

## The family Troglosironidae (Opiliones: Cyphophthalmi) of New Caledonia

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### ABSTRACT

Six new species of litter-inhabiting harvestmen of the genus *Troglosiro* (Opiliones: Cyphophthalmi: Troglosironidae) from New Caledonia are described and illustrated using light microscopy and SEM. The validity of a previously described species (*Troglosiro platnicki* Shear, 1993) is evaluated. The new species add new morphological variation to the opisthosomal sternal regions of *Troglosiro* and nearly double the diversity of known species in this endemic New Caledonian family.

### RÉSUMÉ

**La famille des Troglosironidae (Opiliones : Cyphophthalmi) de Nouvelle-Calédonie.**

Six nouvelles espèces d'opilions de litière du genre *Troglosiro* (Opiliones : Cyphophthalmi : Troglosironidae) de Nouvelle-Calédonie sont décrites et illustrées en microscopies optique et électronique. La validité d'une espèce décrite auparavant (*Troglosiro platnicki* Shear, 1993) est évaluée. Ces nouvelles espèces permettent de documenter un spectre de variation morphologique plus important en ce qui concerne les régions sternales opisthosomales de *Troglosiro* et elles doublent presque le nombre des espèces connues de cette famille endémique de Nouvelle-Calédonie.

### INTRODUCTION

Among the more enigmatic opilionid taxa, the genus *Troglosiro* Juberthie, 1979 was described on the basis of a single species, *Troglosiro aelleni* Juberthie, 1979, collected in the Grotte d'Adio (also known as Ninrin-Reu), near Poya, New Caledonia (Juberthie 1979). The placement of the genus in the system of Cyphophthalmi was indefinite, though it was suggested by Juberthie (1979, 1989) and Shear (1980; see also a brief discussion in Shear 1985) that *Troglosiro*

was somehow related to the families Pettalidae Shear, 1980 and/or Sironidae Simon, 1879. With the description of five additional species attributed to this genus, Shear (1993) erected the family Troglósironidae Shear, 1993, based on a number of apomorphies, namely (1) the two to four median exocrine gland orifices on the male opisthosomal sternite, (2) the basally fused and enlarged apical microtrichia of the spermatopositor, and (3) the enlarged movable fingers of the spermatopositor with dentate lateral margins. Based on these and other morphological characters, Shear (1993) explicitly proposed a sister group relationship of Troglósironidae to Sironidae + Pettalidae (see also de Bivort & Giribet 2004). Molecular data, however, have suggested a relationship of Troglósironidae to Neogoveidae Shear, 1980 (Giribet & Boyer 2002; Boyer *et al.* 2005) or to Sironidae (mitochondrial data in Boyer *et al.* 2005), but not to Pettalidae. A more recent re-analysis of cyphophthalmid relationships including five molecular markers and more than a hundred terminals corroborates the sister group relationship of Troglósironidae to Neogoveidae (Boyer *et al.* 2007). More than a decade later, Sharma & Giribet (2005) described the seventh troglósironid species with a unique disposition of the four ventral opisthosomal gland pores in the anterior portion of a long depression of the sternal segments. They furthermore suggested the homology of sternal gland pores in Troglósironidae and anal gland pores in Pettalidae, Stylocellidae and Sironidae as a matter for future investigation.

In order to broaden knowledge of Cyphophthalmi in general, and Troglósironidae in particular, new material was examined from a number of research expeditions to New Caledonia, made by G. B. Monteith from October 2000 to May 2005. These collections include 295 specimens currently deposited at the Museum of Comparative Zoology (MCZ), Harvard University, Cambridge (USA) and the Queensland Museum (QM), Brisbane (Australia). Type material of all seven described species was examined for comparison purposes; these specimens are listed below. In this study six new species belonging to the genus *Troglósiro* are described from these collections, nearly doubling the number of known species in the family. All species analyzed were examined using scanning electron microscopy, with the exception of the types of species previously described by Juberthie (1979) and Shear (1993), and two species which were represented by too few specimens in available collections; these exceptions, as well as genitalic characters, were analyzed using light microscopy only.

## MATERIALS AND METHODS

The male holotype and a female paratype of each new species was photographed in dorsal, ventral and lateral positions using a JVC KY-F70B digital camera mounted on a Leica MZ 12.5 stereomicroscope. A series of images (from 10 to 18) was taken at different focal planes and assembled with the dedicated software package Auto-Montage Pro Version 5.00.0271 by Syncroscopy. These photographs are available at three different resolutions in the following URL featuring the online catalogue of Cyphophthalmi: <http://giribet.oeb.harvard.edu/Cyphophthalmi>.

Male (and female, when available) paratypes of four of the new species were examined using a FEI Quanta 200 SEM. The spermatopositor of a male paratype was examined for three of the new species with a compound microscope with Nomarski Interference Contrast optics, and measured with an ocular micrometer. All measurements were taken using a stereomicroscope and are given in mm unless otherwise indicated. Nomenclature on body ornamentation follows Murphree (1988).

Specimens cited in this study are lodged in the following institutions: American Museum of Natural History, New York, New York, USA (AMNH); Field Museum of Natural History, Chicago, Illinois, USA (FMNH); Museum of Comparative Zoology, Department of Invertebrate Zoology, Harvard University, Cambridge, Massachusetts, USA (MCZ); Muséum d'histoire naturelle, Genève, Switzerland (MHNG); Muséum national d'Histoire naturelle, Paris, France (MNHN); Queensland Museum, Brisbane, Queensland, Australia (QM).

The following material has been examined for comparison:

*T. aelleni* Juberthie, 1979: 2 syntypes (1 male and 1 juvenile) (MHNG) from the Grotte d'Adio, New Caledonia, collected 2 April 1977 by Aellen & Strinati.

*T. raveni* Shear, 1993: holotype male and paratype female (MNHN) from Berlese sample of dry forest litter, Col des Roussettes, 490 m elevation, New Caledonia, collected 29 May 1987 by R. Raven & N. I. Platnick; 3 male paratypes and 3 juveniles (AMNH) from Col des Roussettes, near Bourail, New Caledonia, 500 m elevation, collected 7 August 1978 by S. & J. Peck; 1 female paratype (FMNH 0000 013 997) from Berlese of litter from dry forest, Col des Roussettes, New Caledonia, 490 m elevation, collected 29 May 1987 by N. I. Platnick & R. Raven.

*T. tillierorum* Shear, 1993: holotype male (MNHN) from Berlese sample from humid forest, Bobeitia (Tillier station 16a: 20°57'13"S, 165°01'01"E), 350 m elevation, New Caledonia, collected 17 November 1988 by A. & S. Tillier.

*T. juberthiei* Shear, 1993: holotype male, paratype female (MNHN) and 6 additional male and 1 additional female paratypes (AMNH) from Berlese sample of montane forest litter, Rivière Bleue, 280 m elevation, collected 21 May 1987, by N. I. Platnick & R. J. Raven; 6 male and 2 female paratypes (FMNH 0000 014 009) from Berlese of litter from montane forest, Rivière Bleue, New Caledonia, 280 m elevation, collected 21 May 1987 by N. I. Platnick & R. Raven.

*T. platnicki* Shear, 1993: holotype male (MNHN) from Berlese sample from humid forest, Rivière Bleue (Tillier station 250k, plot VI X: 22°06'13"S, 166°39'16"E), 160 m elevation, New Caledonia, collected 7 July 1987 by A. Tillier; 3 male and 6 female paratypes, and 4 juveniles (FMNH 0000 014 010) from Col de Mourange, 30 km East of Nouméa, New Caledonia, collected 30 August 1978 by S. & J. Peck (FM[HD]#78-260, from Berlese of leaf litter near pond).

*T. ninqua* Shear, 1993: holotype male and female paratype (MNHN) from Berlese sample from humid forest, Mt. Ninqua (Tillier station 288: 21°44'24"S, 166°09'03"E), 1000 m elevation, New Caledonia, collected 28 October 1986 by A. & S. Tillier.

*T. longifossa* Sharma & Giribet, 2005: male holotype (MNHN) from Gîte Kanua (22°21'S, 166°58'E), Port Boisé, New Caledonia, 20 m elevation, collected 21 November 2001 by G. B. Monteith (Queensland Museum Berlesate 1043, from sieved rainforest litter); 2 male (1 dissected for genitalia, 1 used for DNA extraction following the non-destructive protocol described in Boyer *et al.* 2005) and 4 female (2 dissected for genitalia) paratypes (MCZ 65204), same collecting data as holotype.

## SYSTEMATIC ACCOUNT

Order OPILIONES Sundevall, 1833  
Suborder CYPHOPHTHALMI Simon, 1879  
Family TROGLOSIRONIDAE Shear, 1993

**Genus *TROGLOSIRO*** Juberthie, 1979

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Type species by monotypy: *Troglosiro aelleni* Juberthie, 1979.

***Troglosiro sheari*** n. sp.

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Figs 1-6

TYPE MATERIAL. – New Caledonia. Holotype: male (MNHN [ex MCZ DNA101586]) from Atéou (NNE of Koné), 20°57'S, 164°54'E, 700 m elevation, collected 26 November 2002 by G. B. Monteith (Queensland Museum Berlesate 1044, from rainforest litter). Paratype: 1 female (MCZ 72565 [ex MCZ DNA101584]) from Atéou (NE of Koné), 20°57'S, 164°54'E, 700 m elevation, collected 27 November 2001 by G. B. Monteith (from pyrethrum sampling of tree logs).

TYPE LOCALITY. – Atéou.

ETYMOLOGY. – The name honors William A. Shear, one of the most influential modern opilionologists, who erected the family Troglisironidae, and greatly contributed to knowledge of cyphophthalmid biodiversity in New Caledonia.

DIAGNOSIS. – Troglisironid without opisthosomal sternal depression and with three sternal pores, the anteriormost one towards posterior end of sternite III, the central pore towards anterior end of sternite IV, and the posteriormost pore in center of sternite V. Chelicerae slightly protruding, with the dorsal crest clearly visible from above; dentition regular in second article and slightly irregular in distal article.

DESCRIPTION. – Total length of male holotype (female paratype [MCZ 72565 [ex MCZ DNA 101584]] in parentheses) 2.22 (2.16); width across ozopores 1.10 (1.09), greatest width 1.23 (1.20) occurs between second and third opisthosomal segments (Figs 1, 4); length-width ratio 1.80 (1.80).

Body approximately egg-shaped, dark orange to reddish brown (in alcohol) depending on incidence of light. Body with dense tuberculate-microgranulate microstructure (nomenclature on ornamentation follows Murphree 1988) on almost all surfaces. Ozophores conical, of type 2 of Jubertie (1970; see a re-definition of the types of ozophores in Giribet 2003). Eyes absent (Figs 2, 5). Transverse opisthosomal sulci conspicuous. Mid-dorsal longitudinal opisthosomal sulcus present. Posterior end of body evenly rounded. Opisthosomal sternites not depressed. Three sternal pores along midline of opisthosomal sternites (Fig. 3). Anteriormost opisthosomal sternal pore towards posterior end of sternite III; central pore towards anterior end of sternite IV; posteriormost pore in center of sternite V. Female opisthosomal sternites without clear modifications (Fig. 6).

Coxae of legs I and II movable, coxae of legs III and IV fused (Fig. 3). Ventral prosomal complex of male with coxae of legs II, III and IV meeting in the midline, but coxae I not so. Sternum absent. Gonostome semicircular, width greater than length. Ventral prosomal complex of females with only coxae II meeting in the midline (Fig. 6).

Spiracles in the form of a closed circle, with maximum diameter 70  $\mu$ m. Sternites VIII and IX and tergite IX fused in males and females, forming a corona analis. Anal plate without modifications, in ventral position in males and females. Anal plate 0.17 (0.16) long and 0.26 (0.24) wide. Anal gland pores absent.

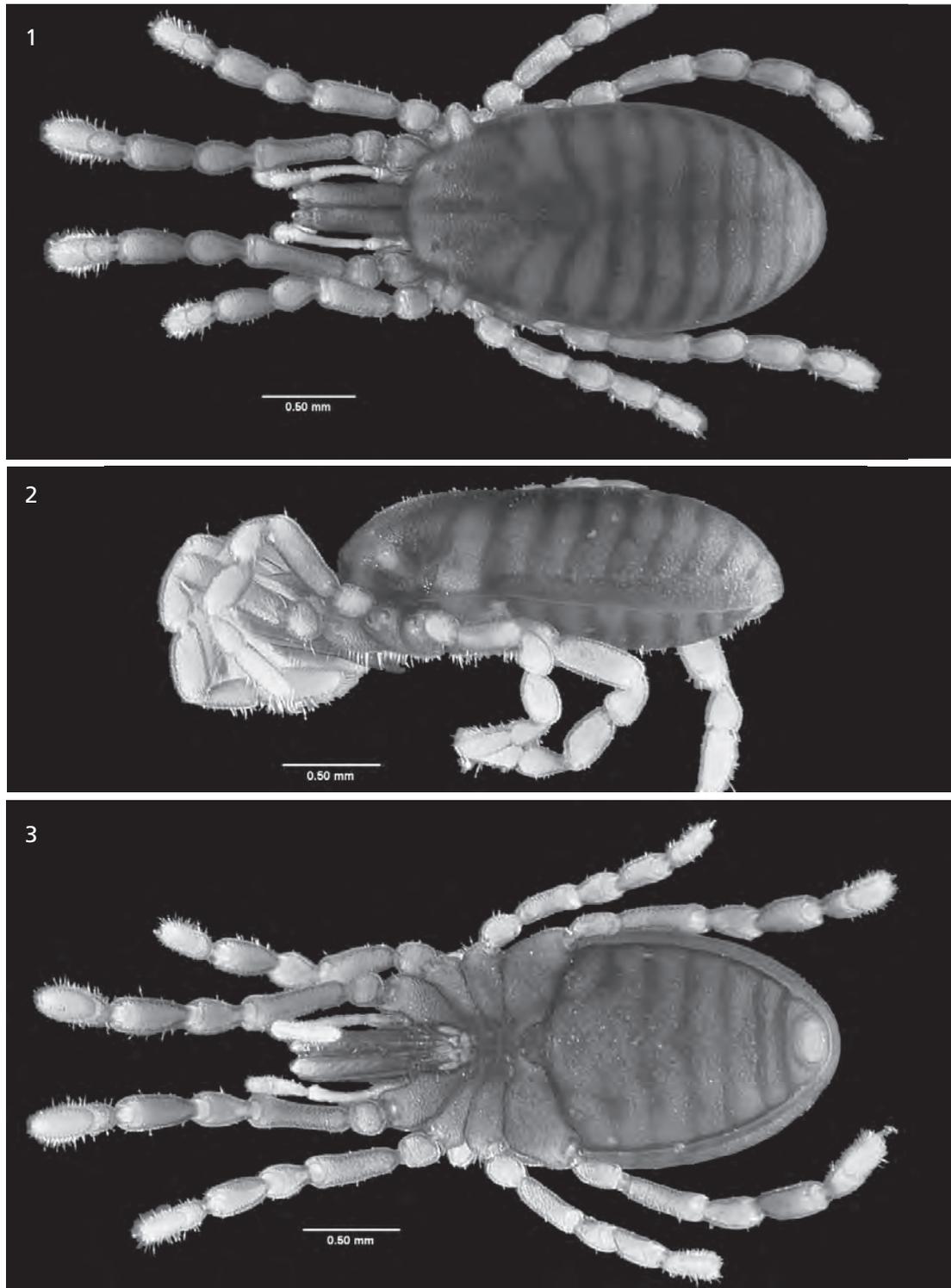
Chelicerae slightly protruding, with the dorsal crest clearly visible from above; relatively stocky; with few setae. Granulation restricted to the proximal article. Proximal article 0.62 (0.57) long, 0.24 (0.20) deep, with relatively small dorsal crest and single posterior ventral process. Second article 0.83 (0.90) long, 0.14 (0.14) deep, widest near the middle of its length; dentition with alternation of small and large nodular teeth. Distal article 0.24 (0.25) long, 0.04 (0.04) deep, dentition slightly irregular.

Palp without ventral process on proximal end of trochanter; without conspicuous modifications. Length/width (length-width ratio in parentheses) of palpal articles from trochanter to tarsus: 0.17/0.09 (1.9); 0.42/0.08 (5.3); 0.23/0.08 (2.9); 0.32/0.07 (4.6); 0.30/0.08 (3.8); total length 1.44. Palpal claw 0.04 long.

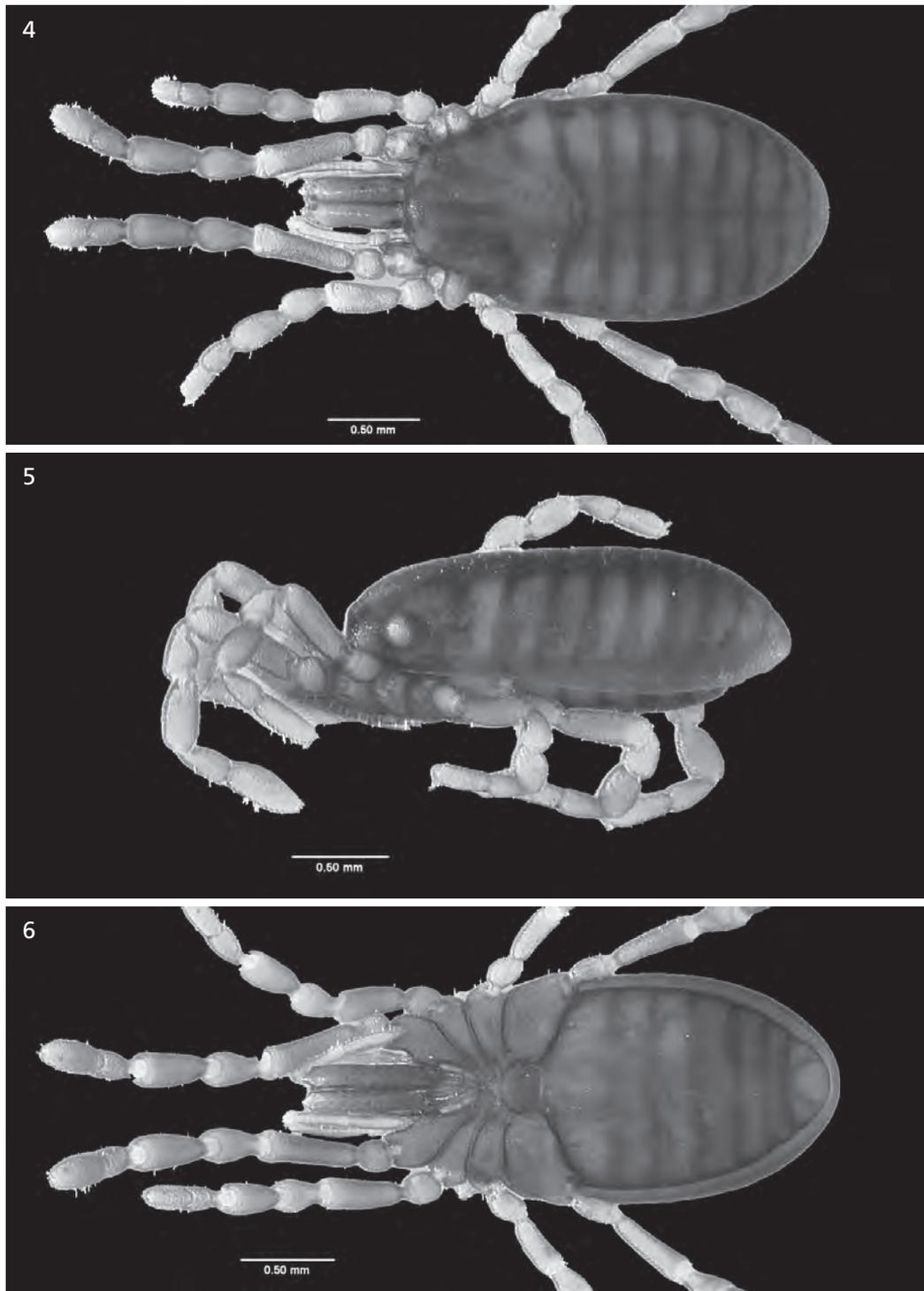
Legs robust; surfaces of all trochanters, femurs, patellae, tibiae and metatarsi thickly and uniformly granulated. Tarsi not appreciably ornamented. Tarsal claws I and IV smooth, tarsal claw II toothed.

Leg measurements of holotype: length/width (length-width ratio in parentheses):

	Tr	Fe	Pa	Ti	Mt	Ta	Total
Leg I	0.18/0.20 (0.9)	0.60/0.17 (3.5)	0.28/0.19 (1.5)	0.37/0.18 (2.1)	0.30/0.16 (1.9)	0.44/0.19 (2.3)	2.17
Leg II	0.17/0.20 (0.9)	0.50/0.17 (2.9)	0.21/0.18 (1.2)	0.29/0.18 (1.6)	0.21/0.14 (1.5)	0.35/0.13 (2.7)	1.73
Leg III	0.17/0.16 (1.1)	0.35/0.15 (2.3)	0.20/0.17 (1.2)	0.26/0.17 (1.5)	0.22/0.14 (1.6)	0.29/0.12 (2.4)	1.49
Leg IV	0.25/0.16 (1.6)	0.47/0.18 (2.6)	0.24/0.19 (1.3)	0.33/0.20 (1.7)	0.25/0.17 (1.5)	0.33/0.15 (2.2)	1.87



FIGS 1-3. *Troglisiro sheari* n. sp. 1, dorsal view of male holotype. 2, lateral view of male holotype. 3, ventral view of male holotype.



FIGS 4-6. *Troglosiro sheari* n. sp. 4, dorsal view of female paratype. 5, lateral view of female paratype. 6, ventral view of female paratype.

Leg measurements of female paratype (MCZ 72565 [ex MCZ DNA 101584]: length/width (length-width ratio in parentheses):

	Tr	Fe	Pa	Ti	Mt	Ta	Total
Leg I	0.17/0.18 (0.9)	0.60/0.17 (3.5)	0.28/0.20 (1.4)	0.36/0.19 (1.9)	0.30/0.16 (1.9)	0.43/0.18 (2.4)	2.14
Leg II	0.17/0.16 (1.1)	0.47/0.16 (2.9)	0.21/0.18 (1.2)	0.30/0.17 (1.8)	0.28/0.15 (1.9)	0.35/0.13 (2.7)	1.78
Leg III	0.18/0.15 (1.2)	0.35/0.15 (2.3)	0.20/0.16 (1.3)	0.27/0.16 (1.7)	0.24/0.14 (1.7)	0.26/0.12 (2.2)	1.50
Leg IV	0.23/0.15 (1.5)	0.46/0.26 (2.9)	0.26/0.19 (1.4)	0.32/0.18 (1.8)	0.25/0.15 (1.7)	0.36/0.14 (2.6)	1.88

Tarsus IV of males not divided, carrying a lamelliform adenostyle proximal to most basal region of tarsus. Adenostyle 0.07 long, slightly curved, and acutely triangular. Tarsus IV of female without modifications. Study of genitalic morphology not undertaken due to paucity of specimens.

DISTRIBUTION. – Known only from the type locality.

REMARKS. – After Bobeitio, the type locality of *T. tillierorum*, Atéou is the northernmost locality where troglosironid populations have been discovered; the two localities are in relatively close proximity. *T. sheari* n. sp. differs from most *Troglosiro* species in the lack of sternal depressions, a feature also found in *T. aelleni* and *T. tillierorum*. It differs from both these species in the number of its sternal pores (*T. aelleni* has two sternal pores in the midline; *T. tillierorum* has four pores in the midline). It is visibly smaller than *T. aelleni*, visibly larger than *T. tillierorum*, and proportionally thinner than both.

***Troglosiro monteithi* n. sp.**

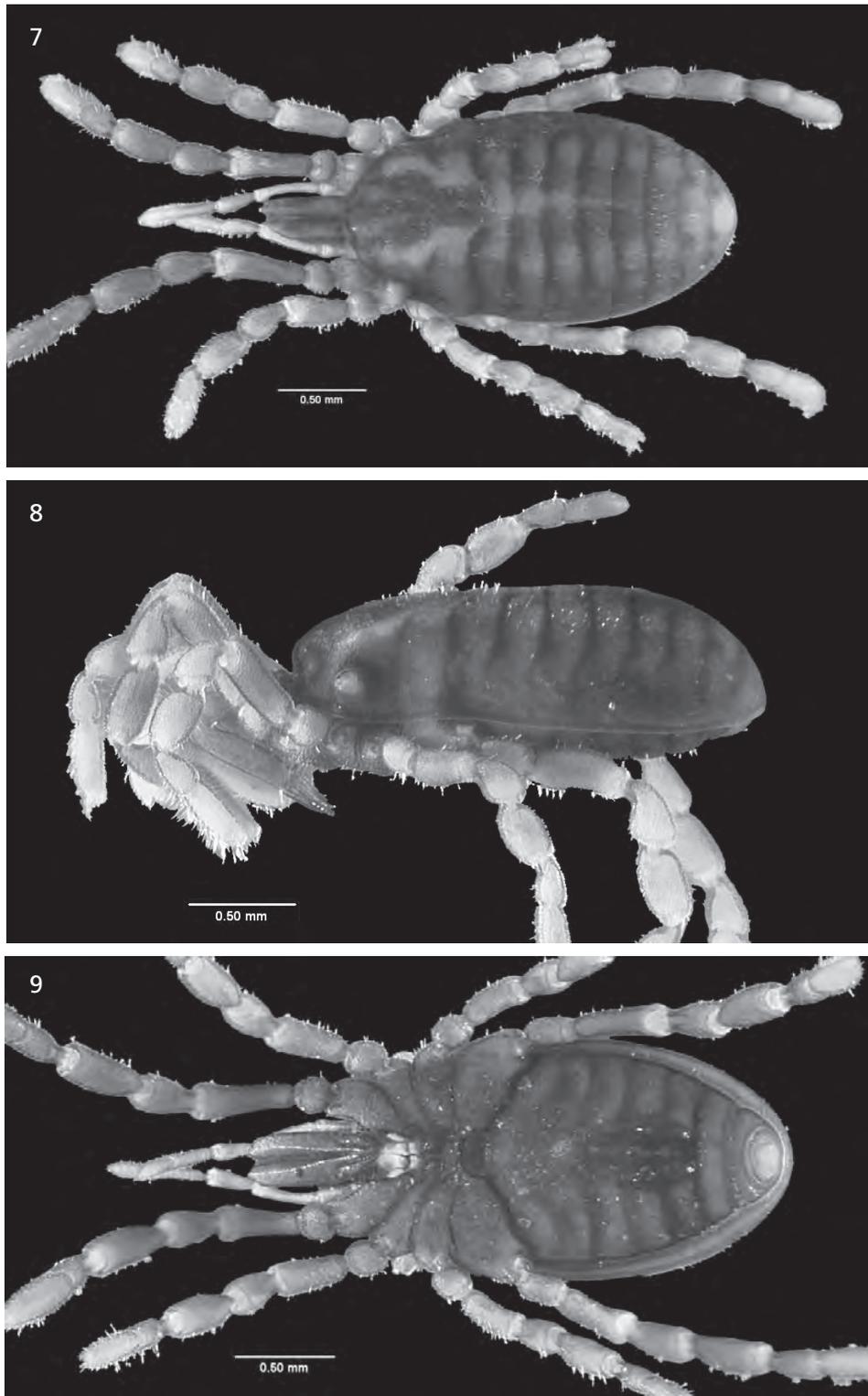
Figs 7-36

TYPE MATERIAL. – New Caledonia. Holotype: male (MNHN [ex MCZ 51948]) from Col d'Amieu sawmill, 21°36'S, 165°43'E, 350 m elevation, collected 14 November 2002 by G. B. Monteith (from sieved rainforest litter). Paratypes: 1 male, 2 female (MCZ 51948; MCZ DNA101580), one female for DNA extraction following the non-destructive protocol described in Boyer *et al.* (2005), 1 male dissected for genitalia, same collecting data as holotype; 1 male for DNA extraction (QM [ex MCZ DNA101687]), from Berlesate, Col d'Amieu upper west slope, 21°37'S, 165°49'E, 480 m elevation, collected 3 May 2005 by G. B. Monteith; 1 male (MCZ 72567 [ex MCZ DNA101688]) mounted on SEM stubs, from Berlesate, Col d'Amieu sawmill, 21°36'S, 165°48'E, 350 m elevation, collected 25 April 2005 by G. B. Monteith; 1 male (MCZ 72566; MCZ DNA101579) from human dung trap, Col d'Amieu sawmill, 21°35'S, 165°48'E, 400 m elevation, collected 11 November 2001 by G. B. Monteith.

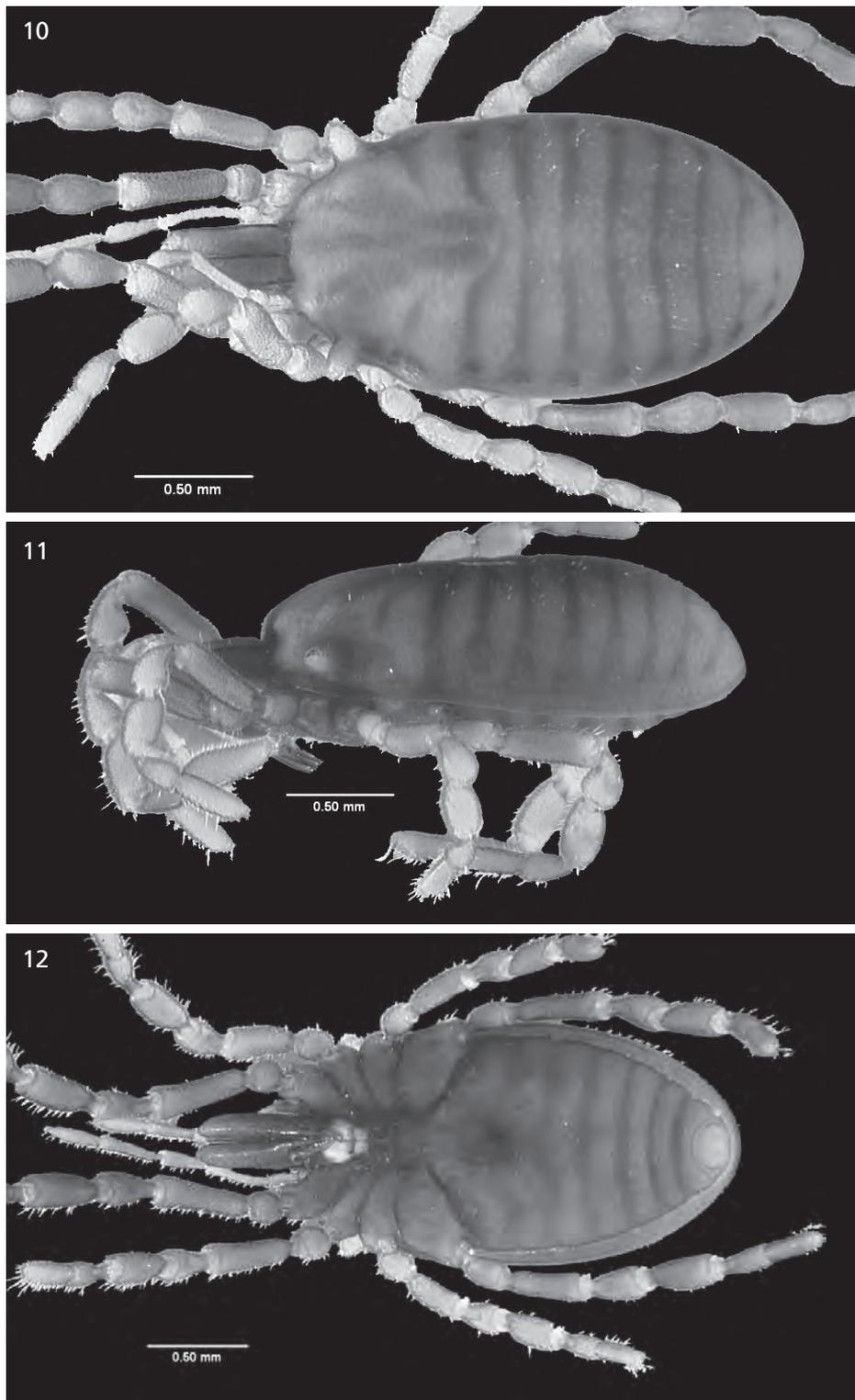
TYPE LOCALITY. – Col d'Amieu.

ETYMOLOGY. – The name honors Geoff B. Monteith, whose diligent collections and pioneer entomological work in New Caledonia made this and ongoing studies of troglosironid systematics possible.

DIAGNOSIS. – Troglosironid with opisthosomal sternites IV through VI deeply depressed on either side of midline, forming two parallel depressions (Figs 9, 16), with four sternal pores along midline of opisthosomal

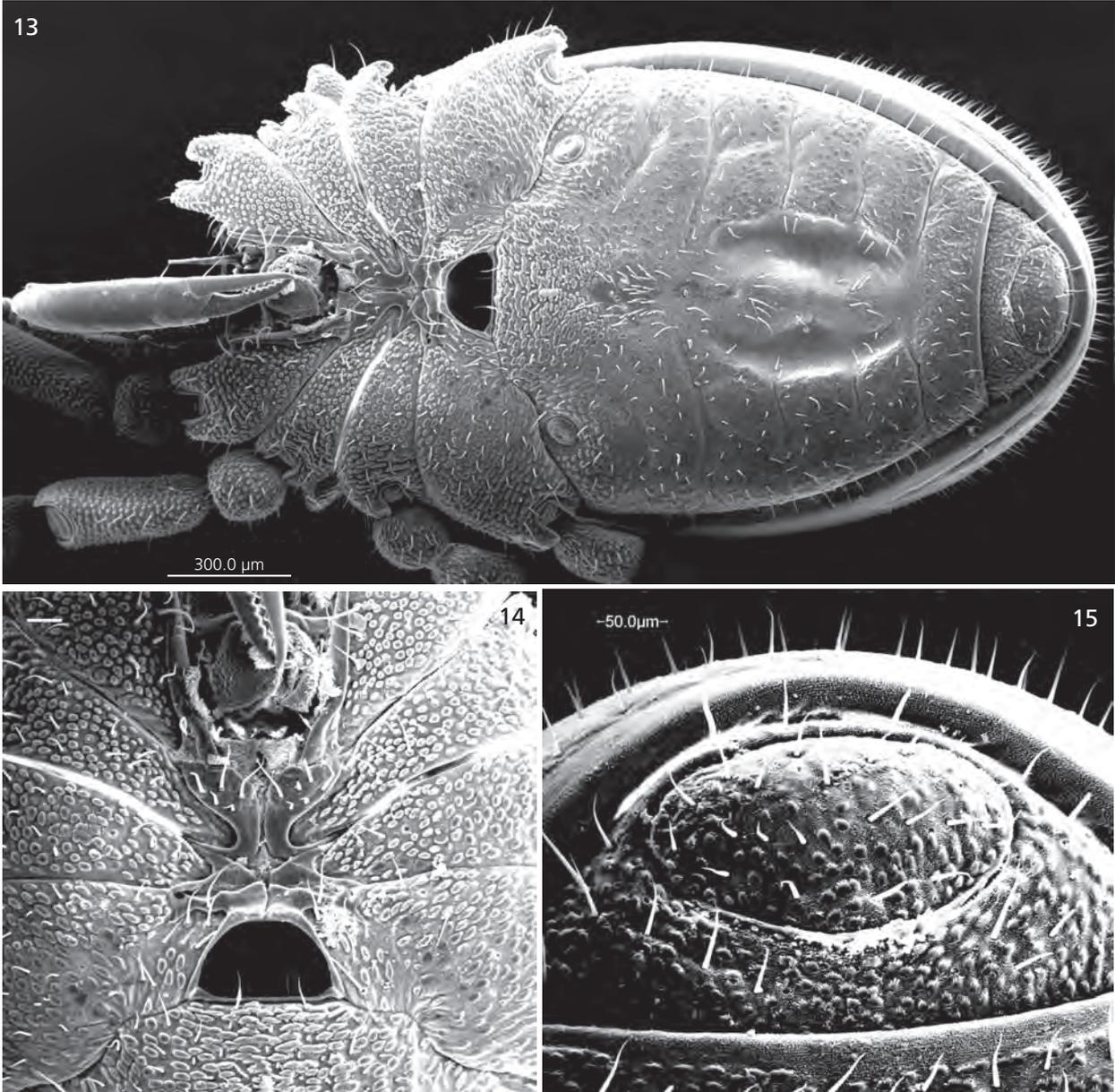


**FIGS 7-9.** *Troglisiro monteithi* n. sp. **7**, dorsal view of male holotype. **8**, lateral view of male holotype. **9**, ventral view of male holotype.

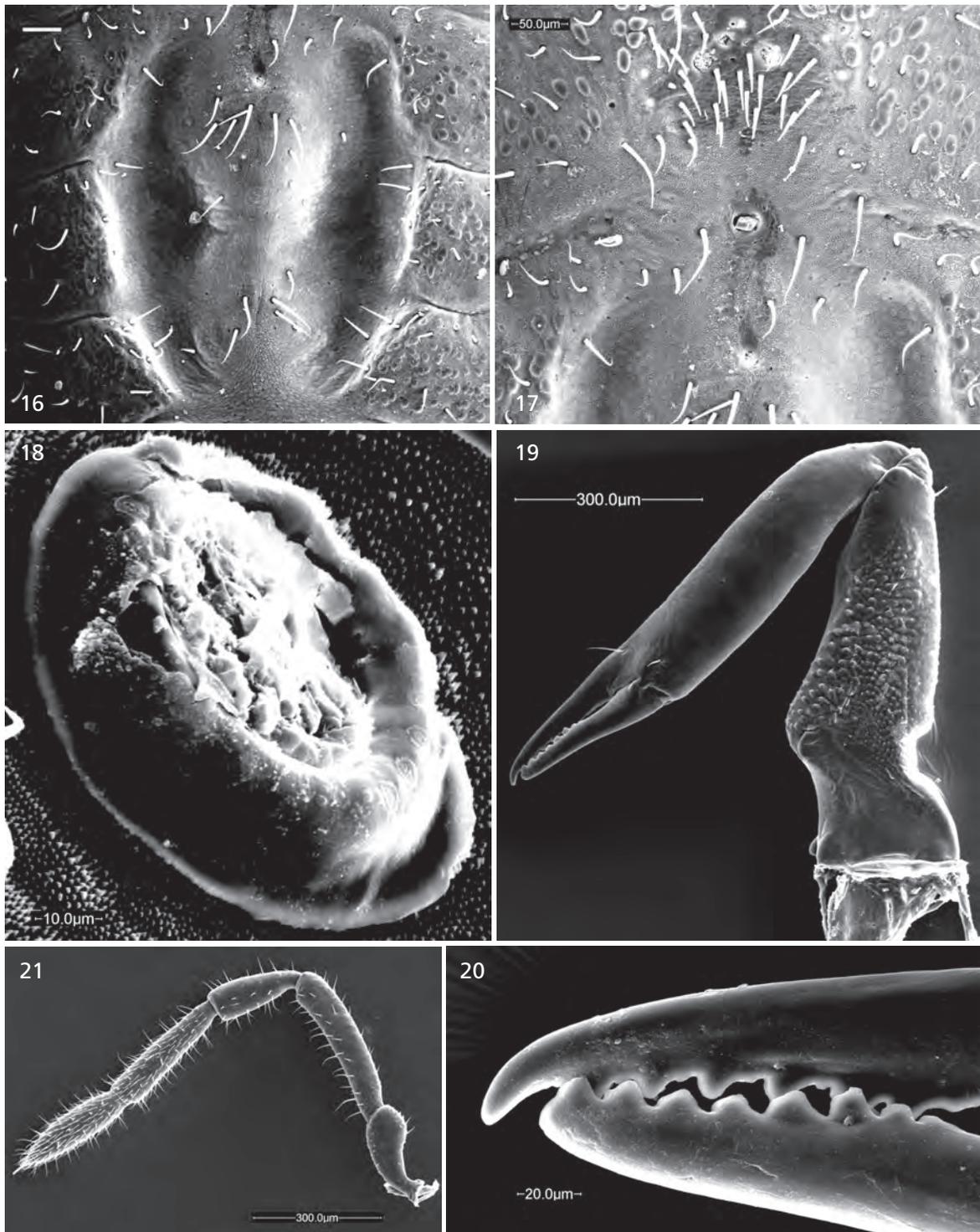


**FIGS 10-12.** *Troglosiro monteithi* n. sp. **10**, dorsal view of female paratype. **11**, lateral view of female paratype. **12**, ventral view of female paratype.

sternites (Figs 16, 17). Two anteriormost sternal pores appear as a parallel pair in sternite III; single central pore lies between sternite III and IV; posteriormost single pore in center of sternite IV. Chelicerae slightly protruding, with the dorsal crest visible from above. Dentition of fixed finger regular, with alternation of small and large nodular teeth in the fixed finger. Dentition of movable finger regular. Spermatopositor with greatly reduced, blade-like median dorsal microtrichia, one pair of blade-like dorsal microtrichia, and one pair of blade-like lateral microtrichia.



**FIGS 13-15.** *Troglisiro monteithi* n. sp. **13**, ventral view of male paratype. **14**, sternal region of male paratype, scale bar = 50.0 µm. **15**, anal region of male paratype.



**FIGS 16-21.** *Troglisiro monteithi* n. sp. **16**, detail of sternal depression of male paratype, scale bar = 50.0 µm. **17**, detail of sternal pores of male paratype. **18**, spiracle of male paratype. **19**, external view of left chelicer of male paratype. **20**, detail of the dentition of the chelical distal segments. **21**, left palp of male paratype.

DESCRIPTION. – Total length of male holotype (female paratype MCZ DNA101580 in parentheses) 2.01 (2.14); width across ozopores 1.10 (1.06), greatest width 1.12 (1.19) occurs between second and third opisthosomal segments (Figs 7, 13); length-width ratio 1.80 (1.79).

Body approximately egg-shaped, dark orange to reddish brown (in alcohol) depending on incidence of light. Body with dense tuberculate-microgranulate microstructure on almost all surfaces. Ozophores conical, of type 2 of Juberthie. Eyes absent (Figs 8, 11). Transverse opisthosomal sulci conspicuous. Dorsum with distinct pattern of pigmentation, shaped like an “M” closed at the bottom (Figs 7, 10), also present in females, albeit faintly. Mid-dorsal longitudinal opisthosomal sulcus absent. Posterior end of body evenly rounded. Opisthosomal sternites IV through VI deeply depressed on either side of midline, forming two parallel depressions (Figs 9, 16). Four sternal pores along midline of opisthosomal sternites (Figs 16, 17). Two anteriormost sternal pores appear as a parallel pair in sternite III; single central pore lies between sternite III and IV; posteriormost single pore in center of sternite IV. Female opisthosomal sternites without clear modifications (Fig. 12).

Coxae of legs I and II movable, coxae of legs III and IV fused (Fig. 14). Ventral prosomal complex of male with coxae of legs II, III and IV meeting in the midline. Sternum absent. Gonostome semicircular, width greater than length. Ventral prosomal complex of females with only coxae II meeting in the midline (Fig. 12).

Spiracles in the form of a closed circle (Fig. 18). Sternites VIII and IX and tergite IX fused in males (Fig. 15) and females, forming a corona analis. Anal plate without modifications, in ventral position in males and females. Anal plate 0.16 (0.14) long and 0.25 (0.24) wide. Anal gland pores absent.

Chelicerae (Fig. 19) slightly protruding, with the dorsal crest visible from above; relatively stocky; with few setae. Granulation restricted to the proximal article, covering part of the surface between the dorsal crest and the anterior terminus. Proximal article 0.51 (0.50) long, 0.22 (0.23) deep, with relatively small dorsal crest and single posterior ventral process. Second article 0.77 (0.74) long, 0.12 (0.13) deep, widest near the middle of its length; dentition with alternation of small and large nodular teeth. Distal article 0.25 (0.23) long, 0.05 (0.05) deep, dentition regular (Fig. 20).

Palp (Fig. 21) without ventral process on proximal end of trochanter; without conspicuous modifications. Length/width (length-width ratio in parentheses) of palpal articles from trochanter to tarsus: 0.15/0.10 (1.5); 0.39/0.07 (5.6); 0.21/0.08 (2.6); 0.28/0.08 (3.5); 0.24/0.08 (3.0); total length 1.27. Palpal claw 0.03 long.

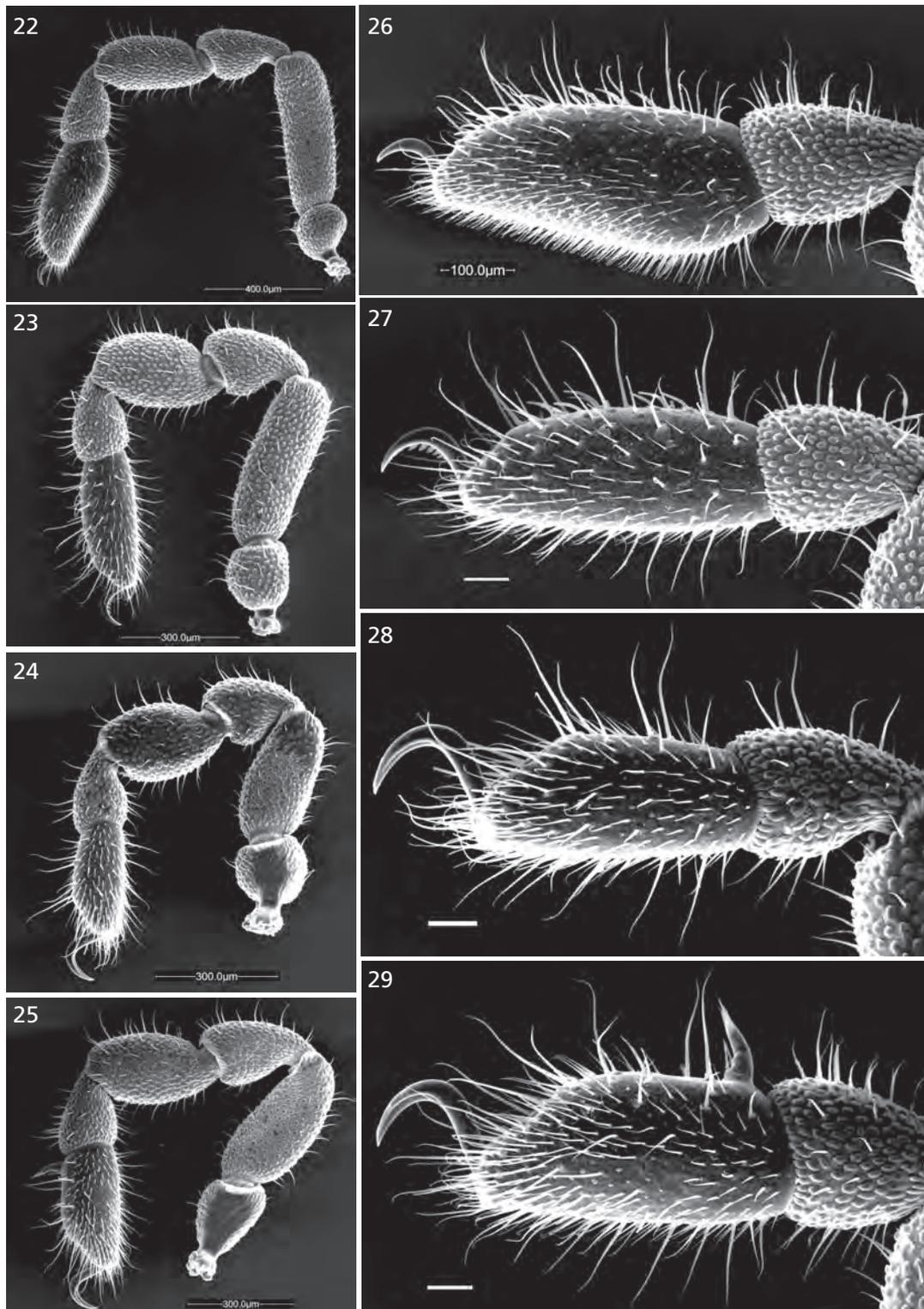
Legs (Figs 22-25) robust; surfaces of all trochanters, femurs, patellae, tibiae and metatarsi thickly and uniformly ornamented with granules. Tarsi (Figs 26-29) not appreciably ornamented. Tarsal claws I, III and IV smooth, tarsal claw II toothed (Figs 30-33).

Leg measurements of holotype: length/width (length-width ratio in parentheses):

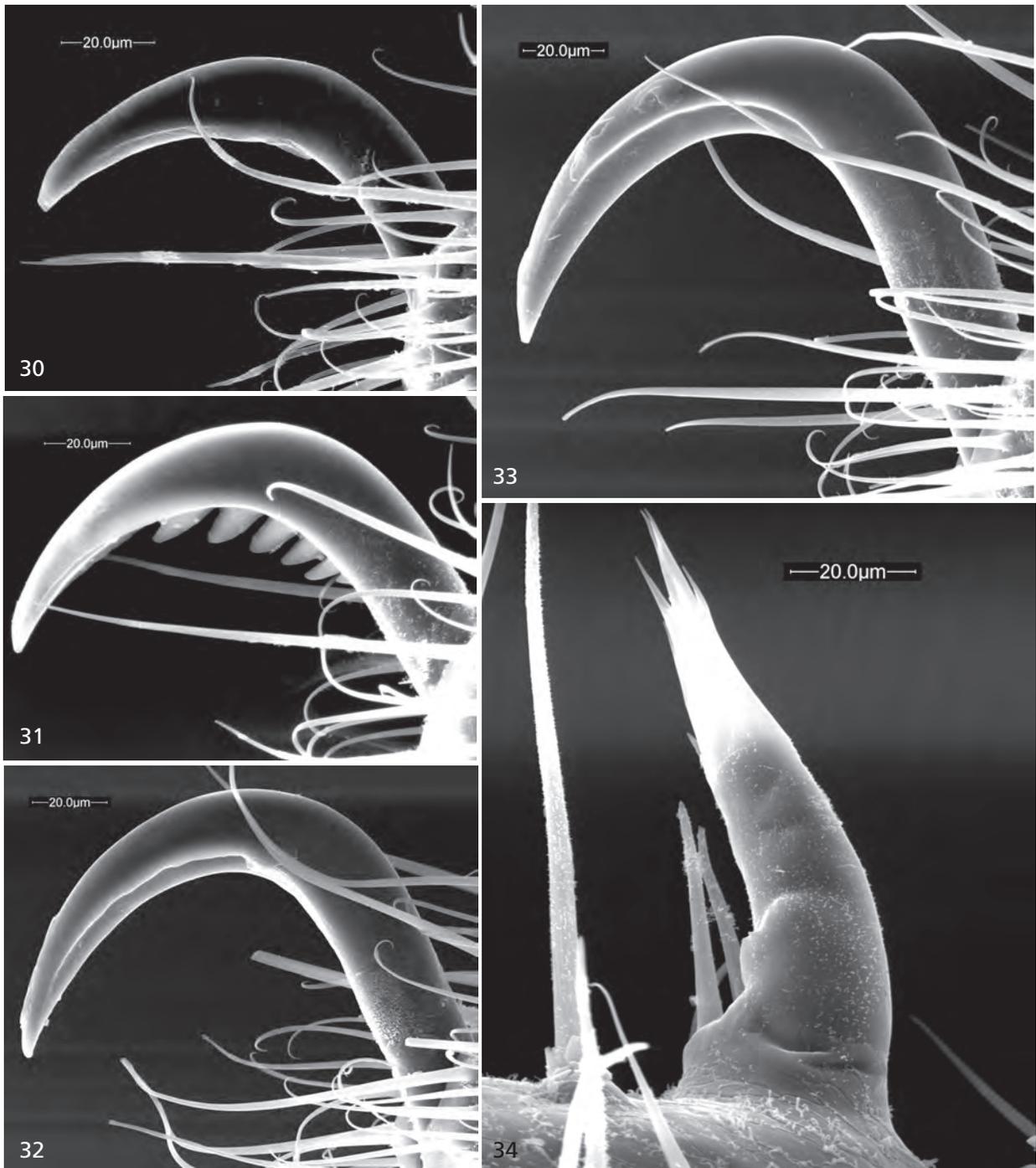
	Tr	Fe	Pa	Ti	Mt	Ta	Total
Leg I	0.16/0.18 (0.9)	0.53/0.17 (3.1)	0.27/0.19 (1.4)	0.35/0.17 (2.1)	0.29/0.16 (1.8)	0.42/0.21 (2.0)	2.02
Leg II	0.16/0.15 (1.1)	0.43/0.15 (2.9)	0.23/0.17 (1.4)	0.28/0.19 (1.5)	0.20/0.14 (1.4)	0.36/0.14 (2.6)	1.66
Leg III	0.15/0.15 (1.0)	0.31/0.14 (2.2)	0.24/0.17 (1.4)	0.26/0.18 (1.4)	0.22/0.13 (1.7)	0.30/0.13 (2.3)	1.48
Leg IV	0.23/0.15 (1.5)	0.40/0.16 (2.5)	0.30/0.19 (1.6)	0.32/0.20 (1.6)	0.24/0.15 (1.6)	0.37/0.16 (2.3)	1.86

Leg measurements of female paratype (MCZ 51948): length/width (length-width ratio in parentheses):

	Tr	Fe	Pa	Ti	Mt	Ta	Total
Leg I	0.17/0.17 (1.0)	0.55/0.16 (3.4)	0.30/0.20 (1.5)	0.35/0.17 (2.1)	0.29/0.16 (1.8)	0.42/0.18 (2.3)	2.08
Leg II	0.16/0.15 (1.1)	0.43/0.15 (2.9)	0.25/0.17 (1.5)	0.29/0.18 (1.6)	0.23/0.14 (1.6)	0.34/0.12 (2.8)	1.70
Leg III	0.16/0.15 (1.1)	0.32/0.14 (2.3)	0.21/0.16 (1.3)	0.25/0.17 (1.5)	0.23/0.13 (1.8)	0.29/0.12 (2.4)	1.46
Leg IV	0.23/0.14 (1.6)	0.44/0.16 (2.8)	0.26/0.18 (1.4)	0.31/0.18 (1.7)	0.26/0.15 (1.7)	0.30/0.14 (2.1)	1.80



**FIGS 22-29.** *Troglisiro monteithi* n. sp. **22**, male left leg I. **23**, male left leg II. **24**, male left leg III. **25**, male left leg IV. **26**, detail of male left tarsus I. **27**, detail of male left tarsus II. **28**, detail of male left tarsus III. **29**, detail of male left tarsus IV.



**FIGS 30-34.** *Troglosiro monteithi* n. sp. **30**, male left tarsal claw I. **31**, male left tarsal claw II. **32**, male right tarsal claw III. **33**, male right tarsal claw IV; **34**, detail of adenostyle.

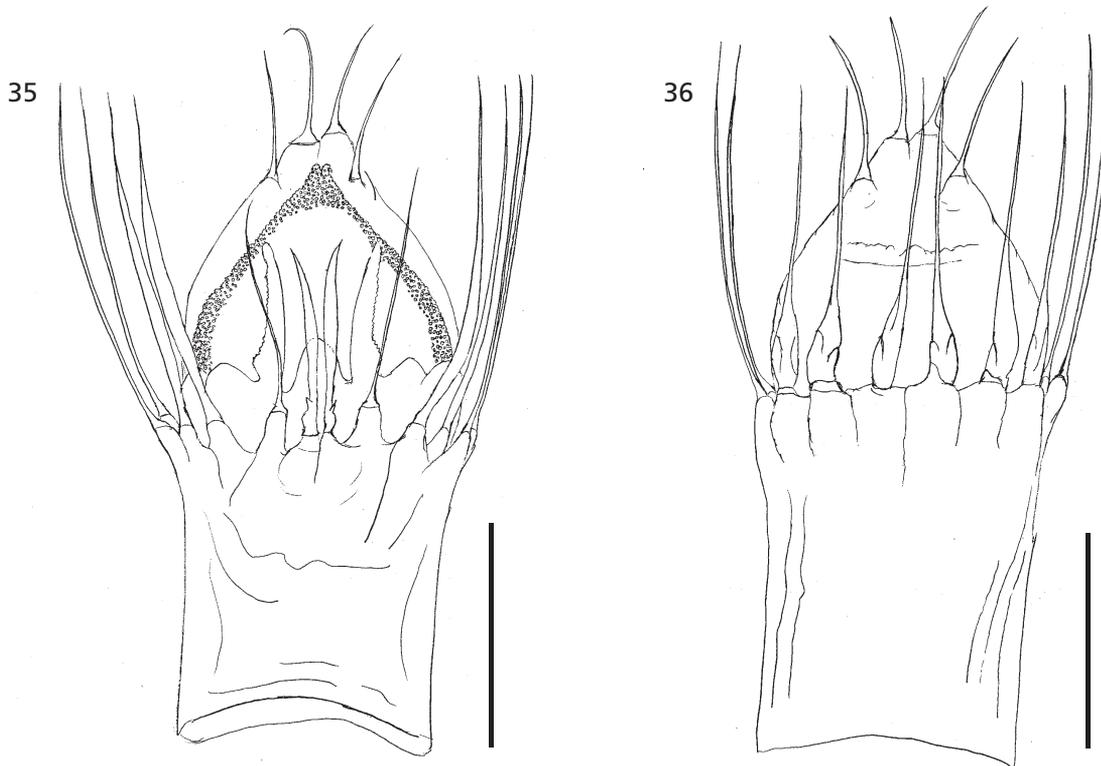
Tarsus IV of males (Fig. 29) not divided, carrying a lamelliform adenostyle proximal to most basal region of tarsus. Adenostyle (Fig. 34) 0.11 long, slightly curved, acutely triangular, and terminating with four short microtrichia. Tarsus IV of female without modifications.

Spermatopositor in ventral view (Fig. 36) with six basally flared, blade-like ventral microtrichia; in dorsal view (Fig. 35) with three lateral microtrichia on each side, with one on each side somewhat blade-like; and three pairs of dorsal microtrichia, with median pair greatly reduced and blade-like, and outer-most pair blade-like. Apical microtrichia greatly enlarged, basally fused, and smooth at the bases. Gonopore structures: ventral plate semicircular, not much larger than gonopore lip, and entirely smooth; movable fingers elongate, with large, laterally protruding basal lobes, and toothed lateral margins; gonopore lip subtriangular, with two points at apex, and toothed with small, blunt teeth.

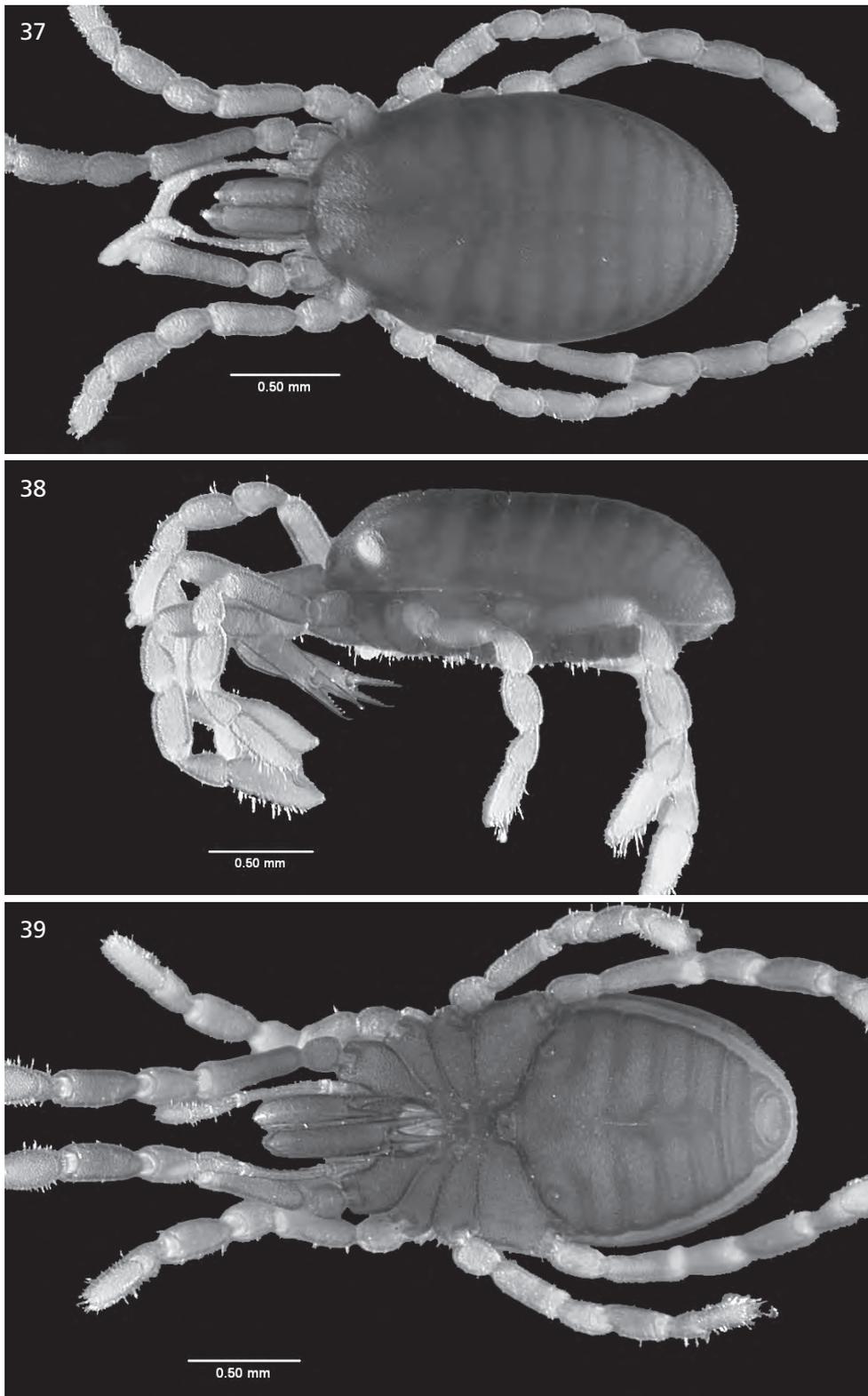
VARIATION. – Range of measurements in males (n = 4) and females (n = 2; in parentheses): body length 2.01-2.21 (2.14-2.24); maximum width 1.12-1.26 (1.19-1.26).

DISTRIBUTION. – Known only from the type locality and its vicinity.

REMARKS. – The depression of the opisthosomal sternites of males of this species is truly remarkable; the two parallel depressions flanking the midline are not found in any other troglosironid, immediately distinguishing *T. monteithi* n. sp. from congeners. The width of the two depressions and the specific opisthosomal sternites depressed most closely resembles the single depression of *T. oscitatio* n. sp.



FIGS 35-36. *Troglosiro monteithi* n. sp. **35**, total spermatopositor, dorsal view. **36**, total spermatopositor, ventral view. Scale bars = 100  $\mu$ m.



**FIGS 37-39.** *Troglосiго wilsoni* n. sp. **37**, dorsal view of male holotype. **38**, lateral view of male holotype. **39**, ventral view of male holotype.

***Troglosiro wilsoni*** n. sp.

Figs 37-66

TYPE MATERIAL. – New Caledonia. Holotype: male (FMNH 0000 013 994; FM(HD)#78-252) from Mt. Koghis, 500 m elevation, collected 26 July 1978 by S. & J. Peck (from leaf litter). Paratypes: 11 male, 8 female (FMNH 0000 013 995; FM(HD)#78-252), 1 male and 1 female paratypes dissected for genitalia, same collecting data as holotype; 2 male, 2 female (MCZ 72568 [ex FMNH 0000 013 995]), same collecting data as holotype; 1 male, 1 female for SEM (MCZ 72569, 72570) [ex FMNH 0000 013 995]), same collecting data as holotype.

TYPE LOCALITY. – Mt. Koghis.

ADDITIONAL MATERIAL. – 14 juveniles, same collecting data as holotype (FMNH 0000 013 995).

ETYMOLOGY. – The name honors MCZ entomologist Edward O. Wilson, whose work in the study of ant diversity and sociobiology inspired the first author's study of systematics.

DIAGNOSIS. – Troglosironid with special opisthosomal sternal depression of males preceded by a field of multiple pores and setae, at the posterior end of sternite III. Opisthosomal sternites IV through VI of males deeply depressed along the midline. The width of the depression increases at the margins of sternites IV and V, and sternites V and VI, becoming widest between sternites IV and V, and terminating abruptly at the posterior end of sternite VI. Two sternal pores on midline of opisthosomal sternites. Anterior pore towards anterior end of sternite IV, posterior pore towards posterior end of sternite IV. Dentition of movable finger somewhat irregular, with alternation of small and large nodular teeth in the fixed finger.

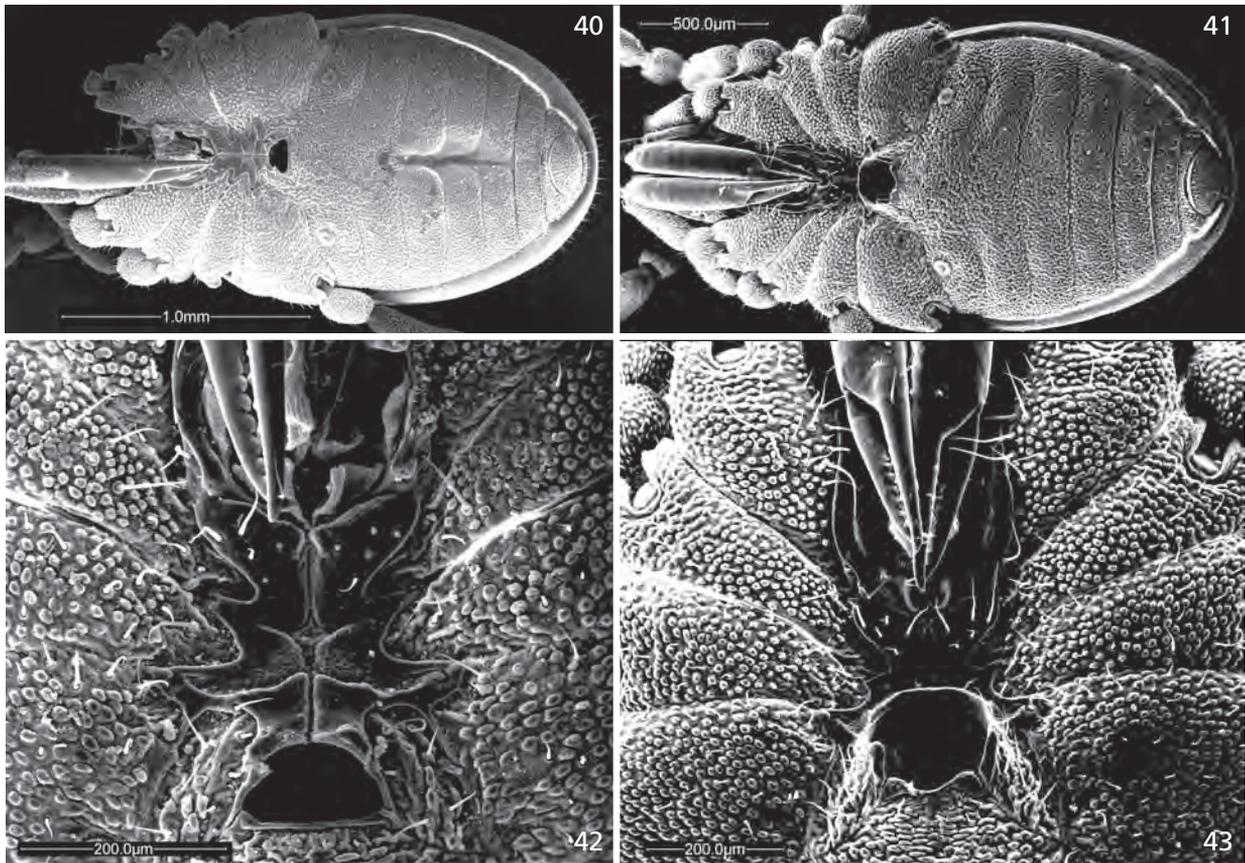
DESCRIPTION. – Total length of male holotype (female paratype FMNH FM(HD)#78-252 in parentheses) 1.81 (1.86); width across ozopores 1.00 (0.98), greatest width 1.06 (1.16) occurs between second and third opisthosomal segments (Figs 37, 40); length-width ratio 1.71 (1.60).

Body approximately egg-shaped, dark orange to reddish brown (in alcohol) depending on incidence of light. Body with dense tuberculate-microgranulate microstructure on almost all surfaces. Ozophores conical, of type 2 of Juberthie. Eyes absent (Fig. 38). Transverse opisthosomal sulci conspicuous (Fig. 37). Mid-dorsal longitudinal opisthosomal sulcus present. Posterior end of body evenly rounded. Opisthosomal sternites IV through VI deeply depressed along the midline. Width of depression visibly increases at margins of sternites IV and V, and sternites V and VI (Fig. 46). Depression widest between sternites IV and V, terminates abruptly at the posterior end of sternite VI. Multiple pores and setae present at posterior end of sternite III, anterior to sternal depression. Two sternal pores on midline of opisthosomal sternites. Anterior pore towards anterior end of sternite IV, posterior pore towards posterior end of sternite IV. Female opisthosomal sternites without clear modifications (Fig. 41).

Coxae of legs I and II movable, coxae of legs III and IV fused (Fig. 42). Ventral prosomal complex of male with coxae of legs II, III and IV meeting in the midline, but coxae I not so. Sternum absent. Gonostome semicircular, width greater than length. Ventral prosomal complex of females with only coxae II meeting in the midline (Fig. 43).

Spiracles (Fig. 47) in the form of a closed circle. Sternites VIII and IX and tergite IX fused in males and females, forming a corona analis (Figs 44, 45). Anal plate without modifications, in ventral position in males and females. Anal plate 0.16 (0.17) long and 0.25 (0.26) wide. Anal gland pores absent.

Chelicerae (Fig. 48) slightly protruding, with the dorsal crest visible from above; relatively stocky; with few setae. Granulation restricted to the proximal article, covering most of the surface between the dorsal crest and the anterior terminus. Proximal article of SEMed paratype 0.68 long, 0.23 deep, with relatively small dorsal crest and single



**FIGS 40-50.** *Troglisiro wilsoni* n. sp. **40**, ventral view of male paratype. **41**, ventral view of female paratype. **42**, sternal region of male paratype. **43**, sternal region of female paratype. **44**, anal region of male paratype. **45**, anal region of female paratype. **46**, detail of sternal depression of male paratype. **47**, spiracle of male paratype. **48**, external view of left chelicer of male paratype. **49**, detail of the dentition of the chelicer distal segments. **50**, left palp of male paratype.

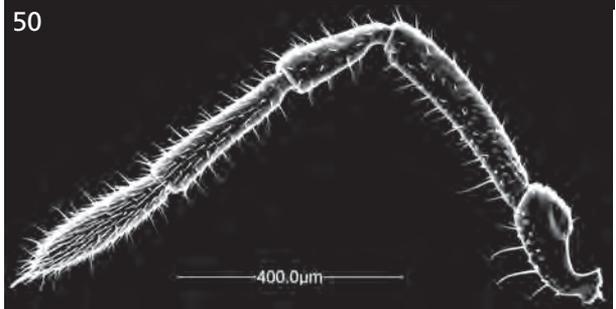
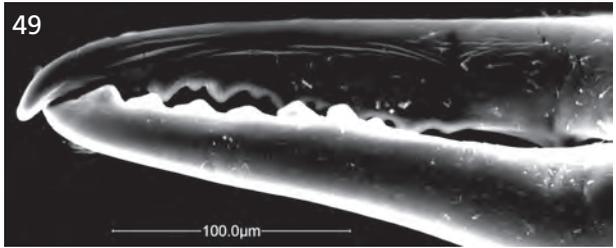
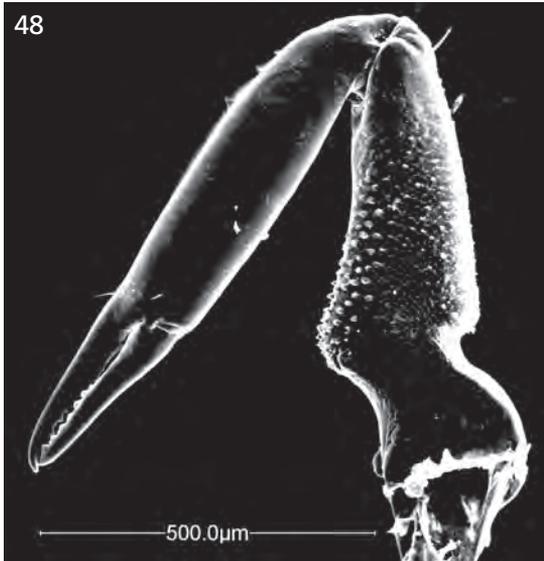
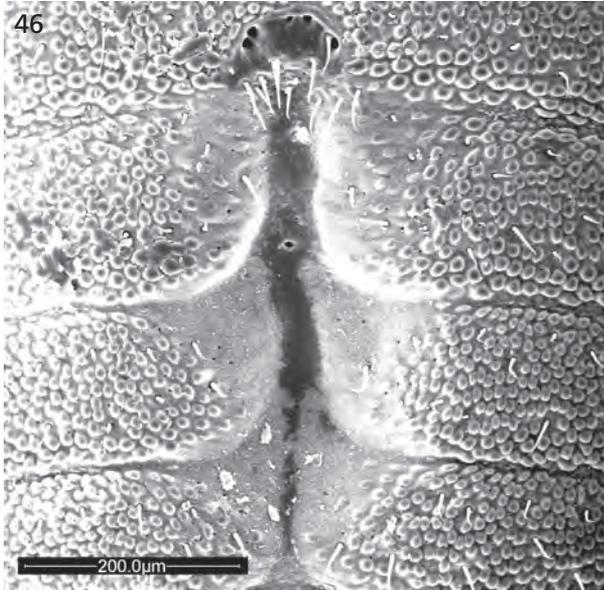
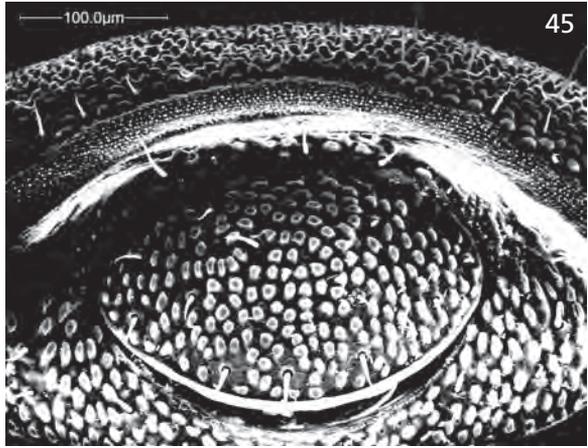
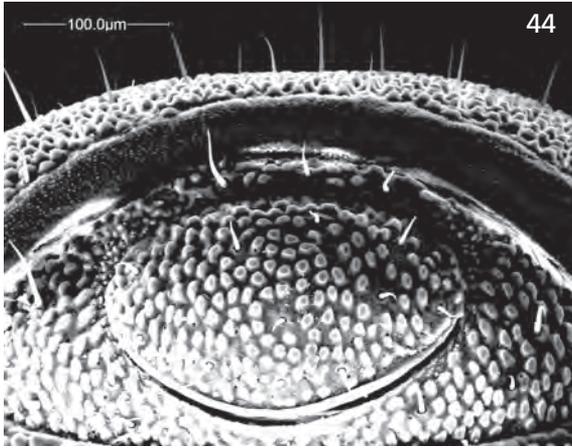
posterior ventral process. Second article 0.86 long, 0.15 deep, widest near the middle of its length; dentition regular, with alternation of small and large nodular teeth. Distal article 0.27 long, 0.05 deep, dentition irregular (Fig. 49).

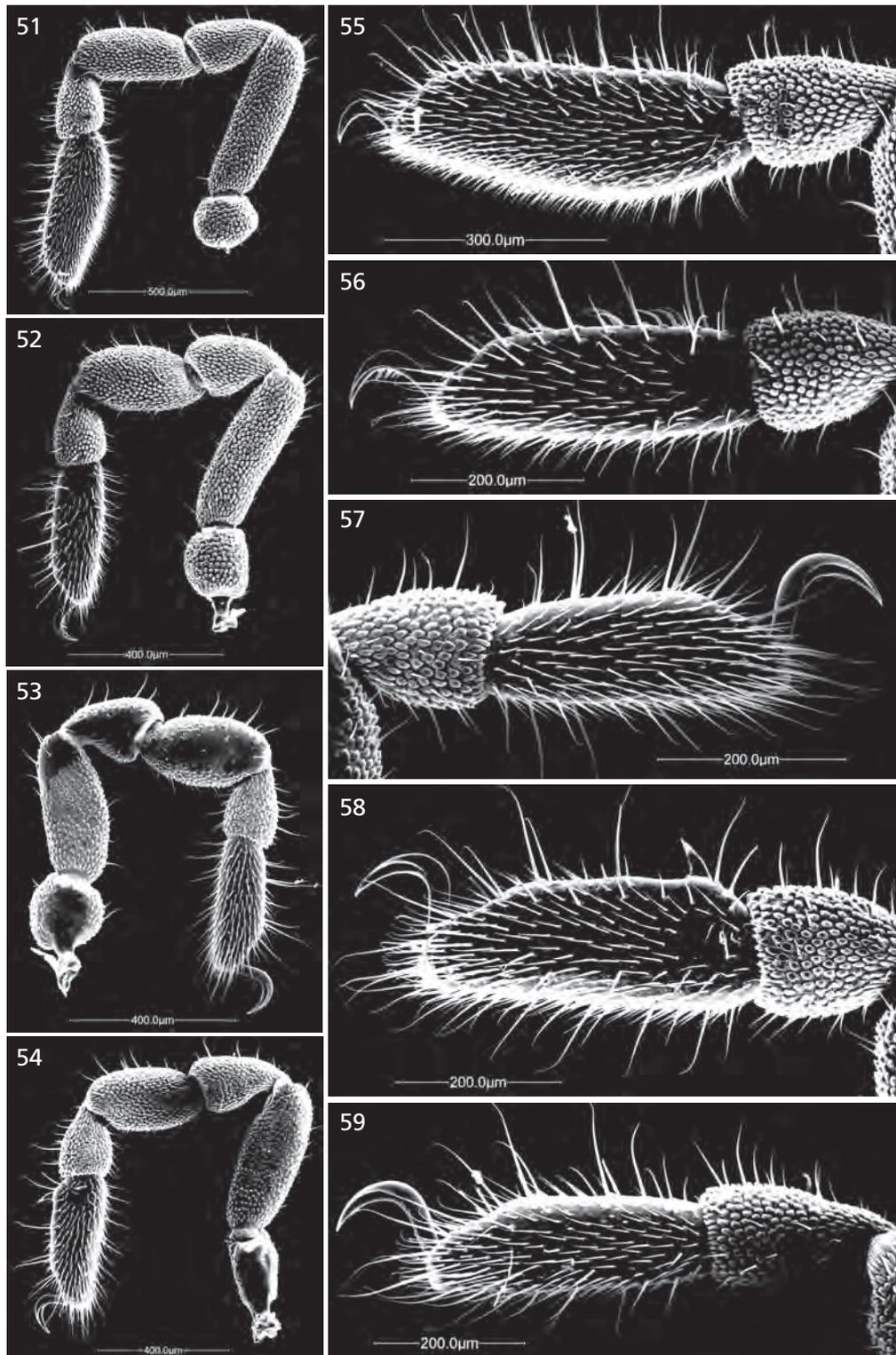
Palp (Fig. 50) without ventral process on proximal end of trochanter; without conspicuous modifications. Length/width (length-width ratio in parentheses) of palpal articles from trochanter to tarsus of SEMed male paratype: 0.24/0.11 (2.2); 0.39/0.08 (4.9); 0.21/0.08 (2.6); 0.29/0.07 (4.1); 0.27/0.07 (3.9); total length 1.40. Palpal claw 0.04 long.

Legs (Figs 51-54) robust; surfaces of all trochanters, femurs, patellae, tibiae and metatarsi thickly and uniformly ornamented with granules. Tarsi (Figs 55-59) not appreciably ornamented. Tarsal claws I, III and IV smooth, tarsal claw II toothed (Figs 60-63).

Leg measurements of holotype: length/width (length-width ratio in parentheses):

	Tr	Fe	Pa	Ti	Mt	Ta	Total
Leg I	0.15/0.18 (0.8)	0.46/0.15 (3.1)	0.22/0.16 (1.4)	0.36/0.16 (2.3)	0.25/0.14 (1.8)	0.43/0.18 (2.3)	1.87
Leg II	0.16/0.17 (0.9)	0.40/0.13 (3.1)	0.23/0.16 (1.4)	0.26/0.17 (1.5)	0.21/0.12 (1.8)	0.35/0.13 (2.7)	1.61
Leg III	0.14/0.15 (0.9)	0.25/0.15 (1.7)	0.22/0.17 (1.3)	0.24/0.17 (1.4)	0.20/0.12 (1.7)	0.27/0.12 (2.3)	1.32
Leg IV	0.21/0.16 (1.3)	0.42/0.17 (2.5)	0.27/0.16 (1.7)	0.30/0.18 (1.7)	0.24/0.15 (1.6)	0.35/0.15 (2.3)	1.79

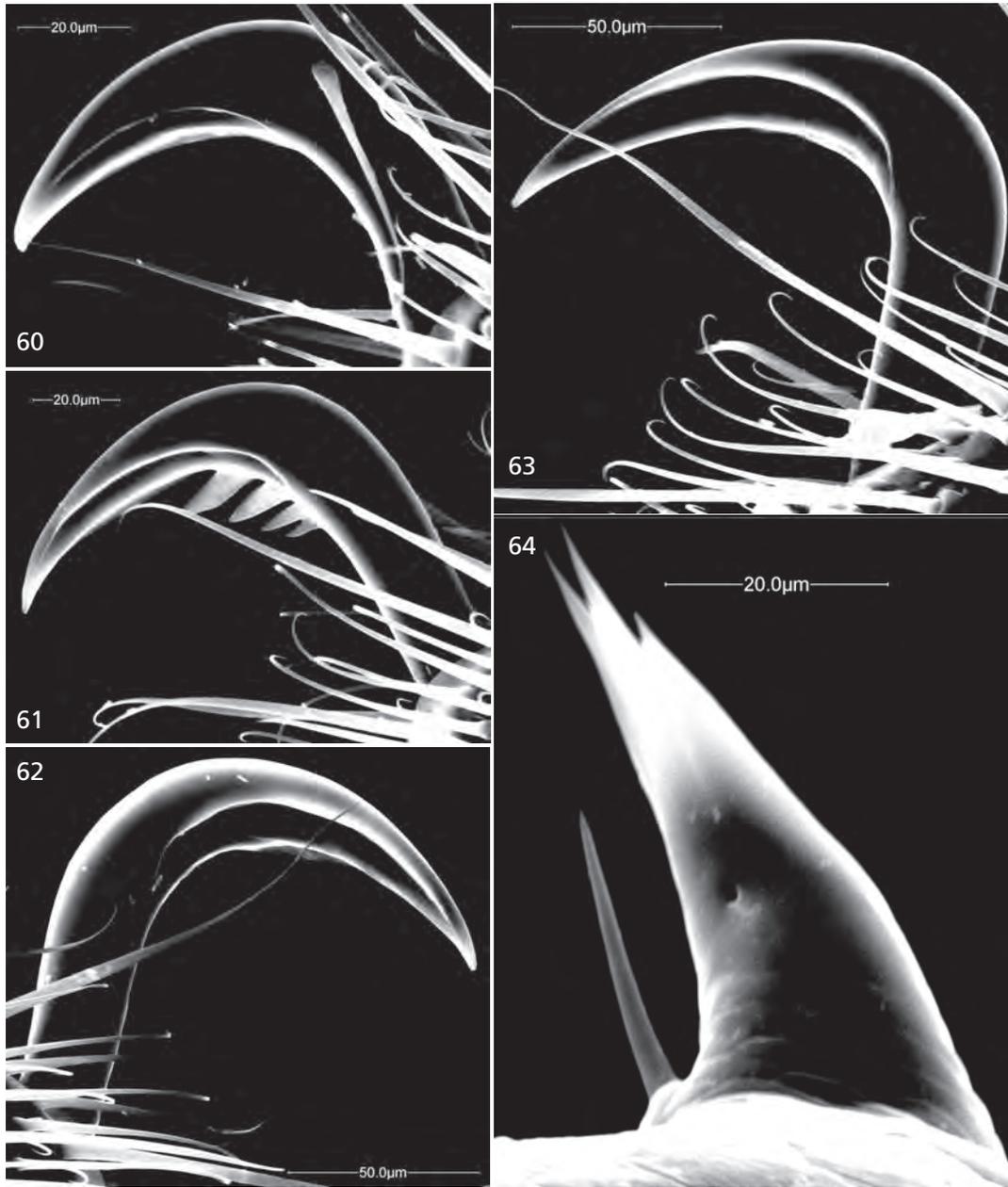




**FIGS 51-59.** *Troglosiro wilsoni* n. sp. **51**, male left leg I. **52**, male left leg II. **53**, male right leg III. **54**, male left leg IV. **55**, detail of male left tarsus I. **56**, detail of male left tarsus II. **57**, detail of male right tarsus III. **58**, detail of male left tarsus IV. **59**, detail of female left tarsus IV.

Leg measurements of female paratype (FMNH 0000 013 995; FM(HD)#78-252): length/width (length-width ratio in parentheses):

	Tr	Fe	Pa	Ti	Mt	Ta	Total
Leg I	0.13/0.19 (0.7)	0.48/0.15 (3.2)	0.26/0.15 (1.7)	0.33/0.15 (2.2)	0.24/0.14 (1.7)	0.43/0.16 (2.7)	1.87
Leg II	0.13/0.14 (0.9)	0.37/0.13 (2.8)	0.23/0.16 (1.4)	0.25/0.15 (1.7)	0.22/0.12 (1.8)	0.32/0.11 (2.9)	1.52
Leg III	0.17/0.14 (1.2)	0.31/0.13 (2.4)	0.21/0.15 (1.4)	0.24/0.15 (1.6)	0.18/0.12 (1.5)	0.26/0.10 (2.6)	1.37
Leg IV	0.17/0.15 (1.1)	0.45/0.16 (2.8)	0.29/0.16 (1.8)	0.28/0.17 (1.6)	0.23/0.12 (1.9)	0.31/0.12 (2.6)	1.73



**FIGS 60-64.** *Troglosiro wilsoni* n. sp. **60**, male left tarsal claw I. **61**, male left tarsal claw II. **62**, male right tarsal claw III. **63**, male right tarsal claw IV. **64**, detail of adenostyle.

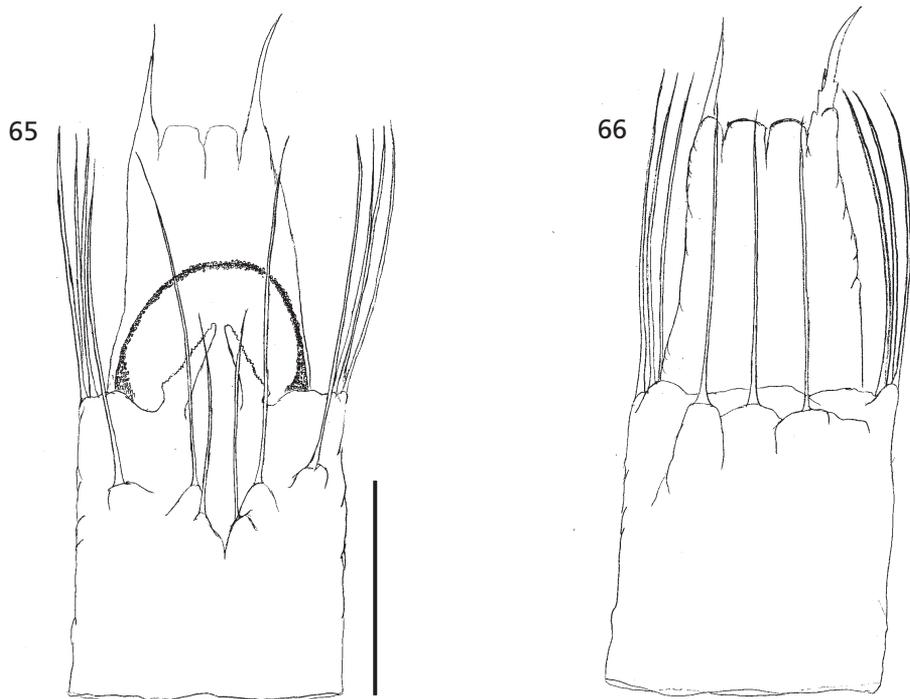
Tarsus IV of males (Fig. 58) not divided, carrying a small lamelliform adenostyle proximal to most basal region of tarsus. Adenostyle 0.05 long, slightly curved, acutely triangular (Fig. 64). Tarsus IV of females without modifications (Fig. 59).

Spermatopositor in ventral view (Fig. 66) with three ventral microtrichia; in dorsal view (Fig. 65) with three lateral microtrichia on each side, and three pairs of dorsal microtrichia, the median pair greatly reduced. Apical microtrichia greatly enlarged, basally fused, and smooth at the bases; middle pair of apical microtrichia missing in studied specimen, possibly broken off, and probably resembling present microtrichial pair. Gonopore structures: ventral plate much larger than gonopore lip, and entirely smooth; movable fingers elongate, with large, laterally protruding basal lobes, and toothed lateral margins; gonopore lip semicircular and toothed with small, blunt teeth.

VARIATION. — Range of measurements in males ( $n = 15$ ) and females ( $n = 11$ ; in parentheses): body length 1.76-1.92 (1.86-1.96); maximum width 1.02-1.18 (1.12-1.24).

DISTRIBUTION. — Known only from the type locality.

REMARKS. — The multiple-pore structure anterior to the sternal depression is most likely an aggregation of sternal gland pores. This morphological structure is not anomalous, as it appears in the holotype and all male paratypes examined. It has not been found in any other species of the family. The sternal depression of *T. wilsoni* n. sp. is proportionally shorter than those of *T. longifossa*, *T. raveni*, and *T. urbanus* n. sp. and is unique in that its width is not uniform, giving the depression a bilobed shape resembling an hourglass.



FIGS 65-66. *Troglisiro wilsoni* n. sp. **65**, total spermatopositor, dorsal view. **66**, total spermatopositor, ventral view. Scale bars = 100  $\mu$ m.

*Troglosiro brevifossa* n. sp.

Figs 67-71

TYPE MATERIAL. – New Caledonia. Holotype: male (MNHN [ex MCZ DNA101695]) from Cap Ndoua (site 1), 22°23'S, 166°56'E, 150 m elevation, collected 21 December 2004 by G. B. Monteith (from Berlesate from rainforest). Paratype: 1 female (QM) same collecting data as holotype; 1 female for DNA extraction (MCZ 72571 [ex MCZ DNA 101696]), from Cap Ndoua (site 2), 22°23'S, 166°55'E, 50 m elevation, collected 28-29 November 2004 by G. B. Monteith (from Berlesate from rainforest).

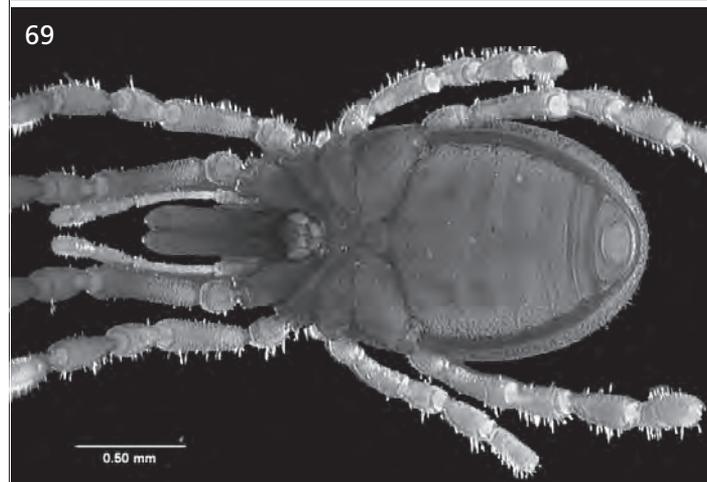
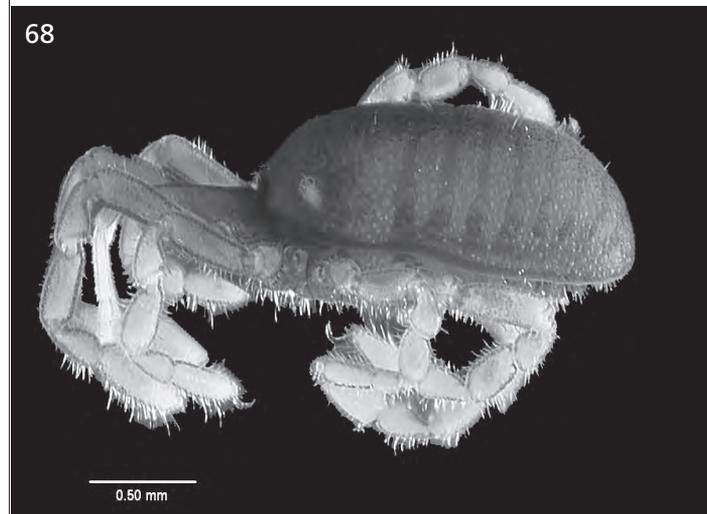
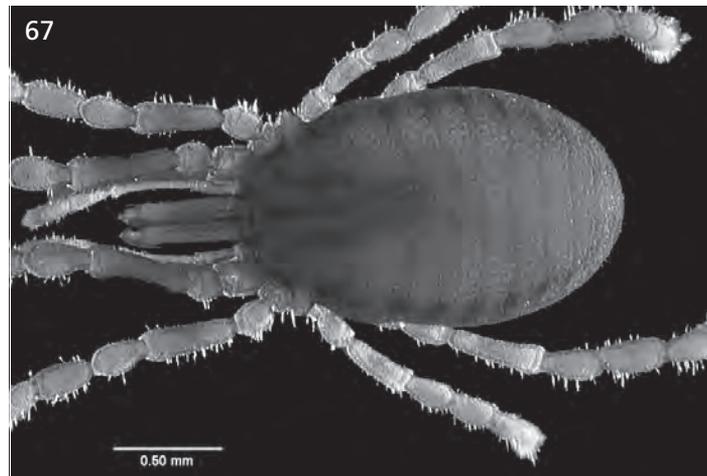
TYPE LOCALITY. – Cap Ndoua.

ETYMOLOGY. – The specific epithet, an invariable noun in apposition, refers to the length of the sternal opisthosomal depression in the males of this species. Derived from Latin *brevis*, meaning brief or short, and *fossa*, meaning ditch, trench or channel.

DIAGNOSIS. – Small troglisironid with opisthosomal sternites IV and V of males depressed and with two sternal pores in longitudinal configuration. This is the smallest sternal depression known in the genus *Troglosiro*. Dentition of movable finger of chelicer regular.

DESCRIPTION. – Total length of male holotype (female paratype [MCZ 72571] in parentheses) 1.72 (1.82); width across ozopores 0.94 (0.92), greatest width 1.08 (1.10) occurs between second and third opisthosomal segments (Figs 67, 70); length-width ratio 1.59 (1.65).

Body approximately egg-shaped, dark orange to reddish brown (in alcohol) depending on incidence of light. Body with dense tuberculate-microgranulate microstructure on almost all surfaces. Ozophores conical, of type 2 of Juberthie. Eyes absent (Fig. 68). Transverse opisthosomal sulci conspicuous (Fig. 67). Mid-dorsal longitudinal opisthosomal sulcus absent. Posterior end of body evenly rounded. Opisthosomal sternites IV and



FIGS 67-69. *Troglosiro brevifossa* n. sp. 67, dorsal view of male holotype. 68, lateral view of male holotype. 69, ventral view of male holotype.

V depressed. Two sternal pores on midline of opisthosomal sternites. Anterior pore in center of sternite III, posterior pore lies between sternites III and IV. Female opisthosomal sternites without clear modifications (Fig. 71).

Coxae of legs I and II movable, coxae of legs III and IV fused (Fig. 69). Ventral prosomal complex of male with coxae of legs II, III and IV meeting in the midline, but coxae I not so. Sternum absent. Gonostome semicircular, width greater than length. Ventral prosomal complex of females with only coxae II meeting in the midline (Fig. 71).

Spiracles in the form of a closed circle, with maximum diameter 0.35. Sternites VIII and IX and tergite IX fused in males and females, forming a corona analis. Anal plate without modifications, in ventral position in males and females. Anal plate 0.12 (0.14) long and 0.22 (0.23) wide. Anal gland pores absent.

Chelicerae slightly protruding, with the dorsal crest visible from above; relatively stocky; with few setae. Granulation restricted to the proximal article. Proximal article 0.56 long, 0.23 deep, with relatively small dorsal crest and single posterior ventral process. Second article 0.77 long, 0.13 deep, widest near the middle of its length; dentition with alternation of small and large teeth. Distal article 0.20 long, 0.04 deep, dentition regular.

Palp without ventral process on proximal end of trochanter; without conspicuous modifications. Length/width (length-width ratio in parentheses) of palpal articles from trochanter to tarsus: 0.17/0.09 (1.9); 0.38/0.06 (6.3); 0.20/0.07 (2.9); 0.27/0.06 (4.5); 0.26/0.07 (3.7); total length 1.28. Palpal claw 0.04 long.

Legs robust; surfaces of all trochanters, femurs, patellae, tibiae and metatarsi thickly and uniformly ornamented with granules. Tarsi not appreciably ornamented. Tarsal claws I, III and IV smooth, tarsal claw II toothed.

Leg measurements of holotype: length/width (length-width ratio in parentheses):

	Tr	Fe	Pa	Ti	Mt	Ta	Total
Leg I	0.15/0.17 (0.9)	0.54/0.15 (3.6)	0.29/0.15 (1.9)	0.31/0.15 (2.1)	0.25/0.13 (1.9)	0.42/0.17 (2.5)	1.96
Leg II	0.13/0.14 (0.9)	0.43/0.13 (3.3)	0.25/0.14 (1.8)	0.25/0.15 (1.7)	0.21/0.12 (1.8)	0.32/0.11 (2.9)	1.59
Leg III	0.13/0.12 (1.1)	0.32/0.12 (2.7)	0.21/0.15 (1.4)	0.21/0.14 (1.5)	0.20/0.10 (2.0)	0.26/0.10 (2.6)	1.33
Leg IV	0.21/0.13 (1.6)	0.42/0.14 (3.0)	0.26/0.15 (1.7)	0.26/0.17 (1.5)	0.23/0.14 (1.6)	0.33/0.15 (2.2)	1.71

Leg measurements of female paratype (MCZ 72571): length/width (length-width ratio in parentheses):

	Tr	Fe	Pa	Ti	Mt	Ta	Total
Leg I	0.15/0.18 (0.8)	0.57/0.16 (3.6)	0.30/0.14 (2.1)	0.33/0.16 (2.1)	0.24/0.12 (2.0)	0.39/0.15 (2.6)	1.88
Leg II	0.13/0.15 (0.9)	0.41/0.13 (3.2)	0.24/0.14 (1.7)	0.27/0.15 (1.8)	0.22/0.11 (2.0)	0.34/0.11 (3.1)	1.61
Leg III	0.16/0.11 (1.5)	0.32/0.12 (2.7)	0.19/0.14 (1.4)	0.22/0.14 (1.6)	0.18/0.10 (1.8)	0.27/0.10 (2.7)	1.34
Leg IV	0.22/0.13 (1.7)	0.43/0.14 (3.1)	0.27/0.14 (1.9)	0.27/0.15 (1.8)	0.19/0.11 (1.7)	0.30/0.10 (3.0)	1.68

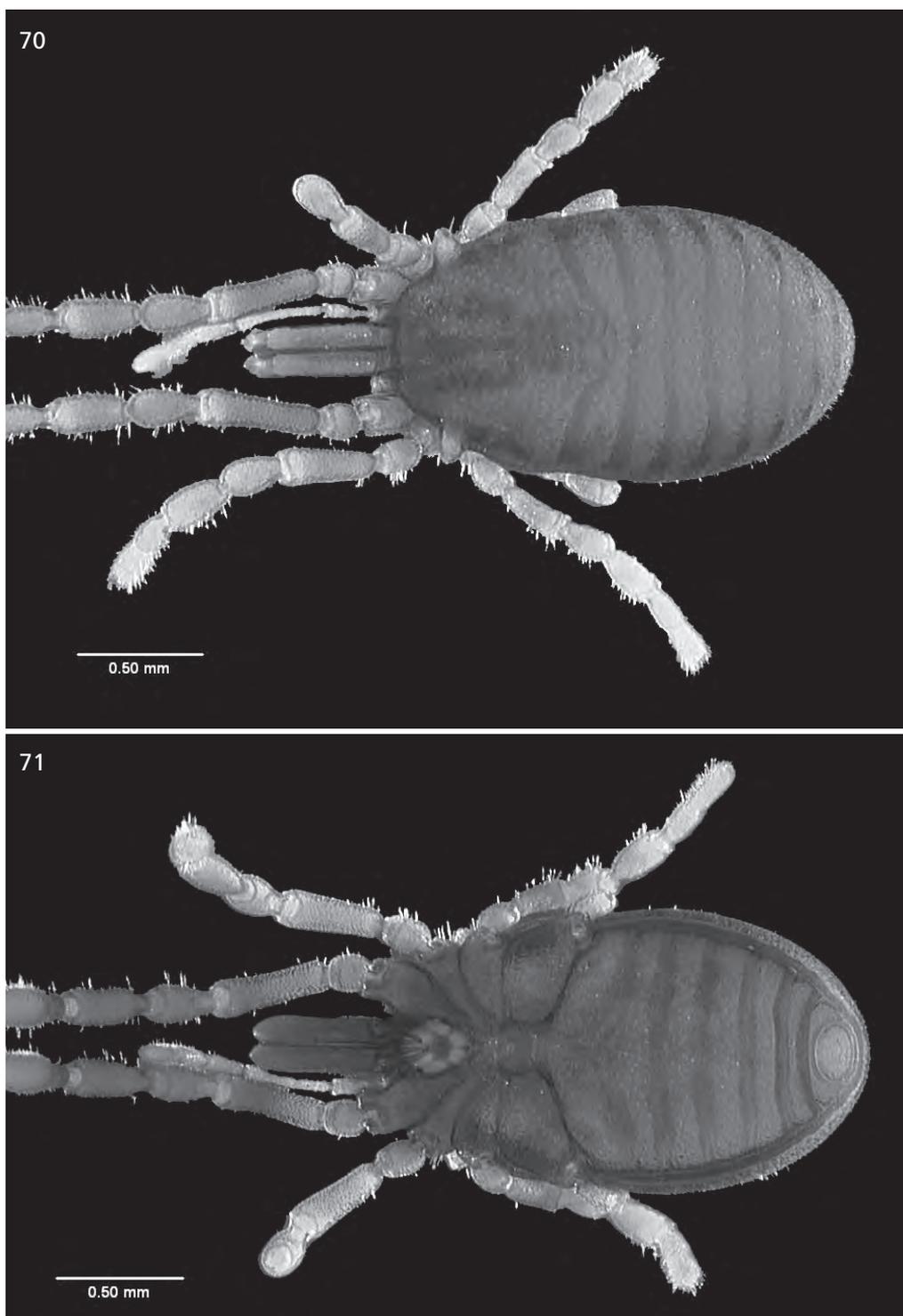
Tarsus IV of males not divided, carrying a lamelliform adenostyle proximal to most basal region of tarsus. Adenostyle 0.11 long, slightly curved, and acutely triangular. Tarsus IV of female without modifications.

Study of genitalic morphology not undertaken due to paucity of specimens.

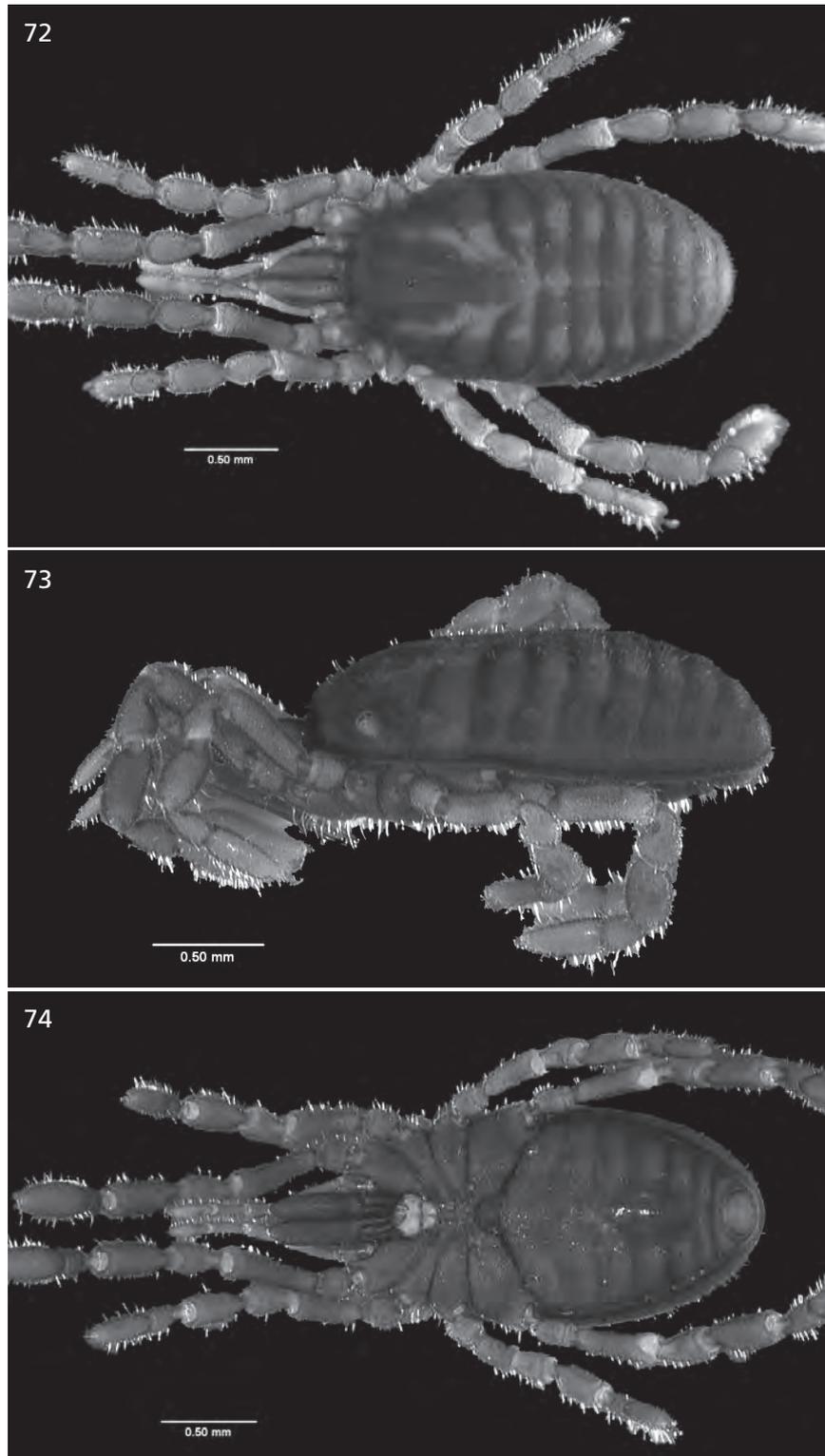
VARIATION. — Range of measurements in females (n = 2): body length 1.81-1.82; maximum width 1.08-1.10.

DISTRIBUTION. — Known only from the type locality and its vicinity.

REMARKS. — The type locality of this species is the southernmost New Caledonian locality where troglisironid populations have been found, and also the southernmost point of the main island. Among the troglisironids that do



FIGS 70-71. *Troglisiro brevifossa* n. sp. 70, dorsal view of female paratype. 71, ventral view of female paratype.



**FIGS 72-74.** *Troglósiro oscitatio* n. sp. **72**, dorsal view of male holotype. **73**, lateral view of male holotype. **74**, ventral view of male holotype.

feature depressions of the opisthosomal sternites, this species has the shortest. This is remarkable, as a neighboring species, *Troglosiro longifossa*, found less than 15 km away, has the longest and widest sternal depression known among troglosironids. The number and configuration of the sternal gland pores in *T. brevifossa* n. sp. males is similarly found in males of *T. aelleni*, a northern species.

***Troglosiro oscitatio* n. sp.**

Figs 72-98

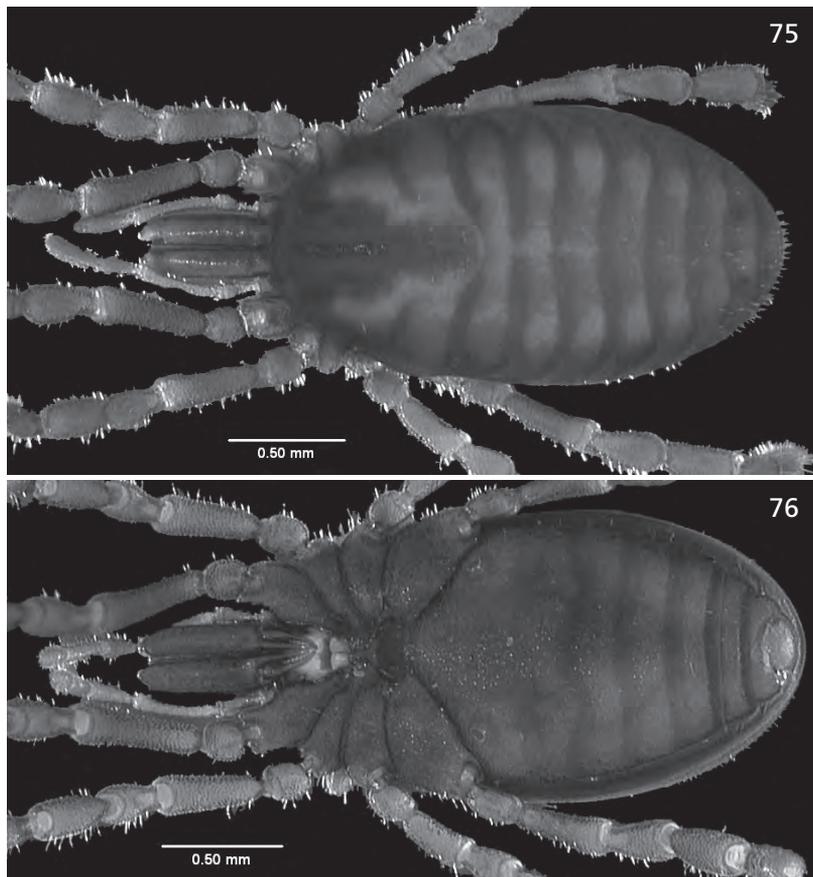
TYPE MATERIAL. – New Caledonia. Holotype: male (MNHN [ex QM]) from Mont Rembai, top junction, 21°35'S, 165°51'E, 780 m elevation, collected 19 December 2004 by G. B. Monteith (from Berlesate, sieved litter). Paratypes: 1 male, 2 female (MCZ 72572; MCZ DNA101709) for DNA extraction, same collecting data as holotype; 1 male (MCZ 72573) mounted on SEM stubs, same collecting data as holotype; 1 male, 1 female (QM), from Mont Rembai, top junction, 21°35'S, 165°51'E, 780 m elevation, collected 30 December 2004 by G. B. Monteith (from Berlesate, sieved litter).

TYPE LOCALITY. – Mont Rembai.

ETYMOLOGY. – The specific epithet refers to the lacuna formed by the sternal opisthosomal depression in the males of this species. Derived from Latin *oscitatio*, meaning gaping or yawning.

DIAGNOSIS. – Troglosironid with an “M” pattern of pigmentation in both males and females and with opisthosomal sternites IV through VII deeply depressed around midline, forming a single, wide, subcircular depression that is widest in sternite V and terminates abruptly at anterior tip of sternite VII. With three sternal pores on midline of opisthosomal sternites. Anteriormost pore in center of sternite III, central pore in sternite IV preceding sternal depression, and posteriormost pore near center of sternite IV. Dentition of movable finger of chelicer regular.

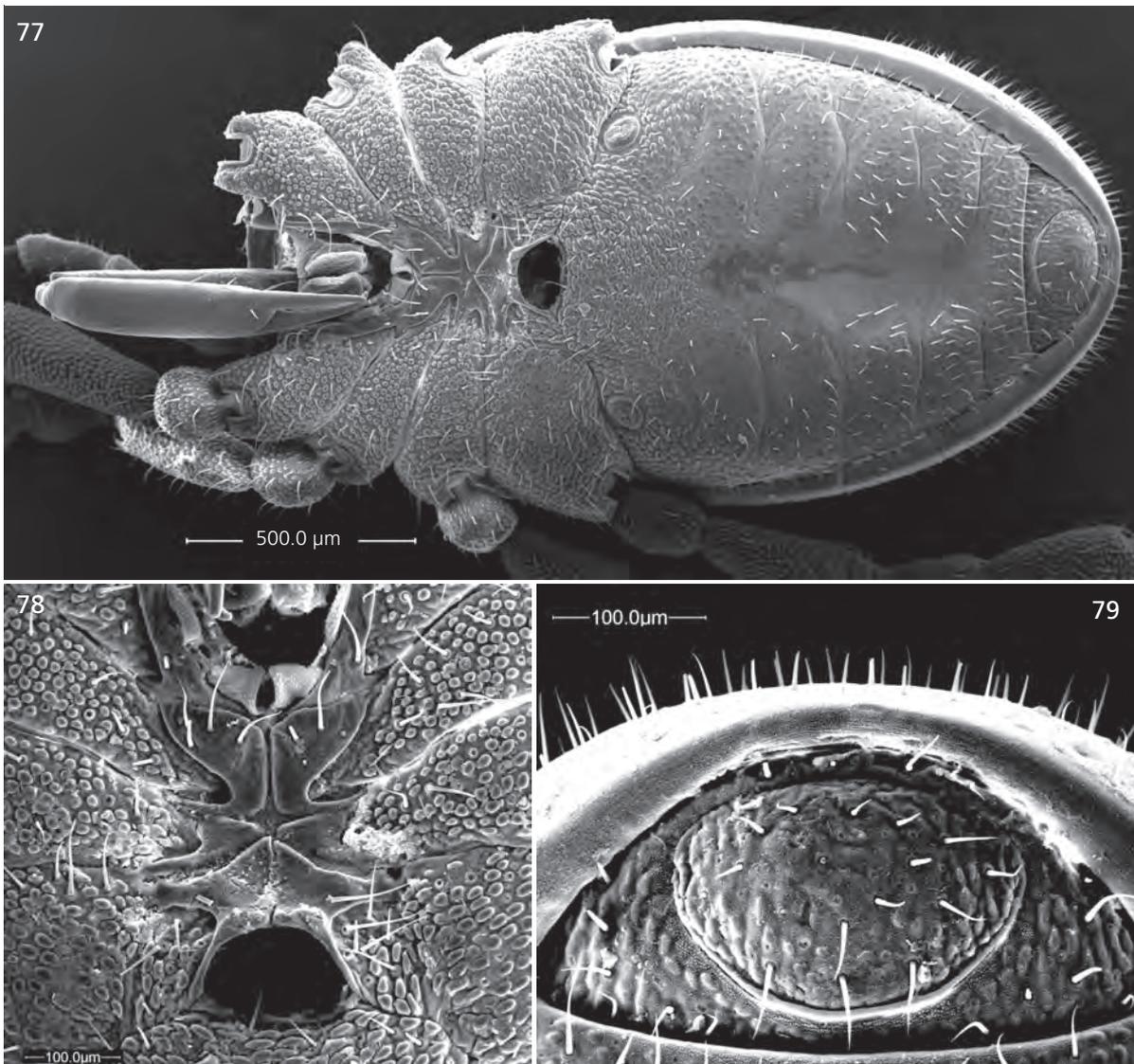
DESCRIPTION. – Total length of male holotype (female paratype MCZ DNA101709 in parentheses) 2.06 (2.16); width across ozopores



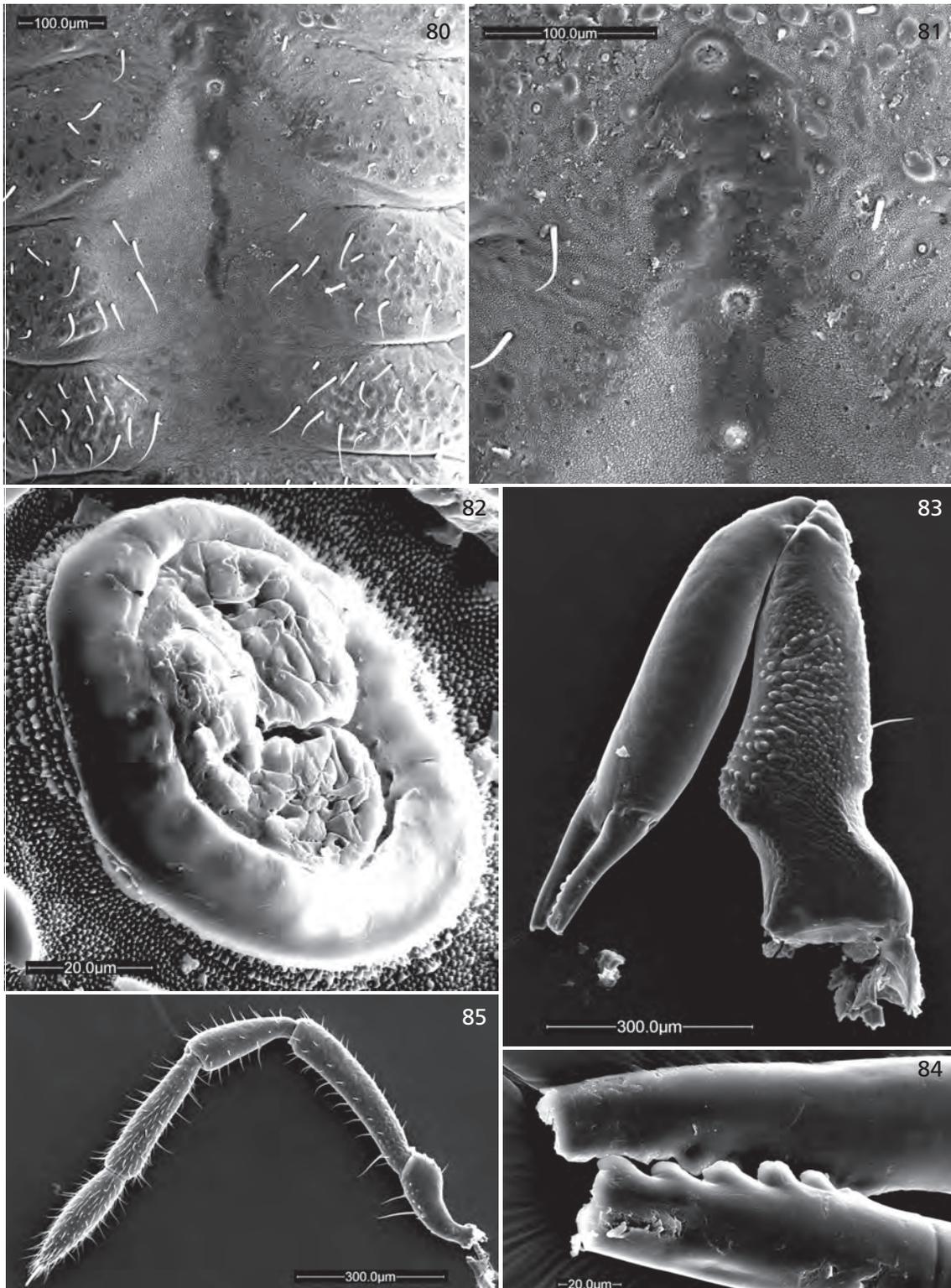
**FIGS 75-76.** *Troglosiro oscitatio* n. sp. **75**, dorsal view of female paratype. **76**, ventral view of female paratype.

1.06 (1.08), greatest width 1.14 (1.20) occurs between second and third opisthosomal segments (Figs 72, 77); length-width ratio 1.81 (1.80).

Body approximately egg-shaped, dark orange to reddish brown (in alcohol) depending on incidence of light. Body with dense tuberculate-microgranulate microstructure on almost all surfaces. Ozophores conical, of type 2 of Juberthie. Eyes absent (Fig. 73). Transverse opisthosomal sulci conspicuous. Dorsum with distinct pattern of pigmentation, shaped like an “M” closed at the bottom (Fig. 72), also present in females. Mid-dorsal longitudinal opisthosomal sulcus absent. Posterior end of body evenly rounded. Opisthosomal sternites IV through VII deeply depressed around midline, forming single, wide, subcircular depression that is widest in sternite V and terminates abruptly at anterior tip of sternite VII (Fig. 80). Three sternal pores on midline of opisthosomal sternites. Antermost pore in center of sternite III, central pore in sternite IV preceding sternal depression, and posteriormost pore near center of sternite IV (Fig. 81). Female opisthosomal sternites without clear modifications (Fig. 76).



FIGS 77-79. *Troglodiro oscitatio* n. sp. 77, ventral view of male paratype. 78, sternal region of male paratype. 79, anal region of male paratype.



**FIGS 80-85.** *Troglosiro oscitatio* n. sp. **80**, detail of sternal depression of male paratype. **81**, detail of sternal pores of male paratype. **82**, spiracle of male paratype. **83**, external view of left chelicer of male paratype. **84**, detail of the dentition of the chelicer distal segments. **85**, left palp of male paratype.

Coxae of legs I and II movable, coxae of legs III and IV fused (Fig. 78). Ventral prosomal complex of male with coxae of legs II, III and IV clearly meeting in the midline, but coxae I not so. Sternum absent. Gonostome ovoid, width greater than length. Ventral prosomal complex of females with only coxae II meeting in the midline (Fig. 76).

Spiracles in the form of a closed circle (Fig. 82). Sternites VIII and IX and tergite IX fused in males and females, forming a corona analis. Anal plate without modifications, in ventral position in males and females (Fig. 79). Anal plate 0.16 (0.13) long and 0.26 (0.24) wide. Anal gland pores absent.

Chelicerae (Fig. 83) slightly protruding, with the dorsal crest visible from above; relatively stocky; with few setae. Granulation restricted to the proximal article, covering part of the surface between the dorsal crest and the anterior terminus. Proximal article 0.64 long, 0.22 deep, with relatively small dorsal crest and single posterior ventral process. Second article 0.76 long, 0.14 deep, widest near the middle of its length; dentition with alternation of small and large teeth in the fixed finger. Distal article 0.21 long, 0.03 deep, dentition regular (Fig. 84).

Palp (Fig. 85) without ventral process on proximal end of trochanter; without conspicuous modifications. Length/width (length-width ratio in parentheses) of palpal articles from trochanter to tarsus: 0.22/0.09 (2.5); 0.37/0.08 (4.6); 0.23/0.09 (2.7); 0.29/0.08 (3.8); 0.24/0.07 (3.4); total length 1.35. Palpal claw 0.05 long.

Legs (Figs 86-89) robust; surfaces of all trochanters, femurs, patellae, tibiae and metatarsi thickly and uniformly ornamented with granules. Tarsi (Figs 90-93) not appreciably ornamented. Tarsal claws I, III and IV smooth, tarsal claw II toothed (Figs 94-97).

Leg measurements of SEMed male paratype (MCZ 72573): length/width (length-width ratio in parentheses):

	Tr	Fe	Pa	Ti	Mt	Ta	Total
Leg I	0.16/0.18 (0.9)	0.57/0.18 (3.2)	0.33/0.18 (1.8)	0.35/0.19 (1.9)	0.27/0.16 (1.7)	0.46/0.18 (2.5)	2.14
Leg II	0.16/0.17 (0.9)	0.46/0.16 (2.9)	0.28/0.17 (1.7)	0.29/0.18 (1.6)	0.25/0.13 (1.9)	0.34/0.13 (2.6)	1.78
Leg III	0.14/0.17 (0.8)	0.35/0.16 (2.2)	0.26/0.16 (1.6)	0.25/0.19 (1.3)	0.25/0.14 (1.8)	0.28/0.12 (2.2)	1.53
Leg IV	0.21/0.16 (1.4)	0.43/0.18 (2.4)	0.33/0.19 (1.8)	0.33/0.20 (1.7)	0.26/0.16 (1.6)	0.34/0.16 (2.2)	1.90

Leg measurements of female paratype (MCZ 72572): length/width (length-width ratio in parentheses):

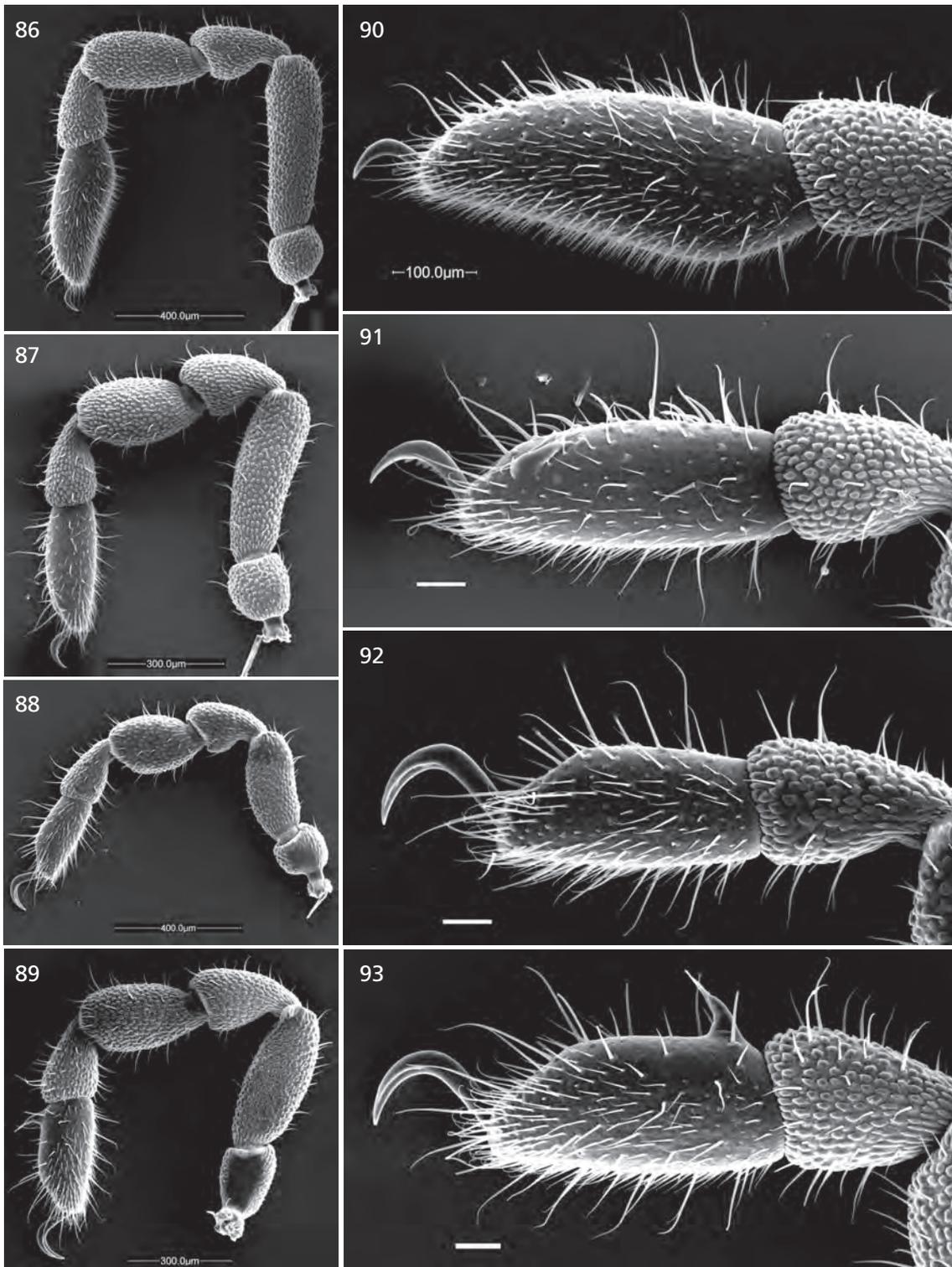
	Tr	Fe	Pa	Ti	Mt	Ta	Total
Leg I	0.18/0.17 (1.1)	0.57/0.16 (3.6)	0.31/0.19 (1.6)	0.36/0.17 (2.1)	0.29/0.15 (1.9)	0.43/0.19 (2.3)	2.14
Leg II	0.17/0.15 (1.1)	0.44/0.14 (3.1)	0.25/0.16 (1.6)	0.29/0.17 (1.7)	0.25/0.14 (1.8)	0.30/0.12 (2.5)	1.70
Leg III	0.14/0.14 (1.0)	0.32/0.14 (2.3)	0.25/0.17 (1.5)	0.26/0.18 (1.4)	0.22/0.13 (1.7)	0.27/0.12 (2.3)	1.46
Leg IV	0.21/0.15 (1.4)	0.47/0.17 (2.8)	0.31/0.18 (1.7)	0.31/0.18 (1.7)	0.25/0.14 (1.8)	0.30/0.13 (2.3)	1.85

Tarsus IV of males (Fig. 93) not divided, carrying a lamelliform adenostyle proximal to most basal region of tarsus. Adenostyle (Fig. 98) 0.09 long, slightly curved, acutely triangular, and terminating with four short setae. Tarsus IV of female without modifications.

Study of genitalic morphology not undertaken.

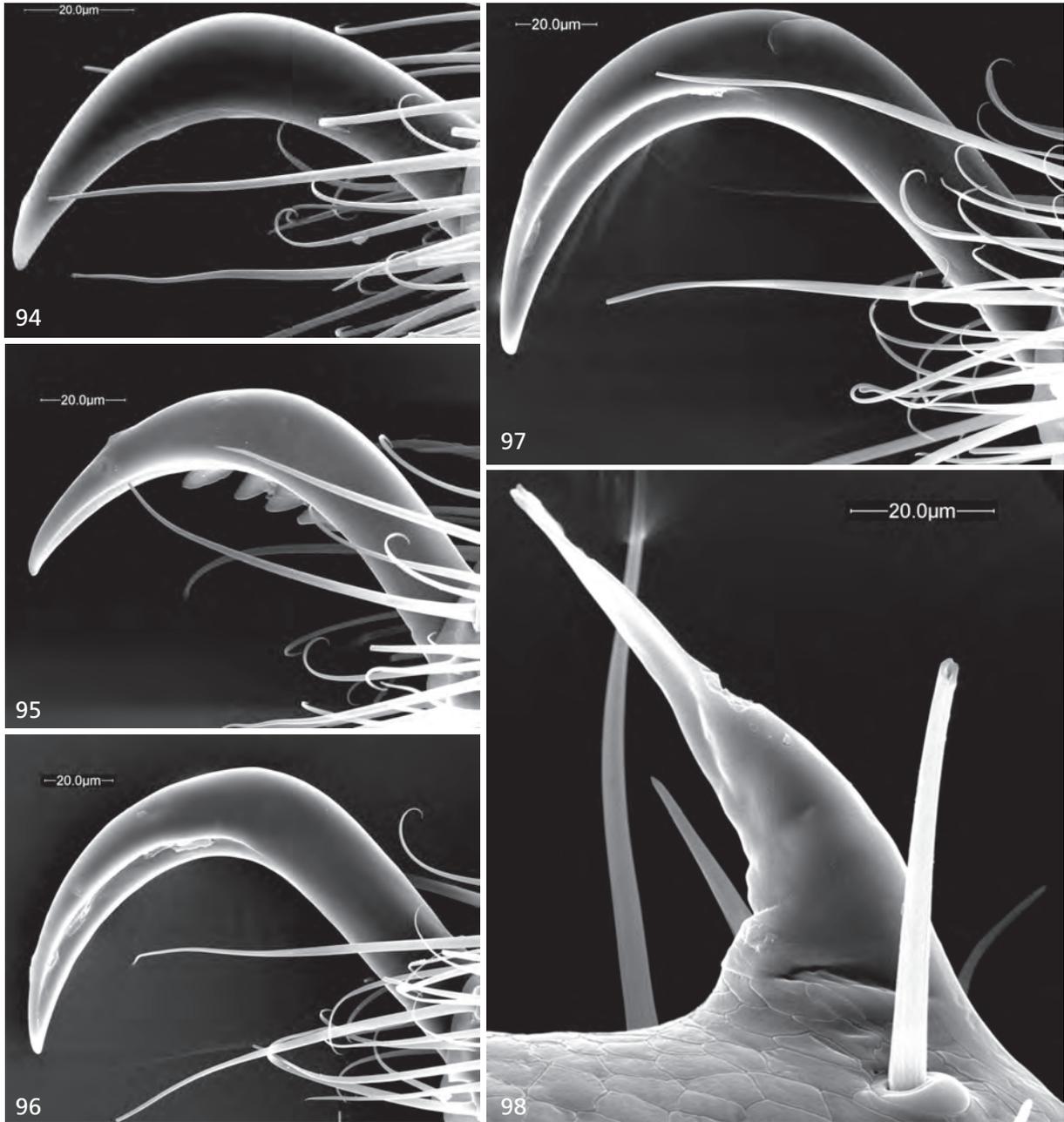
VARIATION. – Range of measurements in males (n = 4) and females (n = 3; in parentheses): body length 1.96-2.06 (2.16-2.18); maximum width 1.12-1.14 (1.20-1.22).

DISTRIBUTION. – Known only from the type locality.



**FIGS 86-93.** *Troglisiro oscitatio* n. sp. **86**, male left leg I. **87**, male left leg II. **88**, male left leg III. **89**, male left leg IV. **90**, detail of male left tarsus I. **91**, detail of male left tarsus II. **92**, detail of male left tarsus III. **93**, detail of male left tarsus IV. Scale bar for Figs 91-93 = 50.0 μm.

REMARKS. — The pattern of dorsal coloration in *T. oscitatio* n. sp. and *T. monteithi* n. sp. is nearly identical, which may be indicative of close phylogenetic relationship. This pattern differs markedly from the striped coloration of *T. raveni*, which extends over the dorsal, lateral and ventral surfaces of the carapace. Furthermore, although the former species features a single opisthosomal depression and the latter two, the approximate width of the depression, as well as the specific sternites depressed, sternites IV through VI, are similar in the two species.



**FIGS 94-98.** *Troglusiro oscitatio* n. sp. **94**, male left tarsal claw I. **95**, male left tarsal claw II. **96**, male right tarsal claw III. **97**, male right tarsal claw IV. **98**, detail of adenostyle.

*Troglosiro urbanus* n. sp.

Figs 99-128

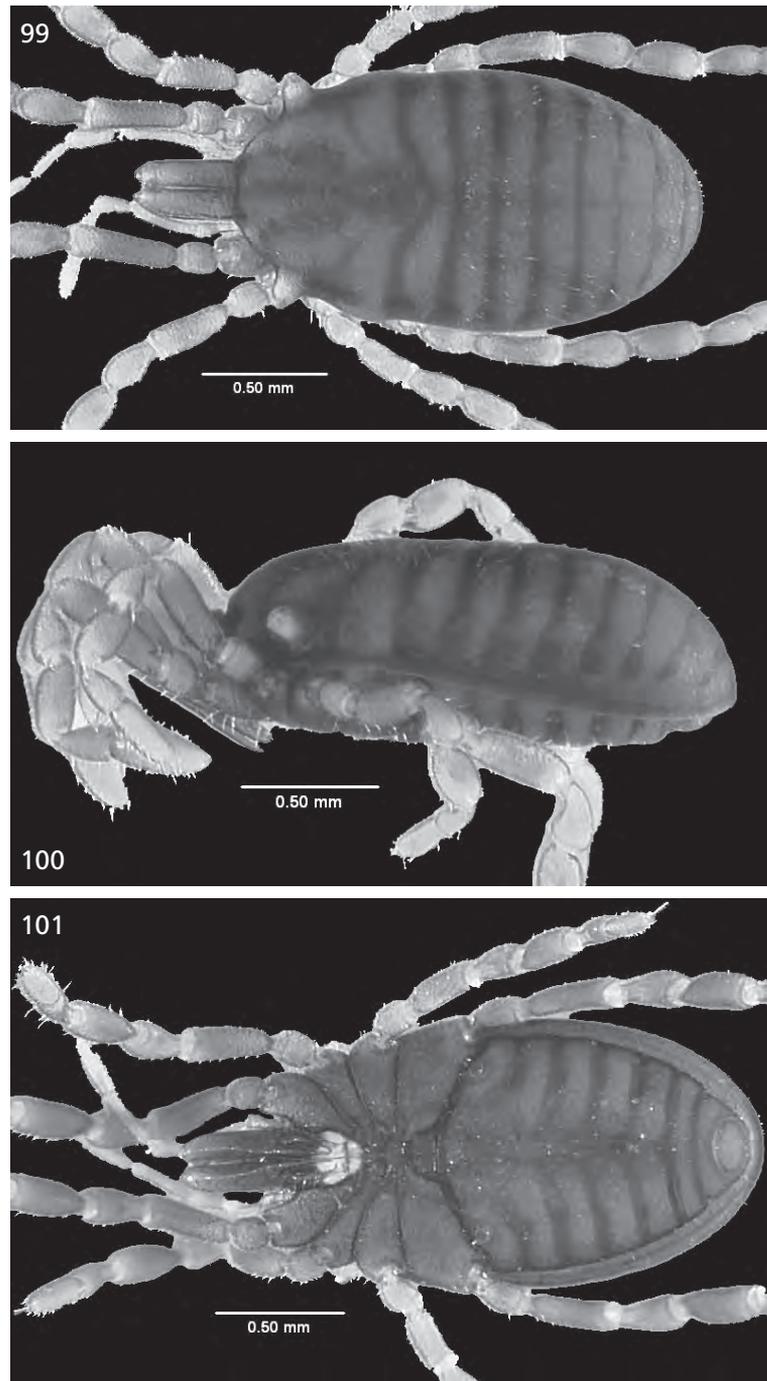
TYPE MATERIAL. — New Caledonia. Holotype: male (MNHN [ex MCZ 51943]) from Yahoué, 22°12'S, 166°30'E, 100 m elevation, collected 4 November 2002 by G. B. Monteith (from sieved litter). Paratypes: 2 male, 2 female (MCZ 72574), same collecting data as holotype; 6 male (MCZ 51943; MCZ DNA101578) for DNA extraction, 1 male and 1 female dissected for genitalia, same collecting data as holotype; 1 male, 1 female (MCZ 72575, 72576) mounted on SEM stubs, same collecting data as holotype; 9 male, 5 female (QM) from Yahoué, 22°12'S, 166°28'E, 100 m elevation, collected 4 January 2004 by G. B. Monteith (from sieved litter); 6 male, 6 female for DNA extraction (MCZ 72577; MCZ DNA101710), from second collection.

ADDITIONAL MATERIAL. — 2 juveniles (MCZ 51943), same collecting data as holotype; 6 juveniles (QM), from second collection.

TYPE LOCALITY. — Yahoué.

ETYMOLOGY. — The specific epithet is a reference to the proximity of the type locality to the New Caledonian capital, Nouméa. Derived from Latin *urbanus*, meaning pertaining to a city or alternatively cultured.

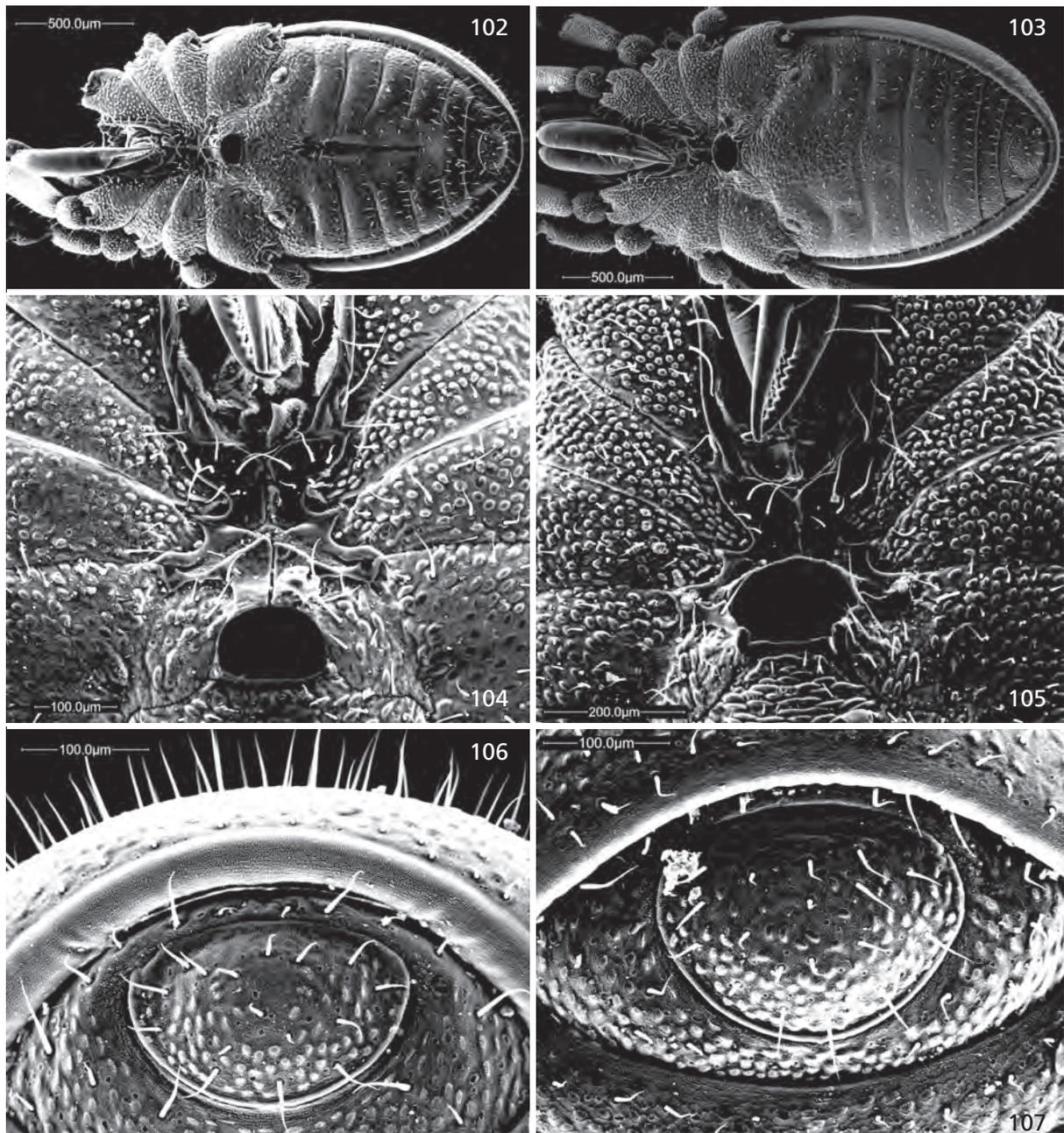
DIAGNOSIS. — Small troglosironid with a sternal opisthosomal depression of males extending from sternite III through VII, and with a particular disposition of the four sternal gland pores: two anteriormost sternal pores appear as a parallel pair towards anterior of sternite III; single central pore lies between sternite III and IV; posteriormost single pore near center of sternite IV. Dentition of movable finger of chelicera regular. Spermatopositor with



FIGS 99-101. *Troglosiro urbanus* n. sp. 99, dorsal view of male holotype. 100, lateral view of male holotype. 101, ventral view of male holotype.

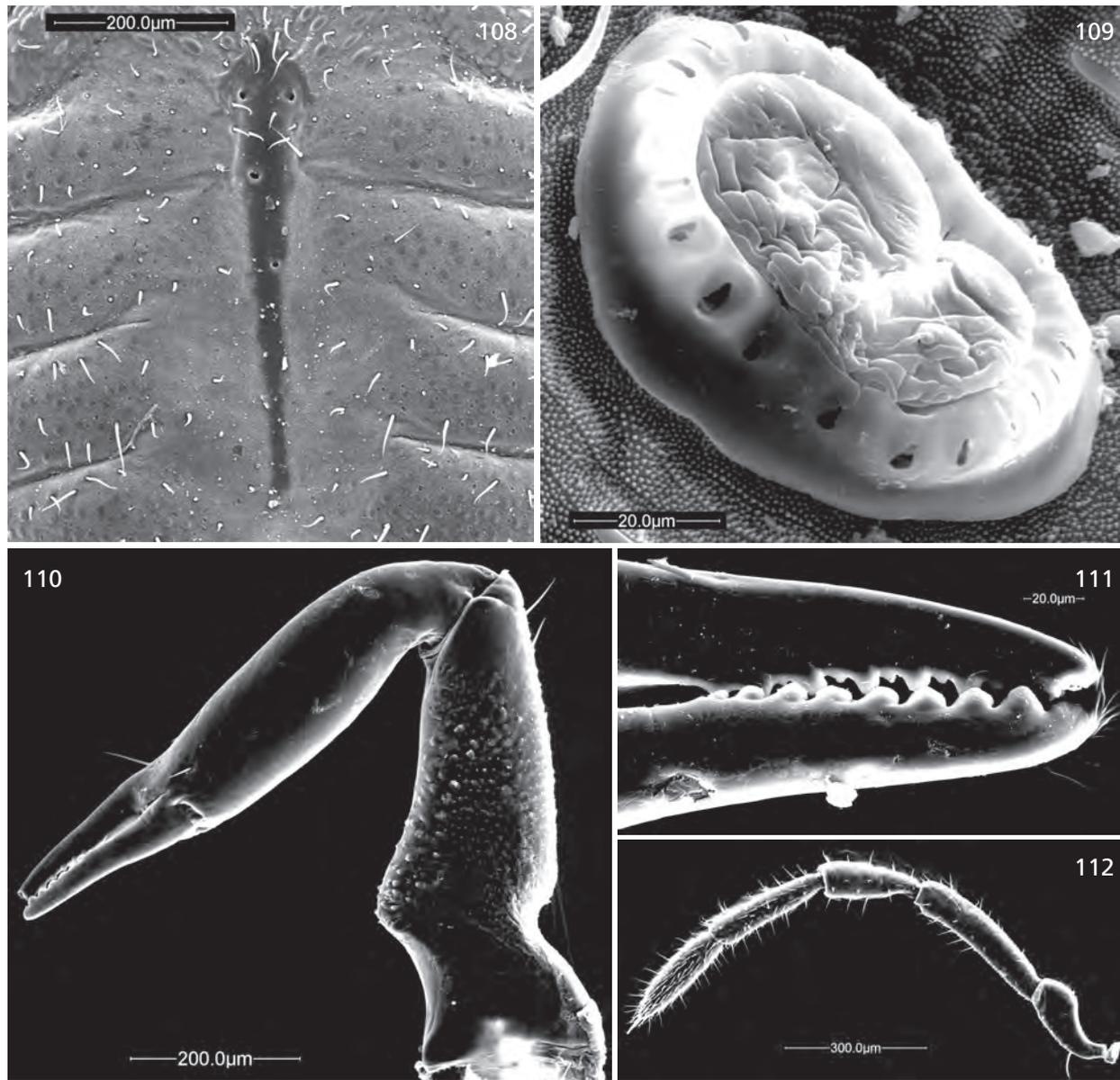
three ventral microtrichia, three lateral microtrichia on each side, and three pairs of dorsal microtrichia, the median pair greatly reduced. Apical microtrichia greatly enlarged, basally fused, and toothed at the bases.

DESCRIPTION. – Total length of male holotype (female paratype MCZ DNA101578 in parentheses) 1.82 (2.00); width across ozopores 0.92 (1.04), greatest width 1.04 (1.12) occurs between second and third opisthosomal segments (Figs 99, 102); length-width ratio 1.75 (1.79).

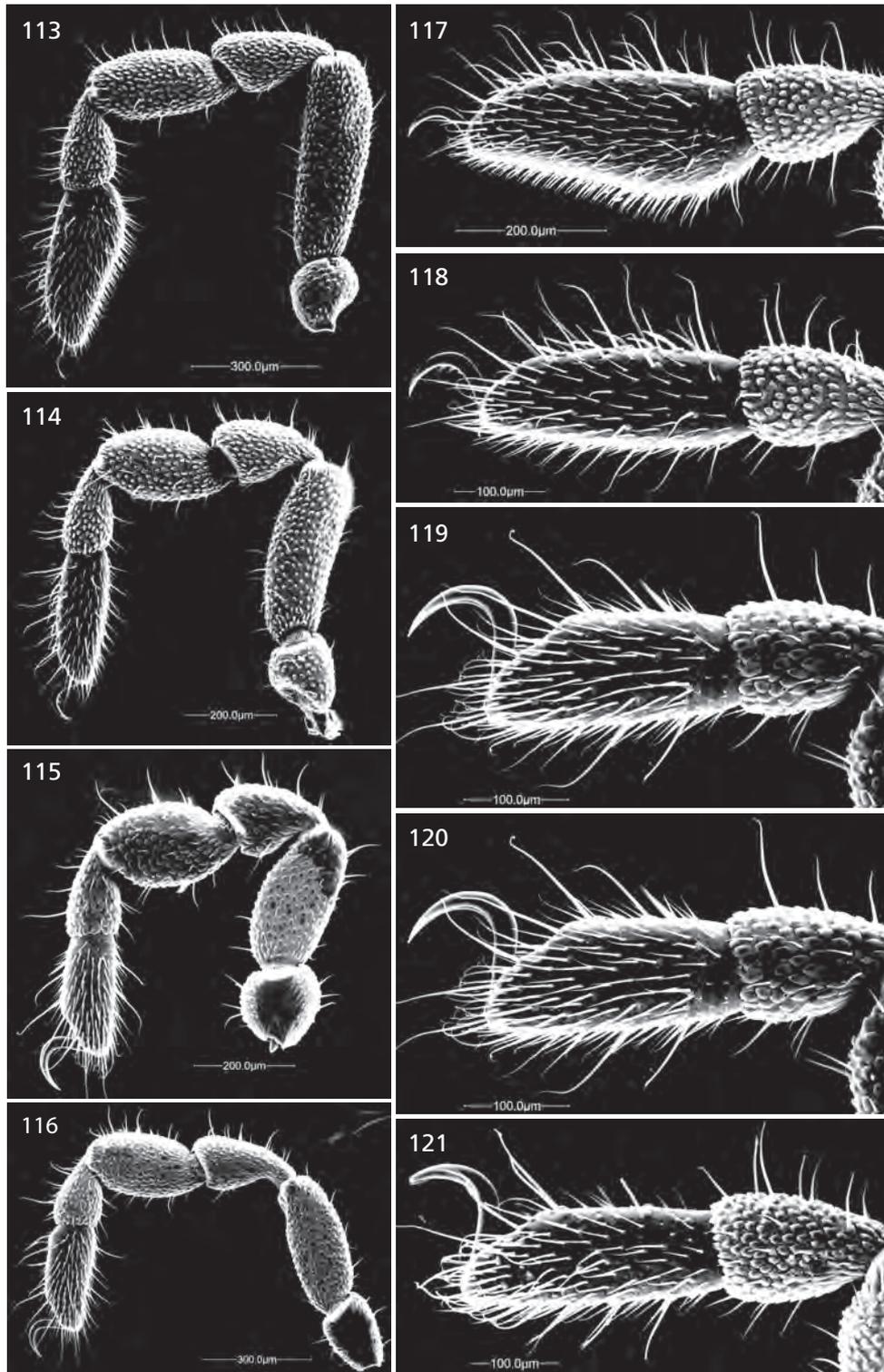


**FIGS 102-107.** *Troglisiro urbanus* n. sp. **102**, ventral view of male paratype. **103**, ventral view of female paratype. **104**, sternal region of male paratype. **105**, sternal region of female paratype. **106**, anal region of male paratype. **107**, anal region of female paratype.

Body approximately egg-shaped, dark orange to reddish brown (in alcohol) depending on incidence of light. Body with dense tuberculate-microgranulate microstructure on almost all surfaces. Ozophores conical, of type 2 of Juberthie. Eyes absent (Fig. 100). Transverse opisthosomal sulci conspicuous. Mid-dorsal longitudinal opisthosomal sulcus present. Posterior end of body evenly rounded. Male opisthosomal sternites III through VII deeply depressed along the midline without forming lateral rims (Figs 101-102). Sternal depression terminating abruptly at the anterior end of sternite VII, and features a few scattered setae. Four sternal pores along midline of opisthosomal sternites (Fig. 108). Two anteriormost sternal pores appear as a parallel pair towards anterior of sternite III; single central pore lies between sternite III and IV; posteriormost single pore near center of sternite IV. Female opisthosomal sternites without clear modifications (Fig. 103).



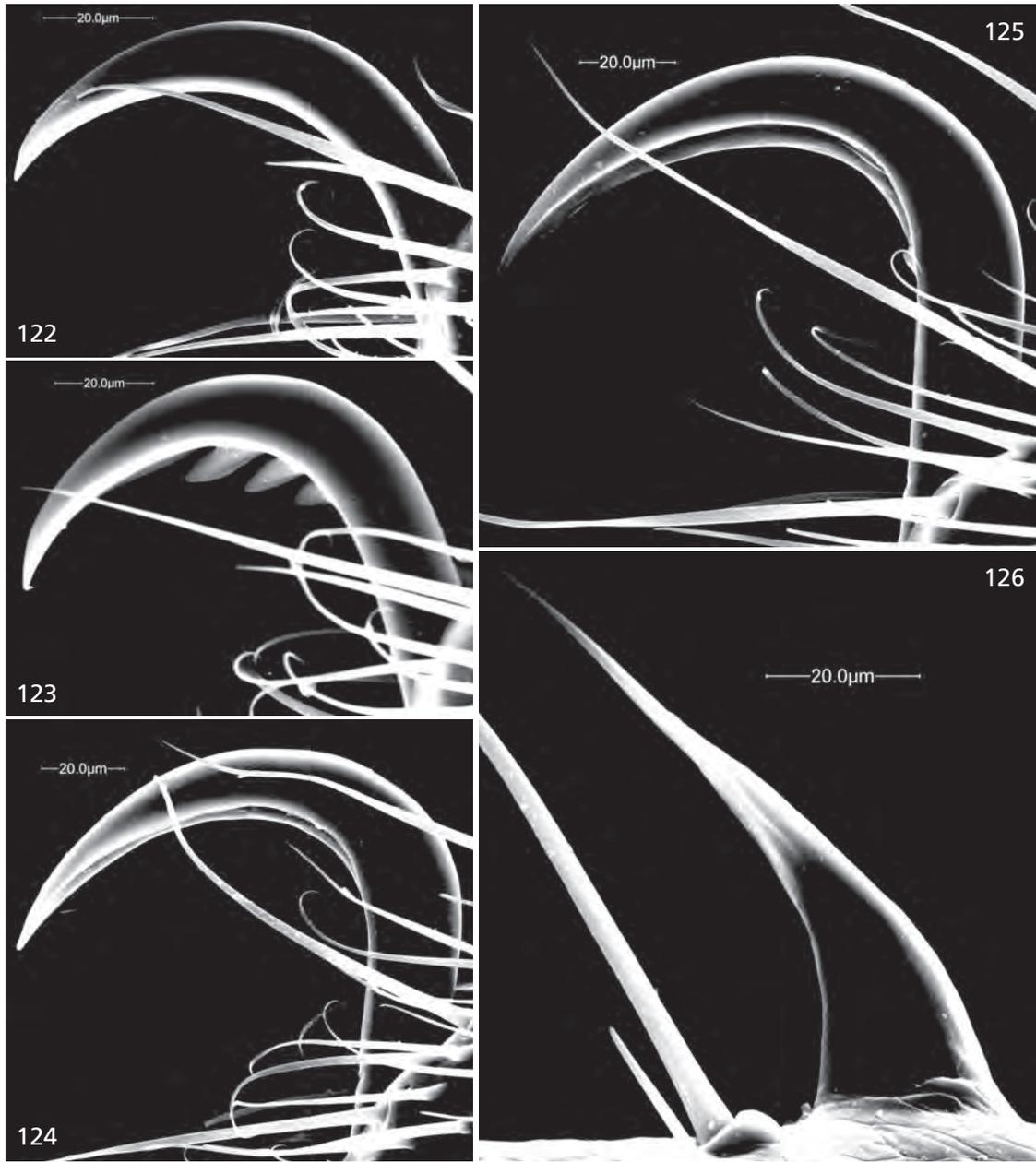
**FIGS 108-112.** *Troglisiro urbanus* n. sp. **108**, detail of sternal depression of male paratype. **109**, spiracle of male paratype. **110**, external view of left chelicer of male paratype. **111**, detail of the dentition of the chelicer's distal segments. **112**, left palp of male paratype.



**FIGS 113-121.** *Troglosiro urbanus* n. sp. **113**, male left leg I. **114**, male left leg II. **115**, male right leg III. **116**, male left leg IV. **117**, detail of male left tarsus I. **118**, detail of male left tarsus II. **119**, detail of male right tarsus III. **120**, detail of male left tarsus IV. **121**, detail of female left tarsus IV.

Coxae of legs I and II movable, coxae of legs III and IV fused (Fig. 104). Ventral prosomal complex of males with coxae of legs II and IV meeting in the midline, but coxae I and III not so. Sternum absent. Gonostome semicircular, width greater than length. Ventral prosomal complex of females with only coxae II meeting in the midline (Fig. 105).

Spiracles (Fig. 109) in the form of a closed circle. Sternites VIII and IX and tergite IX fused in males and females, forming a corona analis (Figs 106, 107). Anal plate without modifications, in ventral position in males and females. Anal plate 0.14 (0.19) long and 0.21 (0.24) wide. Anal gland pores absent.



**FIGS 122-126.** *Troglosiro urbanus* n. sp. **122**, male left tarsal claw I. **123**, male left tarsal claw II. **124**, male right tarsal claw III. **125**, male right tarsal claw IV. **126**, detail of adenostyle.

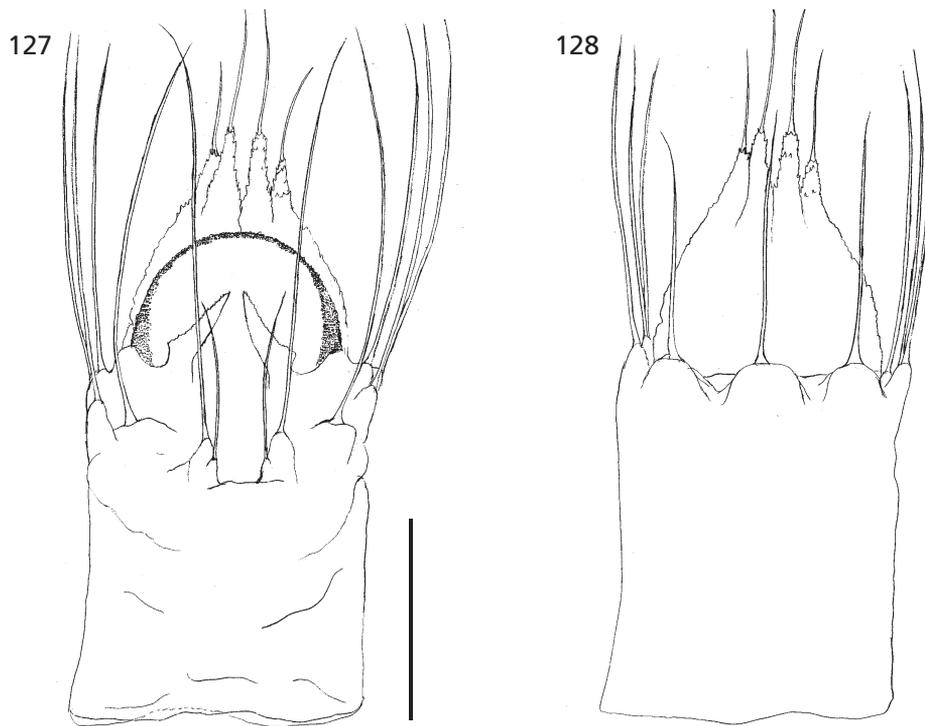
Chelicerae (Fig. 110) not protruding; relatively stocky; with few setae. Granulation restricted to the proximal article, covering most of the surface between the dorsal crest and the anterior terminus. Proximal article of SEMed paratype 0.57 long, 0.21 deep, with relatively small dorsal crest and single posterior ventral process. Second article 0.69 long, 0.14 deep, widest near the middle of its length; dentition with alternation of small and large teeth in the fixed finger. Distal article 0.24 long, 0.05 deep, dentition regular (Fig. 111).

Palp (Fig. 112) without ventral process on proximal end of trochanter; without conspicuous modifications. Length/width (length-width ratio in parentheses) of palpal articles from trochanter to tarsus of SEMed male paratype: 0.23/0.09 (2.5); 0.33/0.07 (4.6); 0.22/0.08 (2.7); 0.27/0.06 (4.1); 0.23/0.6 (3.6); total length 1.28. Palpal claw 0.04 long.

Legs (Figs 113-116) robust; surfaces of all trochanters, femurs, patellae, tibiae and metatarsi thickly and uniformly ornamented with granules. Tarsi (Figs 117-121) not appreciably ornamented. Tarsal claws I, III and IV smooth, tarsal claw II toothed (Fig. 122-125).

Leg measurements of male paratype (MCZ 51943): length/width (length-width ratio in parentheses):

	Tr	Fe	Pa	Ti	Mt	Ta	Total
Leg I	0.16/0.16 (1.0)	0.49/0.15 (3.3)	0.27/0.15 (1.8)	0.30/0.16 (1.9)	0.22/0.14 (1.6)	0.38/0.17 (2.2)	1.82
Leg II	0.15/0.15 (1.0)	0.39/0.14 (2.8)	0.23/0.17 (1.4)	0.24/0.16 (1.5)	0.20/0.12 (1.7)	0.30/0.11 (2.7)	1.51
Leg III	0.14/0.14 (1.0)	0.30/0.14 (2.1)	0.22/0.16 (1.4)	0.22/0.17 (1.3)	0.19/0.11 (1.7)	0.25/0.10 (2.5)	1.32
Leg IV	0.20/0.14 (1.4)	0.36/0.16 (2.3)	0.27/0.16 (1.7)	0.28/0.18 (1.6)	0.19/0.14 (1.4)	0.29/0.12 (2.4)	1.59



**FIGS 127-128.** *Trogloniro urbanus* n. sp. **127**, total spermatopositor, dorsal view. **128**, total spermatopositor, ventral view. Scale bars = 100  $\mu$ m.

Leg measurements of female paratype (MCZ 51943): length/width (length-width ratio in parentheses):

	Tr	Fe	Pa	Ti	Mt	Ta	Total
Leg I	0.15/0.15 (1.0)	0.48/0.15 (3.2)	0.24/0.15 (1.6)	0.28/0.15 (1.9)	0.24/0.14 (1.7)	0.36/0.17 (2.1)	1.75
Leg II	0.15/0.14 (1.1)	0.39/0.14 (2.8)	0.24/0.14 (1.7)	0.25/0.15 (1.7)	0.22/0.12 (1.8)	0.27/0.11 (2.5)	1.52
Leg III	0.14/0.13 (1.1)	0.29/0.13 (2.2)	0.20/0.15 (1.3)	0.22/0.16 (1.4)	0.18/0.11 (1.6)	0.25/0.10 (2.5)	1.28
Leg IV	0.22/0.13 (1.7)	0.40/0.14 (2.9)	0.26/0.15 (1.7)	0.27/0.16 (1.7)	0.22/0.12 (1.8)	0.28/0.10 (2.8)	1.65

Tarsus IV of males not divided, carrying a lamelliform adenostyle proximal to most basal region of tarsus (Fig. 120). Adenostyle 0.06 long, slightly curved, acutely triangular, terminating in long setae (Fig. 126). Tarsus IV of female without modifications (Fig. 121).

Spermatopositor in ventral view (Fig. 128) with three ventral microtrichia; in dorsal view (Fig. 127) with three lateral microtrichia on each side, and three pairs of dorsal microtrichia, median pair greatly reduced. Apical microtrichia greatly enlarged, basally fused, and toothed at the bases. Gonopore structures: ventral plate subtriangular, larger than gonopore lip, and rough at edges; movable fingers elongate, with large, laterally protruding basal lobes, and toothed lateral margins; gonopore lip semicircular and toothed with small, blunt teeth.

VARIATION. – Range of measurements in males (n = 26) and females (n = 15; in parentheses): body length 1.76-1.96 (1.88-2.00); maximum width 1.02-1.12 (1.04-1.12).

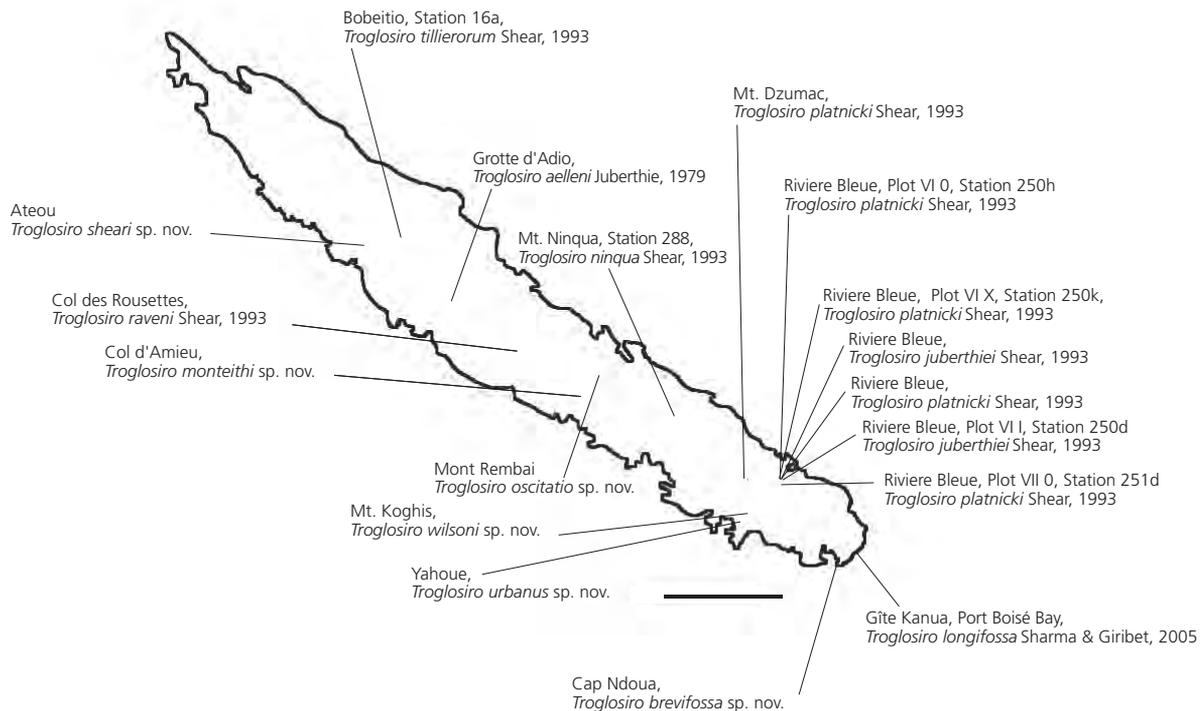


FIG. 129. Map of New Caledonia showing known localities for *Troglisiro* species. Scale bar = 50 km.

DISTRIBUTION. – Known only from the type locality and its vicinity.

REMARKS. – This species most closely resembles *T. longifossa*, but the two are markedly different in two respects. First, the sternal depression of *T. urbanus* n. sp. is much narrower than that of *T. longifossa*. Second, the spermatopositor of *T. urbanus* n. sp. features a greatly reduced, median pair of microtrichia, which is lacking in *T. longifossa* altogether. A particularly compelling synapomorphy is that of *T. urbanus* n. sp. and *T. monteithi* n. sp., for the configuration of their sternal pores (a parallel pair, followed by two single median pores) is similar.

#### DISCUSSION

All six *Troglosiro* species described above clearly belong to Troglosironidae on the basis of a number of apomorphies established by Shear (1993) for the family. The most important of these are (1) coxae I and II free, whereas III and IV are fused, (2) presence of type 2 ozophores, (3) absence of eyes, (4) opisthosomal sternites VIII and IX, and tergite IX fused into a corona analis, (5) tarsal claw II toothed, (6) lamellar adenostyle, and (7) sternites II, III, or IV bearing small, “variously located” median exocrine gland pores. Moreover, a number of heretofore unknown morphological character states are present among these species, such as the dorsal coloration pattern found in *T. monteithi* n. sp. and *T. oscitatio* n. sp., and the diverse configurations of the sternal gland pores.

The incidence of depression of opisthosomal sternites, which are found exclusively in males of *Troglosiro*, is particularly remarkable. The three species that lack sternal depressions, *T. aelleni*, *T. tillierorum*, and *T. sheari* n. sp., are all found in the northern half of New Caledonia. All species found between the center and the southernmost tip of the island, in contrast, invariably possess sternal depressions. This distribution is curious and perhaps indicative of two lineages of Troglosironidae, corresponding to the northern and southern parts of the island. Preliminary examination of internal phylogeny of the family using morphology and multiple molecular markers (Sharma, unpublished senior thesis 2006) corroborates the hypothesis of two lineages.

Although several cases of sympatry are known for Cyphophthalmi in areas with large diversity (e.g., New Zealand, Sumatra, Sri Lanka, and the NW USA), no evidence of sympatry was found among these six new species. In Troglosironidae, only *T. juberthiei* and *T. platnicki* are known to be sympatric (Rivière Bleue is the type locality of both). However, it is possible that these two species constitute a single species. Externally, all the specimens resemble each other closely; the holotypes differ in length by 0.23 mm and identical opisthosomal sternites are depressed in males of these species. Moreover, a number of specimens closely resembling both species (from the localities Pic du Grand Kaori, Forêt Nord, and Pic du Pin, all bordering the type locality) have body lengths that range between and beyond the range of the two holotypes' body lengths. Study of genitalic morphology demonstrates that spermatopositors of males from Pic du Grand Kaori and Forêt Nord feature intermediate characters and could be ascribed to either species. It is therefore likely that *T. platnicki* is not a valid species. The genetic structure of the species complex formed by *T. juberthiei*, *T. platnicki* and their look-alikes is the subject of an ongoing study.

The discovery of these six new species contributes greatly to the knowledge of the biodiversity of Troglosironidae, nearly doubling the number of known member species. Though Troglosironidae remains less speciose than all other Cyphophthalmi families other than the West African endemic Ogoveidae, the distribution of these species across most of the main island enables further phylogenetic and biogeographical hypothesis-testing. The occurrence of these species in a relatively small area also suggests significant diversity of cyphophthalmid fauna in New Caledonia. Due to the species small size and leaf-litter habitat, it is probable that additional species will be discovered on the main island and possibly on the smaller surrounding islands as well.

## ACKNOWLEDGMENTS

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