



## A new termitophilous species of Armadillidae from South Africa (Isopoda: Oniscidea)

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**Abstract.** A new species of Armadillidae, *Ctenorillo meyeri* n. sp., from termite nests of the Kruger National Park in South Africa is described. This is the first termitophilous terrestrial isopod in the family Armadillidae. Termitophilous isopods were previously known only from the families Schoebliidae, Titanidae, Styloniscidae, Turanoniscidae, Platyarthidae, and the genus *Exalloniscus*.

**Riassunto.** Una nuova specie termitofila di Armadillidae del Sudafrica (*Isopoda: Oniscidea*). Viene descritta una nuova specie di Armadillidae, *Ctenorillo meyeri* n. sp., raccolta in termitai del Kruger National Park in Sud Africa. La nuova specie costituisce il primo isopode terrestre termitofilo della famiglia Armadillidae. Isopodi termitofili erano prima conosciuti solo per le famiglie Schoebliidae, Titanidae, Styloniscidae, Turanoniscidae, Platyarthidae e per il genere *Exalloniscus*.

**Key words.** Oniscidea, Armadillidae, *Ctenorillo*, termites, new species, South Africa.

### Introduction

Several terrestrial isopods live in association with ants and termites. They are common inhabitants of the nests of these social insects, and show distinct morphological adaptations to this special environment, such as reduction or absence of eyes and body pigment. Some species in the genera *Platyarthrus* Brandt, 1833 (Platyarthridae), *Porcellionides* Miers, 1877, and *Lucasius* Kinahan, 1859 (Porcellionidae), occur in nests of several species of ants (VANDEL, 1962; TARTALLY *et al.*, 2004). Six species of the genus *Exalloniscus* Stebbing, 1911 (family *incertae sedis*) from South-East Asia are associated with ants, and one species, *E. brincki* Manicasteri & Argano, 1986, with the termite *Macrotermes malaccensis* (Haviland, 1898) (TAITI & FERRARA, 1986, 1988; FERRARA *et al.*, 1987). In southern Africa, all the species in the genera *Schoebli* Budde-Lund, 1909 (Schoebliidae), *Antidorcasia* Kensley, 1971, *Coatonia* Kensley, 1971, *Kogmania* Barnard, 1932, *Phylloniscus* Purcell, 1903, *Titana* Budde-Lund, 1909 (Titanidae), and *Niambia termitophila* Kensley, 1971 (Platyarthridae), are strictly termitophilous (BARNARD, 1932; KENSLEY, 1971). In Madagascar, *Madoniscus termitis* Paulian de Félice, 1950 (Styloniscidae), and in Asia, *Turanoniscus acanthotermis* Borutzky, 1969 (Turanoniscidae), were collected in termitaria (PAULIAN DE FÉLICE, 1950; BORUTZKY, 1969). In Brazil, a few species of Oniscidea were recorded from ant nests (LENKO, 1971) and abandoned termite nests of *Nasutitermes* Dudley, 1890 (LISBOA *et al.*, 2013), but none of those seem to have a strict association with these social insects.

One new species of the genus *Ctenorillo* Verhoeff, 1942, collected by Dr. V.W. Meyer inside mounds of *Macrotermes natalensis* (Haviland, 1898) in South Africa, is described. This represents the first example of a termitophilous species in the family Armadillidae.

## Material and methods

Specimens were collected by hand in the northern Kruger National Park (South Africa). The study area comprises almost 1 000 000 ha of the total area of the park. Isopods were come across during the excavation process of termitaria in the mid to late nineties, as reported by MEYER *et al.* (1999, 2000). These isopods appear to occur mainly on the western side of the park in well-drained, granitic soils. The specimens were stored in 70% ethanol and identifications are based on morphological characters. The species was illustrated with the aid of a *camera lucida* mounted on Wild M5 and M20 microscopes. The photographs were taken with a scanning electron microscope using a FEI ESEM Quanta 200. Samples were dried and introduced in the measuring chamber with no pretreatments. The geographical coordinates of the localities are in decimal degrees (datum WGS84). The material is deposited in the collections of the Museo di Storia Naturale, Sezione di Zoologia “La Specola” of the University of Florence, Italy (MZUF).

## Systematic account

### Family Armadillidae Brandt, 1831

#### Genus *Ctenorillo* Verhoeff, 1942

Type species: *Ctenorillo buddelundi* Verhoeff, 1942, junior synonym of *Ctenorillo regulus* (Van Name, 1920), by monotypy.

Synonyms: *Tuberdillo* Schmalzfuss & Ferrara, 1983; *Vandelillo* Arcangeli, 1957.

#### *Ctenorillo meyeri* n. sp. (Figs 1-4)

**Material examined:** **South Africa:** Holotype ♂, Kruger National Park (North), Mound no. A (23.88216° S 31.29846° E), B (23.98428° S 31.33339° E), C (23.87742° S 31.30188° E), F (23.26052° S 31.28400° E), in nests of *Macrotermes natalensis*, II-IV.1998, leg. V.W. Meyer (MZUF 9768). Paratypes: 7 ♂♂, 5 ♀♀, same data as holotype; 2 ♀♀, same locality, Mound no. 5 (23.24450° S 31.30367° E), in nests of *Macrotermes natalensis*, X.1995, leg. V.W. Meyer (MZUF 9769).

**Description:** Maximum size: ♂, 8 × 4 mm; ♀, 7 × 3 mm. Colour pale. Dorsum covered with large rounded bosses (Figs 1A, B, 2C): cephalon with three rows of low bosses (6, 2, and 6 from front to back of vertex); pereonite 1 with 27 bosses in three rows; pereonites 2-6 with 14 bosses; pereonite 7 with 12 bosses; pleonites 3-5 with five very low bosses; telson with two large ovoidal paramedial bosses. Dorsal cuticle with verruca-like prominences and rounded scale-setae (Fig. 1C). Pereonites 1-7 bearing one *nodulus lateralis* each per side at same distance from lateral margins. Eye reduced, consisting of 5 small ommatidia distinctly separated from each other (Fig. 1D). Cephalon with frontal shield protruding above vertex; profrons with deep antennal sockets receiving antennae when animal rolls up (Fig. 2B). Pereonite 1 (Figs 1A, 2A, B) with posterior margin distinctly sinuous at sides; inner lobe of schisma rounded, distinctly extending beyond posterior margin of outer lobe. Pereonite 2 (Fig. 2A, B) with triangular ventral tooth not reaching posterior margin of epimeron. Pereonites 2-7 (Fig. 1A) with wide quadrangular epimera slightly bent outwards. Telson (Fig. 2C) hourglass-shaped, about 1.5 times as broad as long. Antennula (Fig. 3A) of three articles, second article much shorter than first and third, third article distally with tuft of short aesthetascs. Antenna (Fig. 3B) short and stout with flagellum distinctly shorter than fifth article of peduncle; second article of flagellum about twice as long as first. Mandibles (Fig. 3C, D) with molar penicil semidichotomised, i.e. consisting of several plumose setae arising from common stem; right mandible with 1+1 and left mandible with 2+1 free penicils. Maxillula (Fig. 3E) with outer branch bearing 4+6 simple teeth; inner branch with two slender penicils. Maxilla (Fig. 3F) distally setose and bilobate, with inner lobe distinctly narrower than outer lobe. Maxilliped (Fig. 3G) endite with subapical large seta and two triangular setae on apical margin; palp 2-jointed with two setae on basal article, medial one much longer than inner one. All pleopod exopods with monospiracular covered lungs (Fig. 4C-G). Uropodal protopod (Fig. 2C-E) trapezoidal, with rectangular part visible in dorsal view; exopod very short, inserted dorsally very close to medial margin of protopod.

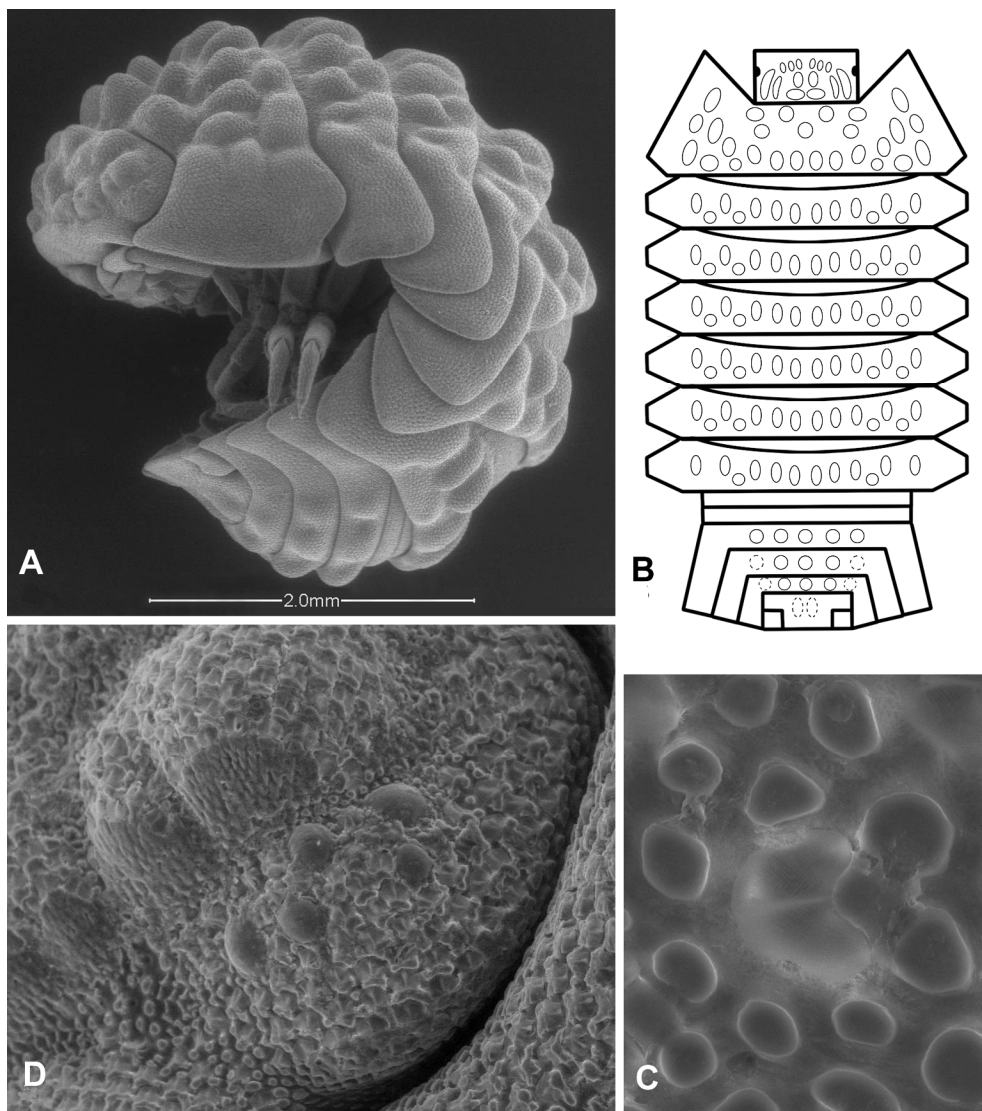


Fig. 1. *Ctenorillo meyeri* n. sp., ♂ paratype: A, adult specimen, lateral view; B, disposition of dorsal ornamentation; C, dorsal scale-seta and basal structure; D, eye.

Male: Pereopods without particular modifications (Fig. 4A, B). Pleopod 1 exopod with long triangular posterior point with rounded apex; endopod with triangular distal part slightly bent outwards, bearing one row of short setae on caudal surface near medial margin (Fig. 4C). Pleopod 2 endopod slightly longer than exopod (Fig. 4D). Pleopods 3-5 exopods as in Fig. 4E-G.

**Etymology:** The new species is named after Dr. Victor Meyer, New Zealand, who collected the specimens during his research on termites in the Kruger National Park.

**Remarks:** The genus *Ctenorillo* was erected by VERHOEFF (1942) for the new species *Ctenorillo buddehundi*, a junior synonym of *Cubaris regulus* Van Name, 1920 (TAITI *et al.*, 1998). *Ctenorillo* is

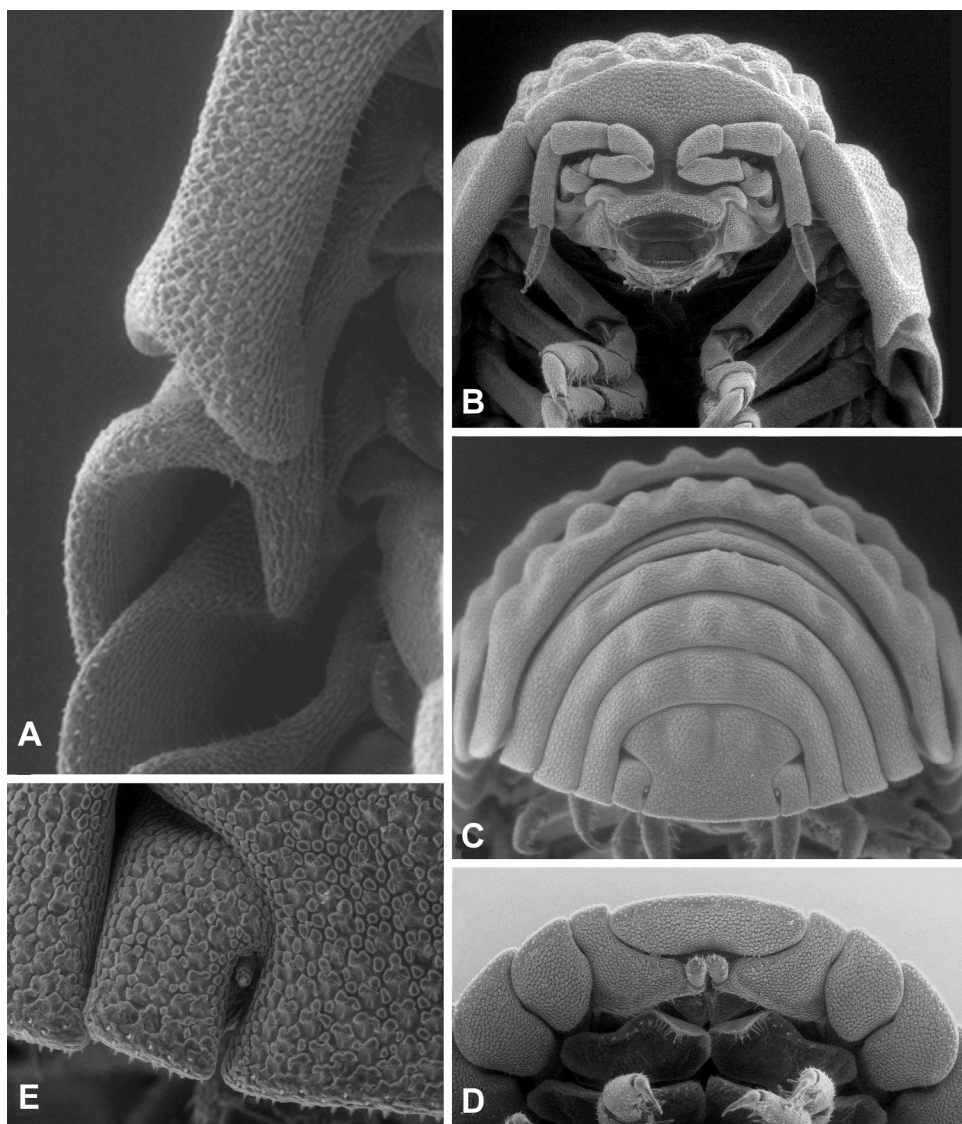


Fig. 2. *Ctenorillo meyeri* n. sp., ♂ paratype: A, interlocking structures on pereonites 1 and 2; B, cephalon in frontal view; C, pereonites 6, 7, pleon, telson and uropods in dorsal view; D, pleonites 4 and 5, telson and uropods in ventral view; E, left uropod in dorsal view.

also a senior synonym of *Tuberdillo* Schmalzfuss & Ferrara, 1983, originally created by ARCANGELI (1941) as a subgenus of *Diploexochus* Brandt, 1833, for four species. Since Arcangeli did not select a type species, the subgenus is not available according to Art. 13.3 of the ICZN. *Tuberdillo* was revalidated and elevated to genus by SCHMALFUSS & FERRARA (1983) who selected *Diploexochus (Tuberdillo) legai* Arcangeli, 1941, as type species. TAITI *et al.* (1998) recognised the synonymy of *Tuberdillo* with *Ctenorillo*.

At present, the genus *Ctenorillo* includes 13 species (SCHMALFUSS, 2003; CAMPOS-FILHO *et al.*, 2014, 2017), i.e. *C. ausseli* (Dollfus, 1893) from the Canary Islands, *C. bananae* (Van Name, 1920) from

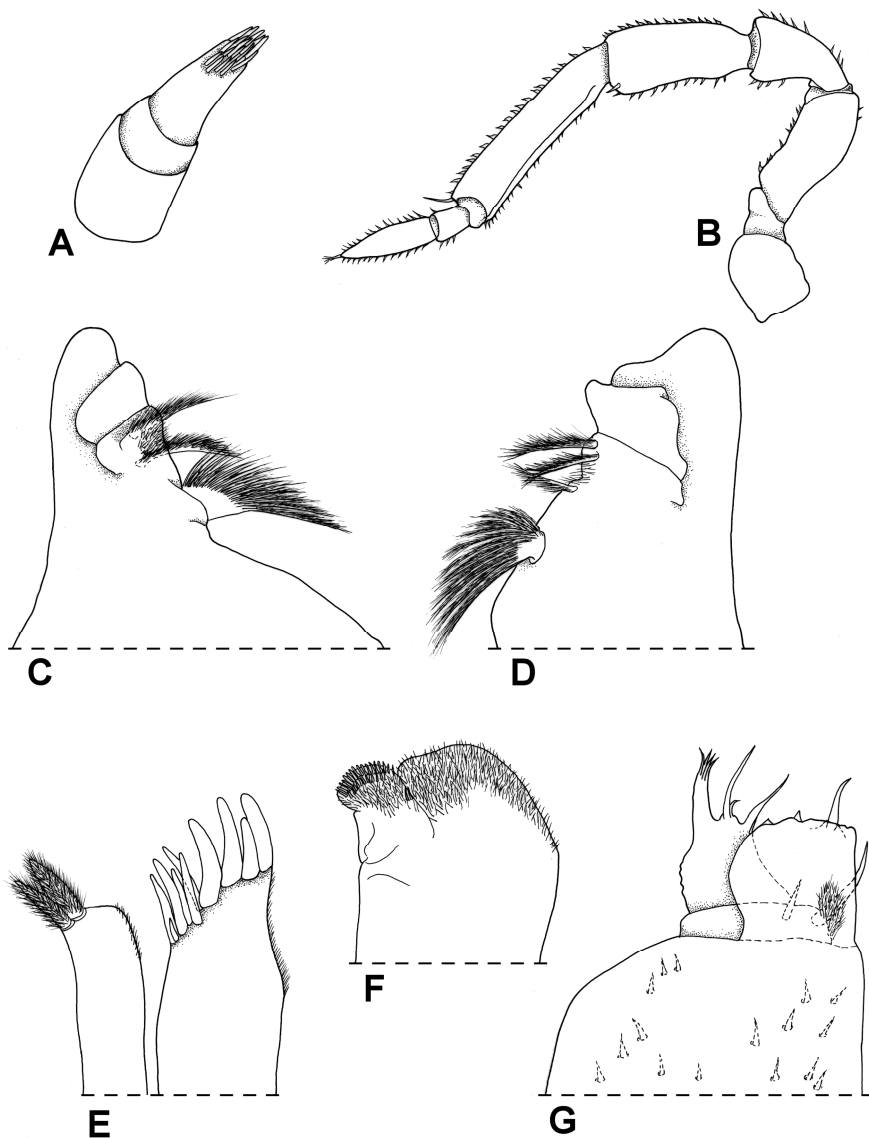


Fig. 3. *Ctenorillo meyeri* n. sp., ♂ paratype: A, antennula; B, antenna; C, right mandible; D, left mandible; E, maxillula; F, maxilla; G, maxilliped.

Cameroon, Congo and Angola, *C. fagei* (Paulian de Félice, 1941) from Ivory Coast, *C. ferrarai* Campos-Filho, Araujo & Taiti, 2014 from Brazil, *C. gabunensis* (Schmalfuss & Ferrara, 1983) from Gabon, *C. guinensis* (Schmalfuss & Ferrara, 1983) from Guinea, *C. kenyensis* Schmölzer, 1974 from Uganda and Tanzania, *C. legai* (Arcangeli, 1941) from Ethiopia, *C. mineri* (Van Name, 1936) from Venezuela, Guyana and Brazil, *C. parituberculatus* (Taiti & Ferrara, 1987) from Malawi, *C. regulus* (Van Name, 1920) from Zaire, Uganda, Kenya, Somalia, and Angola, *C. strinatii* (Schmalfuss & Ferrara, 1983) from Congo, and *C. tuberosus* (Budde-Lund, 1904) from Haiti and Brazil.

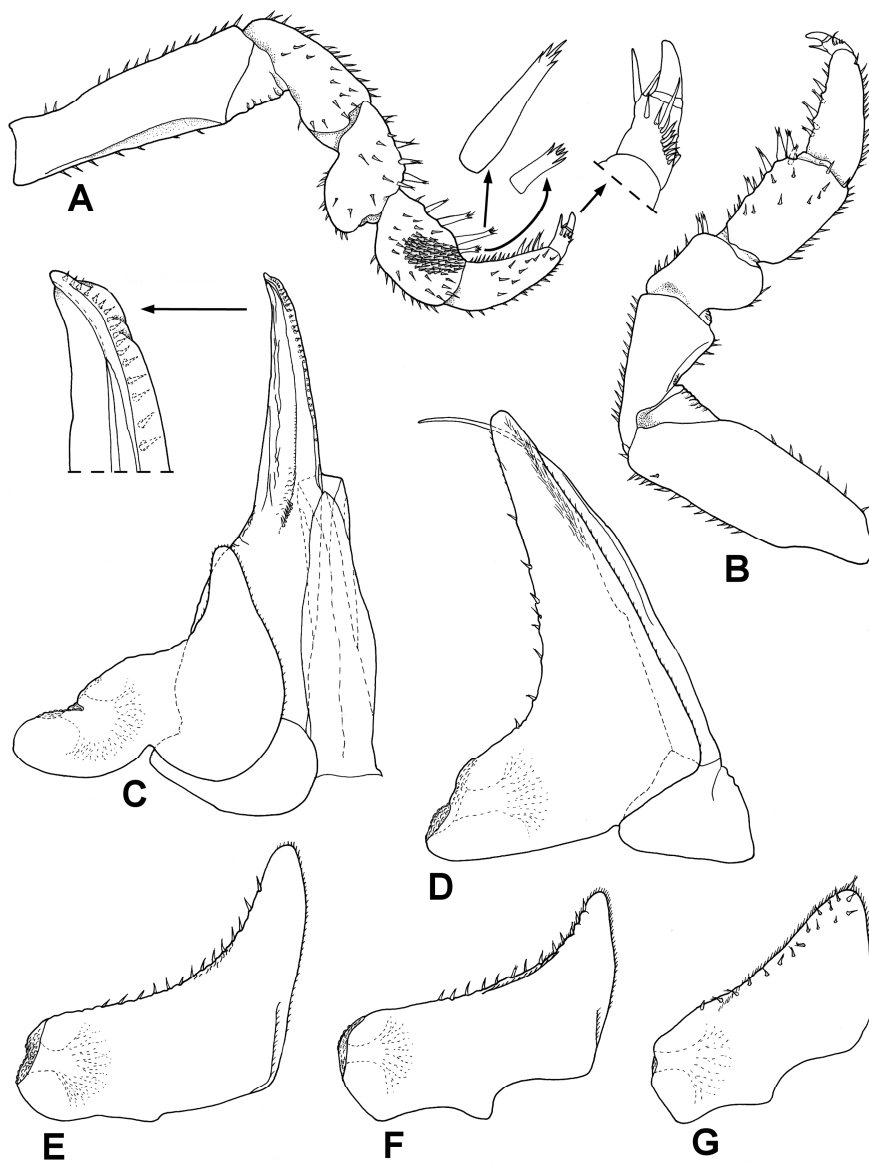


Fig. 4. *Ctenorillo meyeri* n. sp., ♂ paratype: A, pereopod 1; B, pereopod 7; C, genital papilla and pleopod 1; D, pleopod 2; E, pleopod 3 exopod; F, pleopod 4 exopod; G, pleopod 5 exopod.

*Ctenorillo meyeri* n. sp. is included in the genus since it shows the cephalon, pereon, pleon, and telson with developed bosses and tubercles; the cephalon with the frontal lamina protruding above the vertex; pereonite 1 with a schisma; ventral lobe of pereonite 2 triangular; epimera of pereonites 2-7 rectangular and bent outwards; telson hourglass-shaped; antenna short and thickset; uropod with tiny exopod.

The best character to distinguish the species of *Ctenorillo* is the number and disposition of the dorsal bosses and tubercles. *Ctenorillo meyeri* n. sp. is distinguishable from all the other species in the genus

by having the eye reduced with only five ommatidia and five dorsal bosses on pleonites 3-5. The reduction of the eye, as well as the pale colour, is certainly associated with the habitat where the species occurs, inside termite nests.

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