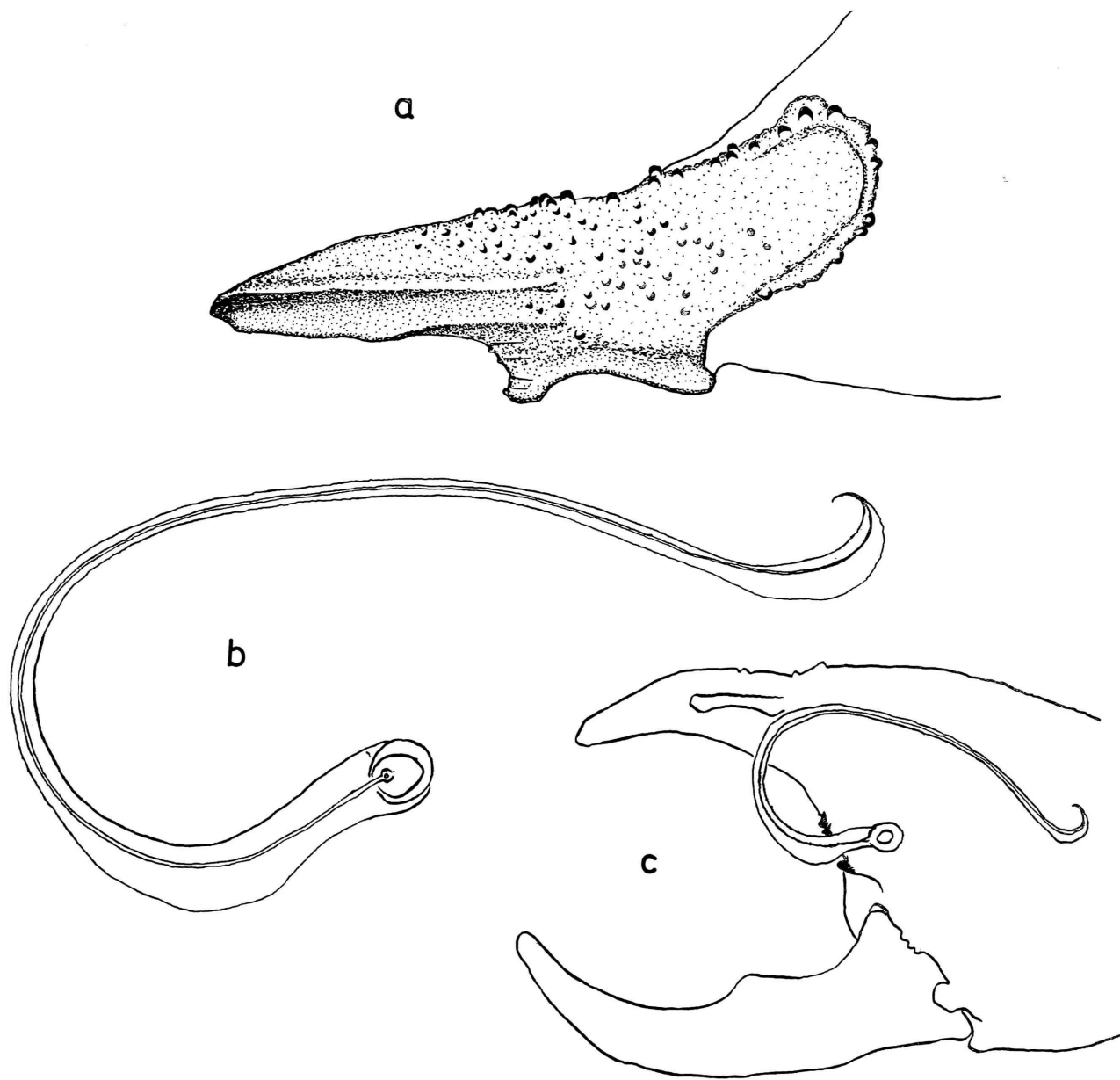


Figure 9. *Hexisopus moisei* sp.n., holotype ♂. *a*, distal end of dorsal jaw of right chelicera, dorsal aspect; *b*, right flagellum enlarged, seen from inner side; *c*, right chelicera from inner side.

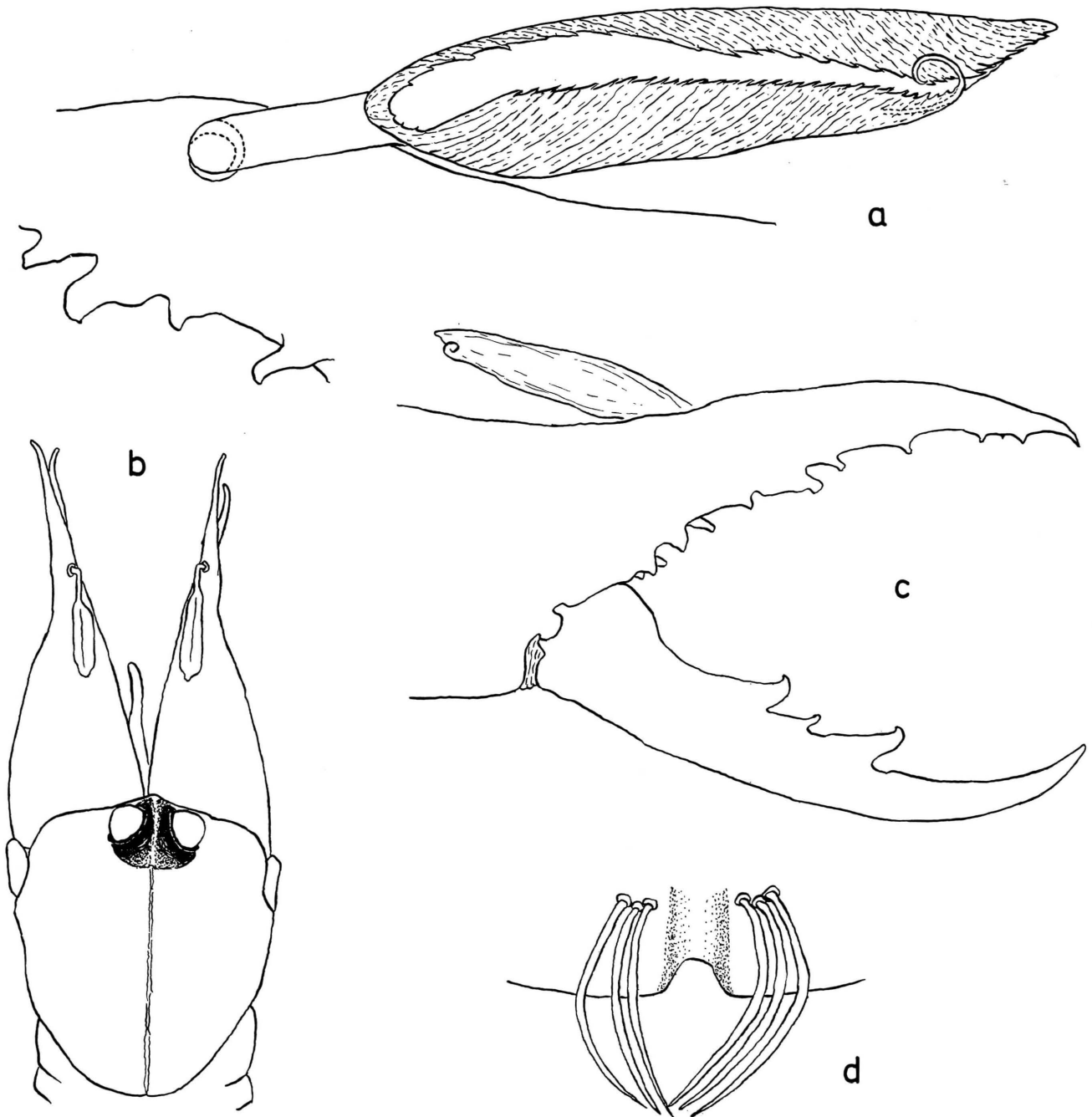


Figure 10. *Blossiola sabulosa* Lawrence, ♂ (NM 9186). *a*, right flagellum enlarged, seen from inner side; *b*, dorsal view of headplate and chelicerae; *c*, right chelicera seen from outer side; *d*, ctenidia.