

A description of
Hadogenes lawrencei
 sp. nov. (Sorpiones) with a
 checklist and key to the
 South West African species
 of the genus
Hadogenes

by
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DEDICATION

I should like to dedicate this paper to Dr. C. Koch to whom it was originally submitted as editor of the Scientific Papers of the Namib Desert Research Station. Dr. Koch took a great interest in the scorpion fauna of the Namib Desert and was a source of much inspiration. His help and encouragement shall always be remembered.

INTRODUCTION

Very few species of the genus *Hadogenes* Kraepelin, 1984 have been recorded from South West Africa and it is thus interesting to have a new and unique species from Harus in the Uri-Hauchab mountains of the southern Namib Desert. It appears that the Uri-Hauchab mountains have been separated from the Namib escarpment and inland plateau by a broad belt of sand for a very lengthy period of time, probably several million years. Scorpions of the genus *Hadogenes* are lithophilous and adapted to living in cracks and crevices in the rocks. Accordingly, the broad belt of sand between the inland plateau and the Uri-Hauchab mountains forms a positive ecological barrier to *Hadogenes* (Fig. 1). As the Uri-Hauchab *Hadogenes* presents several distinctive morphological differences, it is assigned to a new species, the description of which is provided below. It is named in honour of southern Africa's most distinguished arachnologist, Dr. R. F. Lawrence, who has devoted a great many years to studying and describing the arachnid faunas of southern Africa and in particular, S.W. Africa.

II Subfam. *Ischnurinae*

Gen. *Hadogenes* Kraepelin 1894
 Mt. Mus. Hamburg, 11, p. 113, 1894

Hadogenes lawrencei sp. nov.

Type material. Holotype ♀; T.M. 9362, possibly not fully grown and two-sub adult paratypes ♀, ♂, T.M. 9364 and T.M. 9395 respectively. Mr. P. Buys of the State Museum in Windhoek collected the holotype and ♀ paratype on the 8th May, 1969, while Mr. W. D. Haacke of the Transvaal Museum collected the only ♂ (T.M. 9395) on the 11th May, 1969. All specimens were collected in the vicinity of the Harus water hole (25°24'S; 15°10'E) in the Uri-Hauchab mountains. These scorpions were found beneath rocks on the mountain slope.

Diagnosis: The new species is nearest to *Hadogenes tityrus* Simon which it resembles in its small size, shape and size of the caudal segments and the low pectinal tooth number. It is, however easily distinguished from *H. tityrus* in having exceptionally long and slender pedipalps, which are very much longer than the body, and in having an even lower pectinal tooth number. Both these characters also distinguish the new species from all other known species and subspecies of the genus.

Description

Holotype, ♀, (T.M. 9362). (Fig. 2)

Carapace: Anterior margin of carapace shallowly excavated. Lateral eyes large, of equal size and arranged linearly, touching each other at the base. The very fine and even granulation imparts a matt appearance to the mesial area.

Tergites and Sternites: The tergites and sternites are smooth.

Pedipalps: Pedipalps exceptionally long and slender, being 4.75 times the length of carapace. On ventral surface of the brachium, a single slightly curved row of trichobothria extends more or less parallel to and near the posterior margin; cutting edges of the fingers of the chela armed with two neat rows of denticles; lobes at base of moveable fingers absent.

Legs: Dorsal and ventral anterior edges of the femur and patella of legs I—IV defined by well developed keels composed of denticles: area between keels flat. Anterior surfaces of femur and patella resemble the anterior crests of the palpal humerus and brachium.

Caudal segments: Segment I: Much wider than deep and about twice as wide as segment V. Weak well-rounded dorso-lateral keels in proximal third. Lateral keels also weak and well rounded. Segment II: Ventro-lateral and ventro-median keels consisting of a few anteriorly directed denticles. Barely discernible dorso-lateral

keels terminating distally with a weak denticle. Segment III: Ventral keels smooth, dorso-lateral keels smooth and each terminating distally in a weak denticle. Segment IV: Two ventro-medial keels represented by very weak well-rounded granules. Dorso-lateral keels terminating in a weak posterior denticle. Segment V: Dorso-lateral keels totally absent. Posterior third of segment without any keels and quite smooth and rounded. Ventro-lateral keels represented by a few large, sharp, posteriorly directed denticles. Ventro-medial keel represented by four posteriorly directed denticles which are situated between the ventro-lateral keels.

Vesicle: Without granulation.

Pectinal teeth: Each pectine comb with six teeth, implanted side by side and virtually without overlap (Fig. 3).

Genital operculum: Of a pentagonal shape (Fig. 3).

Measurements: These are provided in Table I.

Coloration: Provided in Table II.

Paratypes: (♂, T.M. 9395, ♀, T.M. 9364).

The only significant difference between the holotype and the paratypes is the genital operculum shape and structure of the pectinal combs in the male. Both these differences are because of sexual dimorphism. The male genital operculum shape is oval and each pectine comb has eleven teeth, implanted diagonally and overlapping as normal in all other species of the genus. (Fig. 3).

Discussion

The short tail and low pectinal tooth number relate the new species to *Hadogenes tityrus* Simon and to the other South African genera of the sub-family *Ischnurinae*, namely *Cheloctonus* and *Opisthacanthus*. *Hadogenes* is the only representative of this sub-family known to occur in S.W. Africa.

The very long and slender pedipalps are certainly a specialization unique to the new species. Only limited ecological information is at present available pertaining to the genus *Hadogenes*. These scorpions have a dorso-ventrally depressed body and are well adapted to inhabiting rock cracks and crevices. If the hypothesis is accepted that the pedipalps are also utilized to shield the scorpion during attack (Newlands, 1969), then it is evident that the exceptionally long pedipalps of this species provides a large span of anterior armour (Fig. 4). In the terrarium these scorpions were observed to walk about with both pedipalps extended antero-laterally. The pedipalps are well equipped with trichobothria and it is thus feasible that this wide span is advantageous in the detection of prey as well as enabling the scorpion to reach prey taking refuge in the extremities of rock cracks.

Of special interest is the structure of the female pectines and the keels on the dorsal and ventral anterior surfaces of the legs. Such keels are present on the legs of other species but are never as pronounced and regular, especially on the patella. The flat anterior inter-keel areas are best developed in the femur of each leg. The significance of these distinct leg structures is not clear but it seems possible that they serve to shield the pleural membranes (Fig. 4). The structure of the female pectines is interesting as the teeth are implanted side by side without overlap, a feature unique in the genus. This species also has the lowest number of pectinal teeth known.

Another unique character which the new species shares with *H. tityrus* is its small size and the apparent lack of a lobe at the base of the moveable finger of the chela in adult females. All other species are larger in size and have a well-developed lobe at the base of the moveable finger of the chela when fully grown (Lawrence, 1966). Some species of *Hadogenes* attain great size such as a male *H. troglodytes* (Peters) measuring 210 mm from carapace to vesicle. A female of the same species was found to weigh 32 grams (the specimen was not gravid) while the female holotype of the new species weighed only 0,5 gram. Other species known to attain very large size are *H. bicolor* Purcell, *H. gracilis* Hewitt, *H. granulatus* Purcell, *H. taeniurus* (Thorell) and *H. trichiurus* (Gervais).

Checklist of the South West African species of *Hadogenes*

Of the six species included in this checklist, four are known with certainty to occur in S.W. Africa and one, *Hadogenes bifossulatus* Roewer, should be regarded as a dubious species until further material from the Waterberg becomes available. *Hadogenes gracilis fluvialis* Lawrence occurs in the vicinity of Pofadder and Upington in the Cape. The Albany Museum does however record it from Onseepkans (28°45'S; 19°16'E) on the south bank of the Orange River and it is therefore expected to occur on the north bank in S.W. Africa as well.

Localities without reference are based on Lawrence (1955), the abbreviation N.M. in parenthesis denotes Natal Museum while A.M. denotes additional records based on the collection in the Albany Museum and supplied by Lawrence (*in litt.* 1969).

Hadogenes gracilis fluvialis Lawrence
Lawrence 1955, S. Afr. Anim. Life 1:122.

Type locality: Upington, Cape Province. (28°25'S; 21°15'E).

Other localities: 34 km N.E. of Pofadder (T.M. 9415); 25 km N. of Marydale (T.M. 9498); 24 km W. of Kenhardt (T.M. 9499); Marydale (A.M.); Kenhardt (A.M.); Onseepkans (A.M.).

Hadogenes lawrencei Newlands

Type locality: Harus water hole, Uri-Hau-chab mountains, S.W. Afr. (25°24'S; 15°10'E).

Hadogenes phyllodes (Thorell).

Ischnurus phyllodes Thorell 1877, Act. Soc. Ital. Sci. Nat. 19:257.

Type locality: Unknown, probably Namaqualand.

Other localities: S.W. Africa: Kraikluft, Great Karas Mountains (T.M. 1059, 1060); Farm Narudas No. 268, Karas Mountains T.M. 1061, 1063; Farm Eendoring No. 106, Warmbad distr. (T.M. 9523).

Cape Province: Richtersveld (not certain) (N.M. 9941); Spektakel Pass (T.M. 9400); 8 km south of Kenhardt (T.M. 9495); Bitterfontein (A.M.); and 40 km west of Rietpoort (A.M.)

Hadogenes taeniurus (Thorell)

Ischnurus taeniurus Thorell 1877, Act. Soc. Ital. Sci. Nat. 19: 254.

Type locality: Unknown.

Other localities: S.W. Africa: Uis (T.M. 9416); Ababis (A.M.); Kub (A.M.); Okahandja (A.M.); Farm Uithoek No. 770, Tsumeb distr. (T.M. 9786); Swartboois Drift, Kaokoveld (T.M. 9789–9794); 8 km S.E. of Epupu Falls (T.M. 9798); Epupu Falls, Kaokoveld (T.M. 9799).

South West Angola: Lucira (T.M. 8941); Lungo near Vila Arriaga (T.M. 8919–8921).

Hadogenes tityrus (Simon)

Ischnurus tityrus Simon 1877, Ann. Soc. Ent. France 6:383.

Hadogenes tityrus Kraepelin 1894, Mt. Mus. Hamburg 11: 118.

H. tityrus (Simon), redescribed, Lawrence 1966, Scient. Pap. Namib Desert Res. Stn. No. 8:5.

Type locality: Unknown.

Other localities: S.W. Africa: Kubub; Kaiser Wilhelm Berg near Windhoek; Lüderitzbucht; Farm Valencia No. 42 (T.M. 9384 and 9386); Farm Tiras No. 33, Tiras Mountains (T.M. 9302); Palmenhorst in Swakop River (T.M. 9302); Farm Narudas No. 268, Karas Mountains (T.M. 1062); Aus (T.M. 9738–9739); Macmillans Pass 15 km N.E. of Rosh Pinah (T.M. 9591–9592).

Cape Province: Lekkersing (A.M.); Okiep (T.M. 9686–9687).

Dubious species

Hadogenes bifossulatus Roewer

Roewer 1943, Senckenbergiana, 26: 232.

Type locality: Waterberg, S.W. Africa. Inadequately described, this species of doubtful validity was probably based on a very immature specimen (total length, 31 mm) although Roewer (1954) claims it to have been full grown. It is possibly synonymous with *H. taeniurus* (Thorell).

Key to the S. W. African species of *Hadogenes*:

- (1) Caudal segment I, deeper than wide (2)
Caudal segment I, wider than deep posteriorly (3)
- (2) Dorsal keels of caudal segments II and III terminating in a weak posterior tooth
H. phyllodes Thorell
Dorsal keels of caudal segments II and III terminating in a distinct posterior spine
H. gracilis fluvialis Lawrence
- (3) Sternite V with pronounced posterior lateral depressions
H. taeniurus Thorell
Sternite V without posterior lateral depressions (4)
- (4) Brachium of pedipalps equal to length of carapace. Pectinal teeth; ♀, 9–13; ♂, 13–16. Patella of leg IV, twice as long as maximum width
H. tityrus (Simon)
Brachium of pedipalp longer than carapace length; pectinal teeth ♀ 6; ♂ 11. Patella of leg IV, 2½ times as long as maximum width
H. lawrencei

Table 1. *Hadogenes lawrencei* sp. nov. Measurements of the types in millimetres.

| | Holotype T.M.9362 | Paratypes | |
|--|----------------------|-----------------|-----------------|
| | | T.M.9364 (♀) | T.M.9395 (♂) |
| Carapace length (max.) | 8,5 | 7,8 | 7,8 |
| Carapace width (max.) | 8,5 | 7,9 | 7,8 |
| Pedipalp length | 41,0 | 36,4 | 36,8 |
| Width of the pedipalp humerus | 2,7 | 2,6 | 2,7 |
| Length of handback | 12,0 | 10,2 | 10,0 |
| Width of hand | 4,0 | 3,9 | 3,6 |
| Length of leg IV (from anterior of coxa to tarsus) | 30,0 | 27,7 | 28,5 |
| Caudal segment I, width (max.) | 2,1 | 1,95 | 2,0 |
| Caudal segment I, height (max.) | 1,5 | 1,5 | 1,5 |
| Caudal segment V, width | 1,1 | 1,0 | 1,1 |
| Length of trunk | 27,8 | 25,3 | 27,5 |
| Length of tail | 23,5 | 21,0 | 21,0 |
| Total length (carapace to aculeus) | 49,5 | 47,0 | 48,5 |
| Total width across pedipalps | 89,3 | 78,2 | 78,6 |

SUMMARY

A distinctive new species of lithophilous scorpion, *Hadogenes lawrencei* from the southern Namib Desert is described, bringing the number of species of *Hadogenes* from S.W.Africa to four. A checklist and key for the separation of species is provided.

ACKNOWLEDGEMENTS

I should like to thank Mr. P. Buys of the State Museum, Windhoek and Mr. W. D. Haacke of the Transvaal Museum, Pretoria for collecting the type material, and Mr. B. H. Lamoral for sending material from the Natal Museum. Dr. R. F. Lawrence deserves special thanks for his constant help and encouragement and for reading and commenting upon the manuscript of this paper.

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Table 2. Colouration* of spirit preserved specimens of *Hadogenes lawrencei* sp. nov. and *H. tityrus* Simon.

| Specimen | Carapace | Tergites | Sternites | Cauda | Chela (Dorsally) | Legs (Dorsally) | Legs (Ventrally) | Munsell Colour |
|--|------------|------------|-----------|---------------|------------------|-----------------|------------------|--|
| <i>Hadogenes lawrencei</i> sp. nov. <i>Holotype</i> : T.M.9362 | 5 YR 2/3 | 10 YR 3/2 | 5 YR 4/3 | 5 G 2/1 | 7,5 YR 2/2 | 5 YR 3/2 | 7,5 Y 4/3 | Very dark reddish brown Olive black Dark olive Greenish black Brownish black Dark reddish brown Dark olive |
| <i>Hadogenes tityrus</i> Simon T.M.9306 | 5 Y 6/4 | 7,5 Y 5/3 | 10 Y 4/2 | 5 Y 7/6 | 5 Y 7/6 | 5 Y 7/6 | 5 Y 7/6 | Olive yellow Greyish olive Olive grey Yellow |
| T.M.9384 (Freshly killed) | 7,5 YR 4/4 | 7,5 YR 4/4 | 10 YR 4/4 | 7,5 YR 1. 7/1 | 7,5 YR 1. 2/2 | 2,5 Y 5/3 | 2,5 Y 6/3 | Brown Brown Black Brownish black Yellowish grey Dull yellow |

*Colour determined by means of "Standard Soil Colour Charts" (Oyama & Takehara 1967)

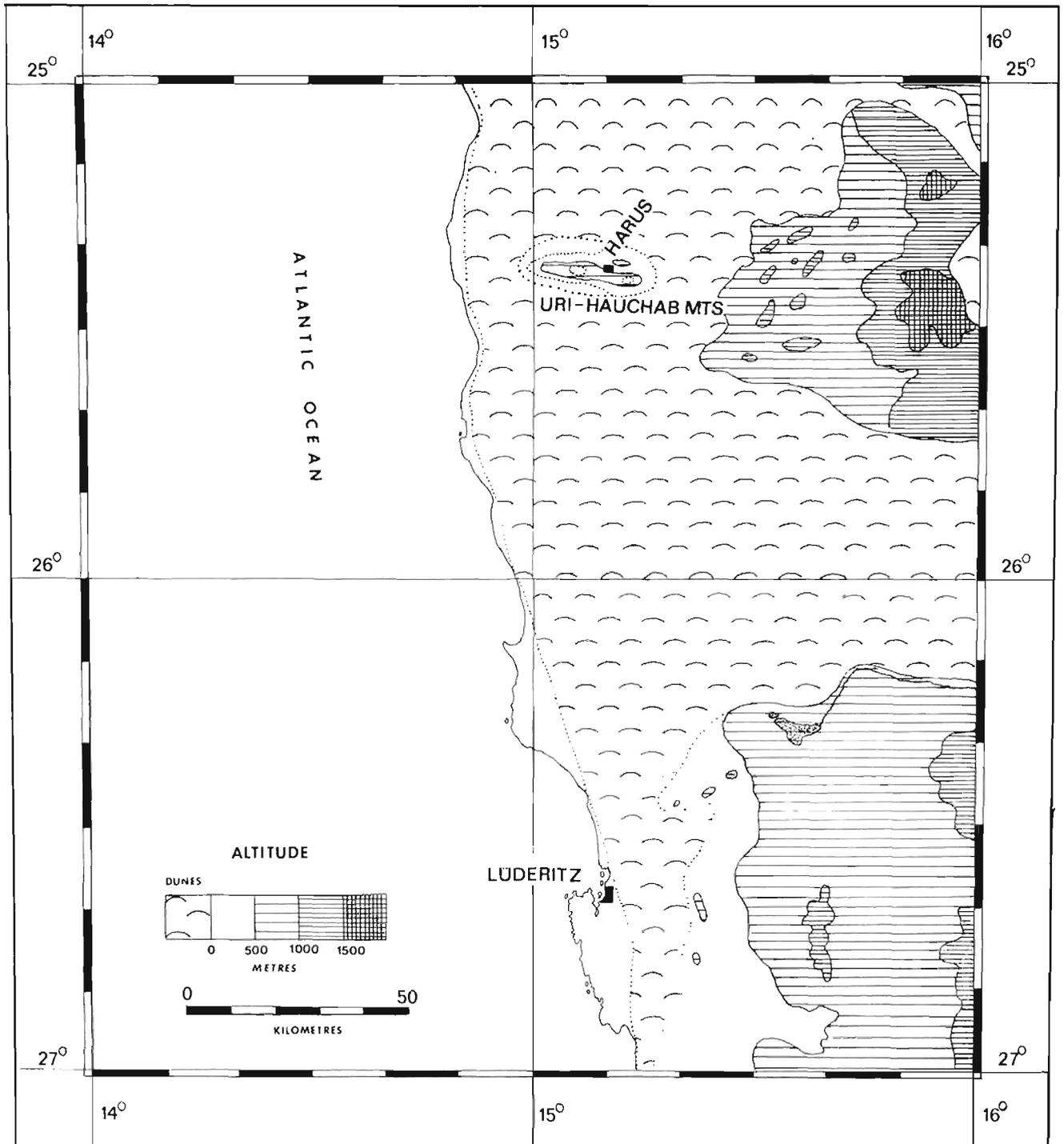


Figure 1. Map showing the location of Harus, the type locality of *Hadogenes lawrencei* sp. nov. The width of the sand dune belt between the Uri-Hauchab mountains and the inland plateau is about twenty kilometres.

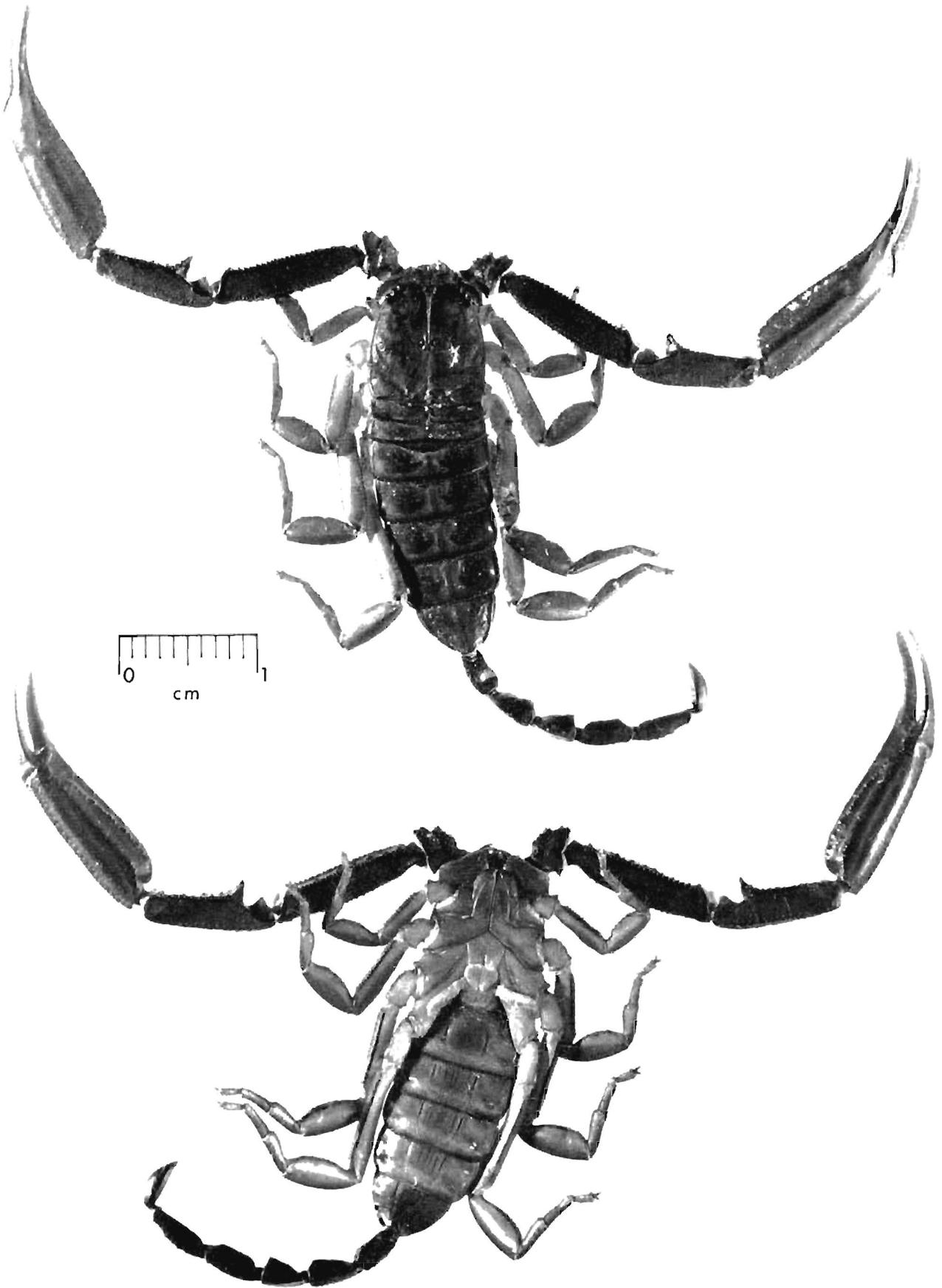


Figure 2. Dorsal and ventral views of the female holotype of *Hadogenes lawrencei* sp. nov. (T.M.9362).

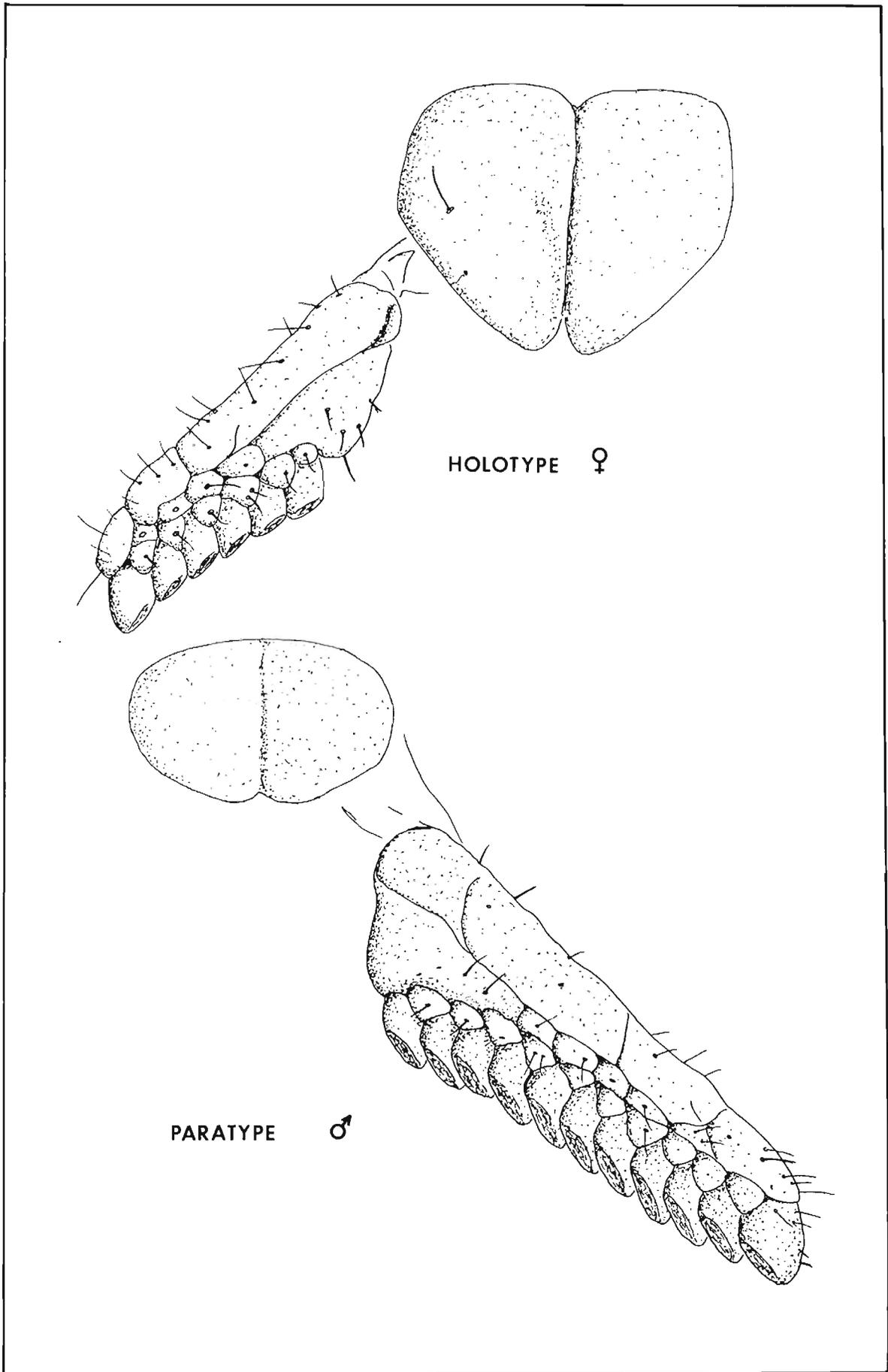


Figure 3. Pectinal combs of *Hadogenes lawrencei* sp. nov. showing the degree of sexual dimorphism.

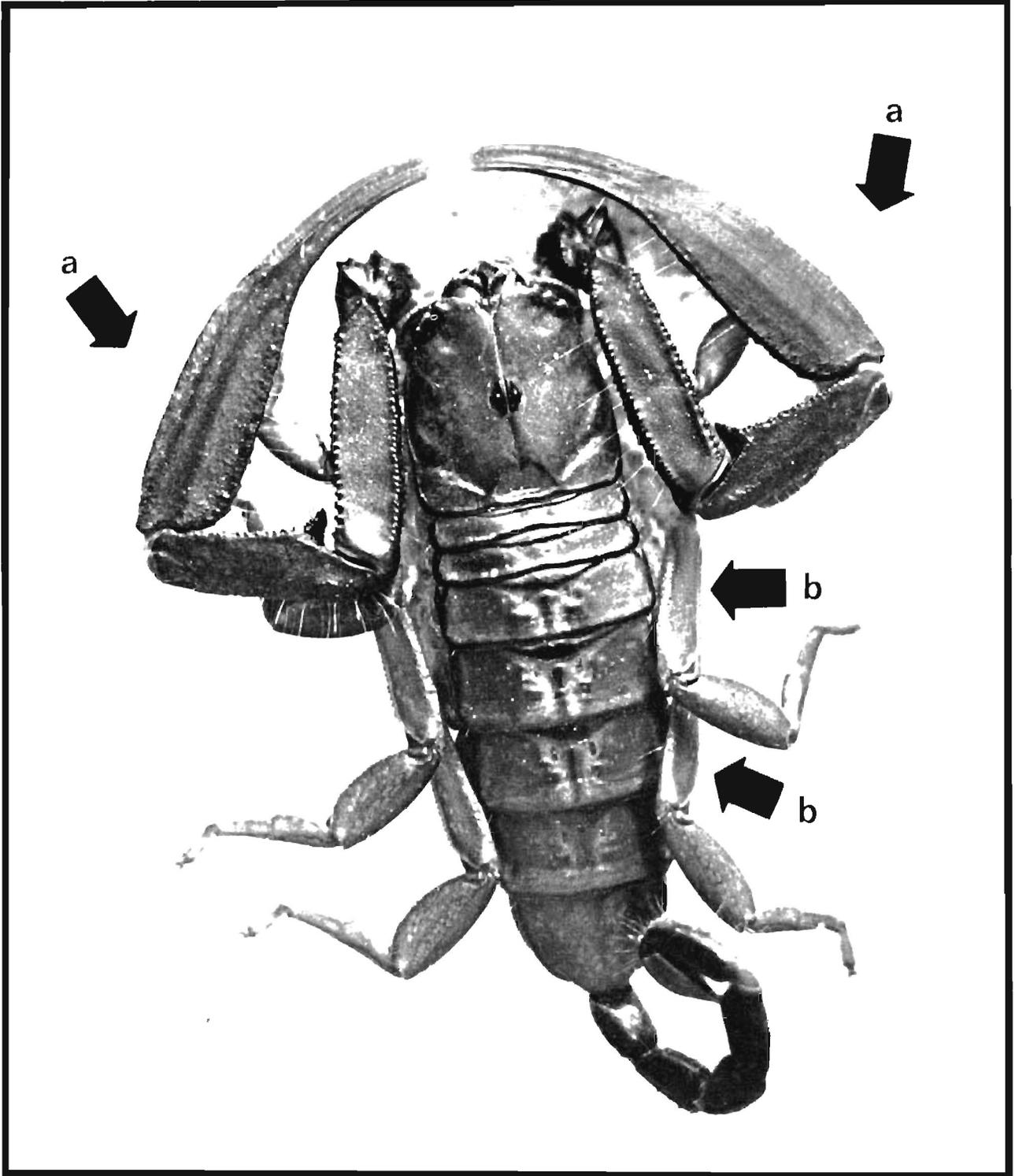


Figure 4. A live male paratype in its normal resting posture in the laboratory. When adopting this posture in a narrow rock crack or crevice, the pedipalps provide a wide span of anterior shielding (a,a) and the leg femurs shield the pleural membranes (b,b).