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## NEW SPECIES AND RECORDS OF CHTHONIID PSEUDOSCORPIONS

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In the present paper there are reported the results of the study of an accumulation of chthoniid pseudoscorpions. Although some of the species reported here are well known in the literature, it seems advisable to list the locality records since many of these records serve to extend the geographical ranges of the species involved. Two species are recorded as new to the literature. Both of these are from Australia and were submitted for study by Dr. J. A. Tubb of the Fisheries Department, Sandakan, Colony of North Borneo. The types of the two new species are deposited in the American Museum of Natural History.

SUBORDER HETEROSPHYRONIDA J. C. CHAMBERLIN

FAMILY **CHTHONIIDAE** HANSEN

*Chthoniinae* DADAY, 1888, *Térmész. füzetek*, vol. 11, p. 167.

*Chthoniidae* HANSEN, 1893, *Ent. Meddel.*, ser. 3, vol. 4, p. 232.

Members of this family can be recognized by the transversely oriented respiratory spiracles that are not accompanied by separate guard sclerites. A basic discussion of the classification of the Chthoniidae will be found in Beier's monograph (Beier, 1932) under the caption of the subfamily Chthoniinae.

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## TRIBE CHTHONINI J. C. CHAMBERLIN

*Chthonini* CHAMBERLIN, 1929, Ann. Mag. Nat. Hist., ser. 10, vol. 4, p. 68.

Forms belonging to the Chthonini can be recognized by the presence of two tactile setae, IB and ISB, located as a transverse pair on the dorsum of the chelal hand. As far as the present paper is concerned, the discussion of the genera of Chthonini as given by Beier (1932) is so satisfactory that generic diagnoses and discussions for the most part have been omitted.

**Chthonius (Chthonius) ischnocheles** (Hermann, 1804)

*Chelifer ischnocheles* HERMANN, 1804, Mémoire aptérologique, Strasbourg, p. 118.

*Chthonius Pennsylvanicus* HAGEN, 1869, Record of American entomology for the year 1868, p. 52.

*Chthonius (Chthonius) ischnocheles* BEIER, 1932, Das Tierreich, vol. 57, p. 48.

RECORDS: One male collected by G. von Krockow at Palisades on Hudson, New Jersey, on June 26, 1909, and four individuals taken at "Palisades," Alpine, New Jersey, on September 4, 1904, by G. von Krockow and E. F. Barnum. Both of these collections were previously identified as "*Chthonius pennsylvanicus* Hag.," the label being apparently in the handwriting of Nathan Banks. A third collection, consisting of a single male, bears the label "Harrow, T. H. S., 1946" as well as the identification "*Chthonius ischnochelus*." All three collections are deposited in the American Museum of Natural History.

REMARKS: The three males examined appear to be somewhat smaller in size than indicated for this species by Beier (1932, 1949). However, until it is possible to compare these specimens with authentically identified material from Europe, it seems advisable to assign these specimens to the species *Chthonius ischnocheles*.

**Chthonius (Ephippiochthonius) tetrachelatus** (Preyssler, 1790)

*Scorpio tetrachelatus* PREYSSLER, 1790, Verzeichniss böhmischer Insecten, p. 59.

*Chthonius tetrachelatus* var. *maculatus* Menge, STECKER, 1875, Deutsche (Berliner) Ent. Zeitr., vol. 19, p. 314.

RECORDS: Two males taken beneath stones on March 20, 1939, by J. Palmoni at Tiberias, Palestine; one collection from Rowayton, Connecticut, and one from Cape May, New Jersey,

by C. J. and M. Goodnight; eight collections from leaf mold, under stones, and under pine bark in Maryland by M. H. Muma; one collection from Rock Creek Park, Washington, D. C., by K. Sommerman; one collection from Telford, Pennsylvania, by Lewis Stannard; two collections from North Carolina by D. L. Wray; one collection from Gainesville, Georgia, by B. J. Kaston; two collections from Lexington, Kentucky; two collections by Patricia Thomas at Mariemont, Ohio; and four collections from Illinois.

REMARKS: This is an exceedingly variable species, but one which defies all attempts towards subdivision into either species or subspecies. Among other characteristics of this species, Beier (1932) mentions the presence of two setae on the posterior margin of the carapace. The writer has found that in nearly every collection examined some individuals exhibit two setae and other individuals have four setae along the posterior carapacial margin. In addition to the great individual variation shown by this species, sexual dimorphism, especially with respect to the chela, is much more marked than heretofore indicated in the literature. One or two individuals from each of the above collections were mounted and examined in detail. It was found that the most marked difference between male and female lies in the depth of the chelal hand and the ratio of the length of the chela to the depth of the chelal hand. In the 11 females measured, the depth of the hand ranges from 0.16 to 0.19 mm. and the ratio of the length of the chela to the depth of the hand ranges from 4.5 to 4.9. The 18 males examined indicate that the range of the depth of the chela is from 0.125 to 0.155 and the ratio of the chelal length to the depth of the hand is 5.3 to 6.0. The possibility of overlapping of the ranges of the above measurements and ratios in the two sexes would appear to be very small.

#### KEWOCHTHONIUS J. C. CHAMBERLIN

*Kewochthonius* CHAMBERLIN, 1929, Ann. Mag. Nat. Hist., ser. 10, vol. 4, p. 65.

*Neochthonius* CHAMBERLIN, 1929, Ann. Mag. Nat. Hist., ser. 10, vol. 4, p. 66.

At the time of the erection of the genus *Neochthonius*, Chamberlin (1929) pointed out that the genus would become a synonym of the genus *Kewochthonius* in the event that the genotype, *K. halberti* (Kew), of the latter genus should on future investigation be found to possess an intercoxal tubercle. Chamberlin (*in litt.*) has on study of additional specimens of *K. halberti*

found a tubercle present. As a result, *Neochthonius* becomes a synonym of *Kewochthonius* since *Kewochthonius* has priority by pagination and by the desires of the original author.

Numerous authors have considered the genus *Neochthonius* as a subgenus of the genus *Chthonius* C. Koch. It is the opinion of Chamberlin (*in litt.*) as well as the opinion of the present writer that the genus *Kewochthonius* should stand as a separate and distinct genus, differing from *Chthonius* chiefly in the nature of the teeth of the chelal fingers, these teeth being acute and well spaced in the species of *Chthonius* but forming a continuous row or series of small and usually blunt teeth in the genus *Kewochthonius*.

***Kewochthonius paludis* (Chamberlin, 1929) new combination**

*Neochthonius paludis* CHAMBERLIN, 1929, Ann. Mag. Nat. Hist., ser. 10, vol. 4, p. 66.

*Chthonius (Chthonius) pearsei* HOFF, 1945, Trans. Amer. Micro. Soc., vol. 64, p. 316.

RECORDS: Three collections taken by D. L. Wray in North Carolina: a single female from leaf mold at Concord on October 7, 1948; several specimens taken from hardwood leaf mold at Yanceyville on October 27, 1948; and a large number of individuals from leaf mold at Pittsboro on October 7, 1948. In addition, a single male has been found in a collection of the Illinois Natural History Survey, the collection having been taken by Lewis Stannard on March 28, 1943, at Reelfoot Lake, Tennessee. This last collection extends considerably the geographic range of this species, which previously has been reported from Georgia (Chamberlin, 1929) and from North Carolina (Hoff, 1945).

REMARKS: The palpal podomeres of the male from Tennessee appear to be slightly larger than those of the specimens from North Carolina. In spite of this difference in size, the specimens from the two areas are certainly conspecific.

***Apochthonius moestus* (Banks, 1891)**

*Chthonius moestus* BANKS, 1891, Canadian Ent., vol. 23, p. 165.

*Apochthonius moestus* CHAMBERLIN, 1929, Ann. Mag. Nat. Hist., ser. 10, vol. 4, p. 67.

RECORDS: Thirty-eight records based chiefly on the collections of the Illinois Natural History Survey, D. L. Wray, and

M. H. Muma indicate that this species is a common inhabitant of leaf mold of the deciduous forest throughout North Carolina and Maryland, as well as in the states of the Mississippi River valley. One record is from Pennsylvania. A very unusual record is one from Denton County, Texas, based on a collection of the Illinois Natural History Survey, the specimens having been taken by B. Maxwell from leaf mold on sand soil, December 28, 1946.

***Kleptochthonius multispinosus* (Hoff, 1945) new combination**

*Heterochthonius multispinosus* HOFF, 1945, Trans. Amer. Micro. Soc., vol. 64, p. 314.

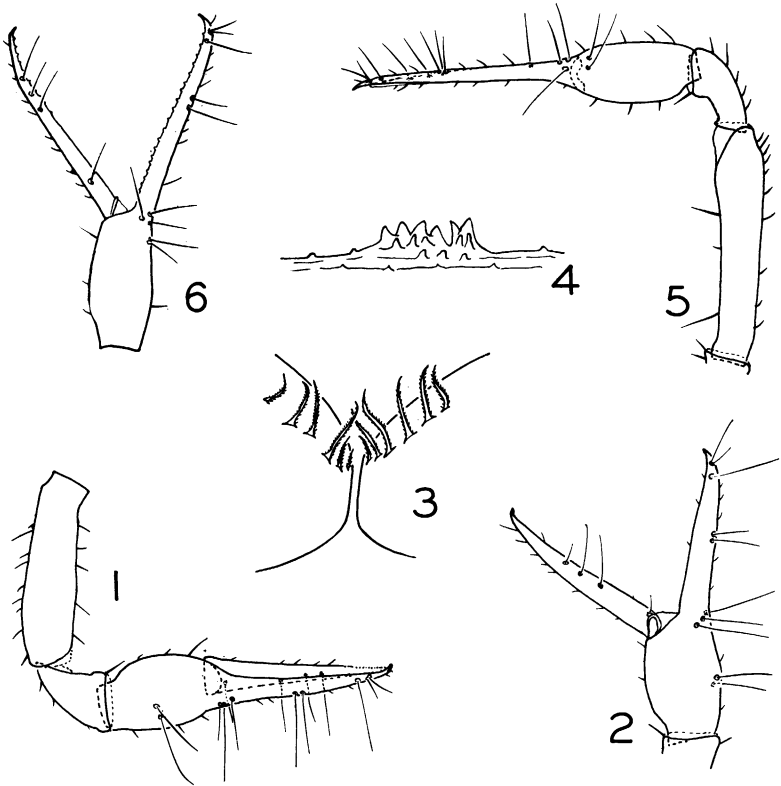
RECORDS: One female from Monte Sano, Madison County, Alabama, by A. F. Archer in December, 1940; three males from Bowen, Kentucky, on May 8, 1947, collected by P. O. R. and M. W. S., Acc. No. 49372, Illinois Natural History Survey; three females and one male from Newfound Gap, Great Smoky National Park, North Carolina, by Clarence and Marie Goodnight, June 21, 1941; two females from Hillsboro, North Carolina, by D. L. Wray, on October 26, 1948, from hardwood leaf mold near the Eno River; and one male from leaf mold at Mt. Pisgah, North Carolina, 5000 feet elevation, by D. L. Wray, April 7, 1949.

REMARKS: This is a fairly common and widely distributed form found in the leaf mold of the deciduous forest (Hoff, 1949). The present material, especially that from Kentucky and Tennessee, indicates that there is much more variation in the species than was previously indicated. This variation is chiefly in the size of the podomeres of the palpi, some individuals approximating *H. crosbyi* (Chamberlin, 1929) in this respect. At the same time the length:width ratio of the palpal femur clearly indicates that these specimens are *multispinosus* and not *crosbyi*. In collections containing individuals that are small in size, there will be found some individuals that fall within the size limits described by Hoff (1949) for *H. multispinosus*.

***Austrochthonius australis*, new species**

Figures 1-3

A species of the genus *Austrochthonius* as diagnosed by Beier (1932). The description of this new species is based on the single



FIGS. 1-3. *Austrochthonius australis*, new species, female holotype. 1. Dorsal view of palp. 2. Lateral view of chela. 3. Spines of coxae of second leg.

FIGS. 4-6. *Tubbichthonius solitarius*, new species, male holotype. 4. Epistome of carapace. 5. Dorsal view of palp. 6. Lateral view of chela.

available individual, the female holotype. The male is unknown.

**FEMALE:** Body and appendages golden yellow in color; body fairly stout; length between 1.15 and 1.2 mm. Carapace wide and subquadrate in shape; apparently with 20 setae; lateral margins weakly convex in the anterior part; posterior margin nearly straight and with four setae; anterior margin with a blunt epistome, medial half of anterior margin including epistome markedly serrate; dorsal surface of carapace almost smooth, lateral portions marked by net-like lines; anterior eye of each side removed from the anterior carapacial margin by a little more than the diameter of the eye, posterior eye removed from the anterior eye by about the diameter of the latter; anterior eye with

convex cornea, cornea of posterior eye flattened; length of carapace 0.46 mm., greatest width and posterior width 0.42 mm., ocular breadth 0.36 mm. With respect to abdomen, chaetotaxy of the tergites appears to be as described for the genus; most sternites apparently with six to eight setae, exact number difficult to determine from present specimen; sclerites of the abdomen very weakly sculptured to smooth; pleural membrane apparently unsculptured; abdomen about 0.7 mm. long.

Chelicera fairly stout; margins of hand rounded or evenly convex; medial border of the hand marked by scale-like sculpturing; base of hand and fixed finger with four setae; flagellum as usual in the genus; length of chelicera 0.30 mm., width of base 0.18 mm. Fixed cheliceral finger basally stout, terminally acute; inner margin with 10 or 11 conical teeth, the distalmost being the largest and the teeth becoming smaller towards the basal end of the series. Movable cheliceral finger moderately stout; with about 18 marginal teeth, these showing some irregularity in size and becoming minute at the basal end of the series; a definite knob representing the galea; galeal seta located slightly basad of the midpoint of the finger; serrula exterior apparently consisting of 14 plates, but tightly closed condition of chelicerae precludes an exact count; length of movable finger 0.173 mm.

Palpus (fig. 1) moderately stout; surface of podomeres virtually smooth; setae not numerous. Maxilla 0.245 mm. long, 0.12 mm. wide. Trochanter with a very short and concave flexor margin without setae, convex extensor margin with several long setae, especially near the distal end; length 0.158 mm., width 0.097 mm. Femur with both extensor and flexor margins a very little concave; widest towards the distal end; setae longer and more numerous on the extensor than on the flexor surface; length 0.36 mm., width 0.095 mm. Tibia subtriangular, extensor margin evenly convex, flexor margin nearly straight; length 0.175 mm., width 0.105 mm. Chela with a fairly stout hand, extensor margin flatly convex, flexor margin more strongly and evenly convex; pedicle poorly developed; fingers from dorsad nearly straight, not especially slender; length of chela 0.55 mm., width 0.135 mm. From the side, chela (fig. 2) with the dorsal margin of the hand very weakly and unevenly convex, ventral margin more evenly convex, especially convex in the basal portion; fixed finger nearly straight, movable finger very little curved; chaetotaxy as shown in the figure; teeth of finger margins sub-

quadrate in general outline; teeth of fixed finger about 50 in number, spaced throughout the entire finger margin, and becoming gradually reduced in size in the basal third of the finger margin; movable finger with about 40 teeth, these becoming reduced in size near the midpoint of the finger and becoming vestigial and then entirely wanting in the basal fourth of the margin; hand 0.195 mm. long, 0.135 mm. deep; movable chelal finger 0.36 mm. in length.

Legs with surface of podomeres smooth; setae large and not numerous except small and numerous on the tarsi. Second leg with well-developed coxal spines (fig. 3), six on each coxa; each coxal spine flattened, long, and slender; each spine arising from an individual insertion and feathered along the entire length of both margins; the medial one or two of each row smaller than the others. First leg with trochanter triangular, 0.102 mm. long, 0.078 mm. deep; pars basalis more or less cylindrical, a little deeper near the distal end than elsewhere, length 0.187 mm., depth 0.060 mm.; pars tibialis subcylindrical or subquadrate, extensor margin a little convex, length 0.105 mm., depth 0.052 mm.; tibia subcylindrical, deeper in the distal part than elsewhere, length 0.109 mm., depth 0.043 mm.; tarsus slender, tapering somewhat towards the distal end, length 0.206 mm., depth 0.035 mm. Fourth leg with trochanter 0.128 mm. long, depth 0.086 mm.; femur stout, few setae present, entire femur 0.319 mm. long, 0.148 mm. deep; pars basalis 0.152 mm. in length measured along the flexor margin, maximum depth 0.148 mm.; pars tibialis with extensor margin more convex than flexor margin, 0.202 mm. in length as measured along the extensor margin, depth 0.132 mm.; tibia very slightly S-shaped, much deeper and appearing somewhat swollen in the distal half, a tactile seta near the midpoint of the extensor margin, length 0.226 mm., depth 0.068 mm.; metatarsus with both margins nearly straight, deepest at the basal margin and narrowing rapidly towards the distal end, 0.095 mm. long, 0.054 mm. wide; telotarsus more or less cylindrical, a little less deep towards the distal end, 0.202 mm. long, 0.035 mm. deep.

The female genitalia appear to be very simple but, owing to a break in the mounted animal, cannot be described in detail.

**TYPE LOCALITY:** A single female, the holotype, from Mt. Slide, a minor peak about 40 miles northeast of Melbourne, Victoria, Australia; collection by J. A. Tubb, July 15, 1930.



REMARKS: The present species extends markedly the geographical range of this genus, which was formerly known only from South America. The species *A. australis* differs from previously described species of the genus in the details of the chelicera, palpus, and coxal spines.

TRIBE PSEUDOTYRANNOCHTHONIINI BEIER

*Pseudotyrannochthoniini* BEIER, 1932, Das Tierreich, vol. 57, p. 69.

DIAGNOSIS: No medially located tactile setae on the chelal hand; tactile seta IB located near the base of the fixed finger, ISB chiefly lacking. Coxal spines only on coxa I. Intercoxal tubercle either absent or present.

Genera belonging to this tribe can be separated by the following key, which includes *Tubbichthonius*, a new genus described below.

- 1. Intercoxal tubercle lacking.....2  
 Intercoxal tubercle present.....3
- 2. The spines of coxa I are inserted singly on the coxa (two South American species).....*Pseudotyrannochthonius* Beier, 1930  
 The spines of coxa I are at least in part grouped together and arise out of a common base (three South African species)..*Afrochthonius* Beier, 1930
- 3. Coxal spines of coxa I simple, springing from a common base (two Asiatic species).....*Centrochthonius* Beier, 1931  
 Coxal spines of coxa I not terminally simple, each spine inserted individually.....4
- 4. Chela with tactile seta IB on the fixed finger near the base; eyes absent; cave-inhabiting form (one South African species).....  
 .....*Chthoniella* Lawrence, 1935  
 Chela with tactile seta IB on the hand near the base of the fixed finger; eyes present (one species from Australia).....  
 .....*Tubbichthonius*, new genus

TUBBICHTHONIUS, NEW GENUS

DIAGNOSIS: With characteristics of the Chthoniidae and the Pseudotyrannochthoniini. Carapace with lateral margins roughly parallel but a little convex, widest in the posterior portion; two pairs of well-developed eyes; 18 setae on carapace. Chelal hand with tactile setae IB and ISB located just proximal to the base of the fixed finger; teeth of margins of chelal fingers widely spaced, conical, acute. Coxa I with numerous coxal spines arranged in a linear series, each spine inserted individually into the surface of the coxa and each appearing somewhat feather-like. Intercoxal tubercle with two setae.

GENOTYPE: *Tubbichthonius solitarius*, new genus and new species.

REMARKS: This genus shows close affinities to *Centrochthonius* from Asia and to *Chthoniella* from extreme southern Africa. Morphological differences between *Tubbichthonius* and other genera of Pseudotyrannochthoniini are indicated in the above key. The genus is named in honor of J. A. Tubb.

### ***Tubbichthonius solitarius*, new species**

Figures 4-6

The species description is based on the single available individual, the male holotype. The species name *solitarius* has reference to the presence of a single individual in the collection.

MALE: Light golden yellow in color; body length 1.7 mm. Carapace with surface marked by a reticulate pattern, becoming somewhat scale-like on the sides of the carapace; posterior margin concave and with two well-developed marginal setae; lateral margins weakly convex, especially just anterior to the center; anterior margin nearly straight, with an irregularly toothed medial epistome (fig. 4); setae of carapace variable in size, the longer ones with a tendency to be lanceolate in shape; eyes well developed, the anterior eye of each side separated from the anterior carapacial margin by about the lesser diameter of the eye, the two eyes of each side separated by about one-half of the lesser diameter of the anterior eye; a strong seta inserted at the anterior margin of the posterior eye; carapace 0.47 mm. long, 0.40 mm. in greatest breadth; posterior width 0.40 mm.; ocular breadth 0.39 mm. Abdomen somewhat slender, wider towards the posterior portion; neither tergites nor sternites divided. Tergites with reticulated surface; tergite 1 with one pair of setae, each of tergites 2 and 3 with two pairs of setae; each of tergites 4 through 7 with three pairs of setae, the lateral seta being small in the fourth and fifth tergites; the eighth tergite apparently with seven setae, the ninth with five; tenth tergite with four setae. Sternites very weakly sculptured; the third sternite with eight well-developed and medially placed marginal setae and in addition with four small setae in a transverse linear series just anterior to each spiracle; fourth sternite with six marginal setae and three small setae anterior to each spiracle; each more posterior sternite usually with six to eight

medially placed and large marginal setae with one to three smaller and more laterally placed setae on each side; setae of posteriormost sternites very long. Each spiracle distinctly paralleling the posterior margin of its sternite and very long. Pleural membranes marked by extremely small and very minute spinule-bearing tubercles; abdomen 1.23 mm. long, 0.70 mm. wide.

Chelicera fairly stout; fixed finger and hand with eight setae, the extra and accessory setae small and more or less confined to the basal portion of the hand; palm of hand with surface reticulate, small spinules on the inner surface of the hand; flagellum of about eight feathered and flexible setae; chelicera 0.40 mm. in length, base 0.20 mm. wide. Fixed finger gently curved, apex acute, basal two-thirds of finger margin paucidenticulate with the distalmost tooth very large and acute, others smaller; serrula interior of 18 well-defined ligulate plates. Movable cheliceral finger fairly well curved, apex sharply pointed, inner margin except for the basal one-fourth with numerous and fairly uniform dentations directed somewhat distally; serrula exterior of 21 to 22 plates; galeal seta located a little proximal to the midpoint of the finger; movable finger 0.225 mm. long.

Palpus (fig. 5) with surface of podomeres marked by a poorly developed scale-like or reticulate pattern except on the chelal fingers; maxilla with only three or four setae, length 0.43 mm., width about 0.24 mm. Trochanter subtriangular, flexor margin gently curved, length 0.20 mm., width 0.13 mm. Femur without pedicle, subcylindrical in outline, both extensor and flexor margins a little concave near the center so that the two ends of the podomere appear a little wider than the middle portion, a few small acuminate setae on the extensor margin, setae of the flexor margin several times longer than those of the extensor margin; femur widest near the distal end; length 0.65 mm., width 0.138 mm. Tibia without pedicle, widest near the distal end; extensor margin gently convex and with several setae of moderate length, flexor margin very little concave and seemingly without setae except at the very distal end; length 0.255 mm., width 0.132 mm. Chela from the dorsad with hand fairly stout and fingers very long and slender, extensor margin flattened and nearly straight except at the ends, flexor margin gently convex; pedicle poorly developed; hand narrowed at finger base;

setae much more numerous on the extensor than the flexor surface; fingers nearly straight in dorsal view; chela 0.96 mm. long, 0.17 mm. wide; movable finger 0.59 mm. in length. From the side, hand (fig. 6) with both margins gently convex, the ventral a little more so than the dorsal; fixed finger nearly straight except at the end; movable finger nearly straight except curved near the distal one-third; hand 0.345 mm. in length, 0.17 mm. in depth. Tactile setae of chela arranged as shown in the figures. Marginal teeth of chelal fingers widely spaced and acute; 19 teeth spaced along almost the entire margin of the fixed finger; movable finger with 10 well-spaced and acute teeth confined to the distal half, with some indication of contiguous vestigial teeth on the more proximal portion of the finger margin.

Legs slender except for the basal podomeres of the third and fourth legs; surfaces of podomeres chiefly marked by weakly developed, net-like or scale-like impressions, these best seen when the legs are treated with caustic; basal podomeres with few setae; distal podomeres, especially the tarsi, very setaceous. First leg with 10 long coxal spines, each deeply incised in the terminal half, usually trifid; trochanter of first leg with gently convex flexor margin, length 0.165 mm., depth 0.128 mm.; pars basalis more or less cylindrical, slightly deeper near the distal end than elsewhere, extensor margin with numerous short setae, flexor margin with much longer setae, length of pars basalis 0.37 mm., depth 0.085 mm.; pars tibialis with both margins nearly straight, distinctly deeper at the distal third or fourth than elsewhere, length 0.234 mm., depth 0.068 mm.; tibia more or less cylindrical, length 0.214 mm., depth 0.056 mm.; tarsus with both margins nearly straight, deepest at the proximal end and becoming gradually narrowed towards the distal end, length 0.396 mm., depth 0.050 mm. Fourth leg with trochanter 0.21 mm. long, 0.128 mm. deep; femur stout, with margins of pars tibialis very weakly convex, length of entire femur about 0.59 mm., depth about 0.22 mm. (measurements from leg treated with caustic); tibia weakly S-shaped, fairly stout, length 0.43 mm., depth 0.093 mm.; metatarsus with both margins nearly straight, widest across the proximal margin and becoming narrowed distally, length 0.183 mm., depth 0.074 mm.; telotarsus subcylindrical, length 0.43 mm., depth 0.047 mm.

Genital complex with 10 setae on the anterior operculum; posterior operculum with eight setae along the posterior margin

and a linear group of five setae along each side of the genital opening.

**TYPE LOCALITY:** One male, the holotype, collected by J. A. Tubb at Mt. Slide, about 40 miles northeast of Melbourne, Victoria, Australia, on July 15, 1930.

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