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# A third species of the rare millipede genus *Apterourus* Loomis, 1966 (Diplopoda: Chordeumatida: Striarioidea: Apterouridae)

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**Abstract.** The millipede genus *Apterourus* Loomis, 1966, the only genus of the family Apterouridae Loomis, 1966 (Diplopoda: Chordeumatida: Striarioidea), contains two species and is rarely collected. We add a third species from Mt. Palomar, San Diego County, California, USA, *Apterourus palomar* Shear, Richart and Marek, **new species**.

**Key words.** New species, Mt. Palomar, California.

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## Introduction

Loomis (1966) described the species *Apterourus horizontalis* based on specimens collected in San Bernardino County, California, at Cajon Pass, 7 miles west of Cajon on Big Pine Road. The specimens had been collected 37 years earlier by O. F. Cook. The unique new species could not be assigned to any existing chordeumatidan millipede family, so Loomis established the monobasic family Apterouridae Loomis, 1966. Shear (1972), revising the classification of the North American Chordeumatida, was unable, on the basis of Loomis' description, to place the family and left it *incertae sedis*. Five years later (Shear 1977), the type material was relocated in the United States National Museum of Natural History (Smithsonian Institution), and study confirmed that the monobasic family was not only justified but that it belonged in the suborder Striariidea and the superfamily Striarioidea. The genus *Apterourus* remained monotypic for 37 years, until Shear (2003) described a second species, *Apterourus serratus* Shear, 2003, from 12 kilometers southeast of California Highway 1 on Palo Colorado Road, in Monterey County, California, thereby extending the genus' range some 435 km north. The species was represented by a single male but the gonopods were distinct from those of *A. horizontalis*. Shear (2003) provided an extensive discussion of the systematic position of the apterourids and the morphology of the gonopods of both species. A third species, described below as *Apterourus palomar* Shear, Richart and Marek, **new species**, was collected from Mt. Palomar in San Diego County, California. Additional reliable new records of the genus from iNaturalist, supported by photographs, establish the range of the genus and additional new species are expected when material from these locations is collected.

# Materials and Methods

Specimens were collected by hand and preserved in 75% ethanol. Morphological studies were done using an Olympus SZH stereomicroscope and an Olympus BX50 compound microscope equipped with Nomarski optics. For scanning electron microscopy (SEM), specimens were first cleaned in an ultrasonic cleaner, then mounted on 12.7 mm diameter aluminum stubs using double-sided adhesive carbon discs and allowed to air-dry. These were sputter coated with a 40-nm thick layer of gold and palladium using a Cressington 208HR sputter coater and a Cressington MTM20 thickness controller. SEM micrographs were taken with a FEI Quanta 600 FEG environmental scanning electron microscope. Micrographs were edited and refined using GIMP, and plates were composed in InkScape.

All specimens are deposited in the Virginia Museum of Natural History, Martinsville VA, USA (VMNH).

# Results

Order Chordeumatida Pocock, 1894
Suborder Striariidea Cook, 1896
Superfamily Striarioidea Bollman, 1895

## Family Apterouridae Loomis, 1966

Apterouridae Loomis 1966: 221; Shear 1977: 689; Shear 2003: 512.

## Genus *Apterourus* Loomis, 1966

*Apterourus* Loomis 1966: 221; Shear 1977: 689; Shear 2003: 512.

**Type species.** *Apterourus horizontalis* Loomis, 1966. For a complete diagnosis of the genus, see Shear (1977). Two features worth noting here: apterourids are the only members of the suborder Striariidea to have coxal glands on the male eleventh legs, and the male ninth legs are reduced to single elements which probably include the sternum, coxa and telopodite (Fig. 8)

## *Apterourus palomar* Shear, Richart and Marek, new species

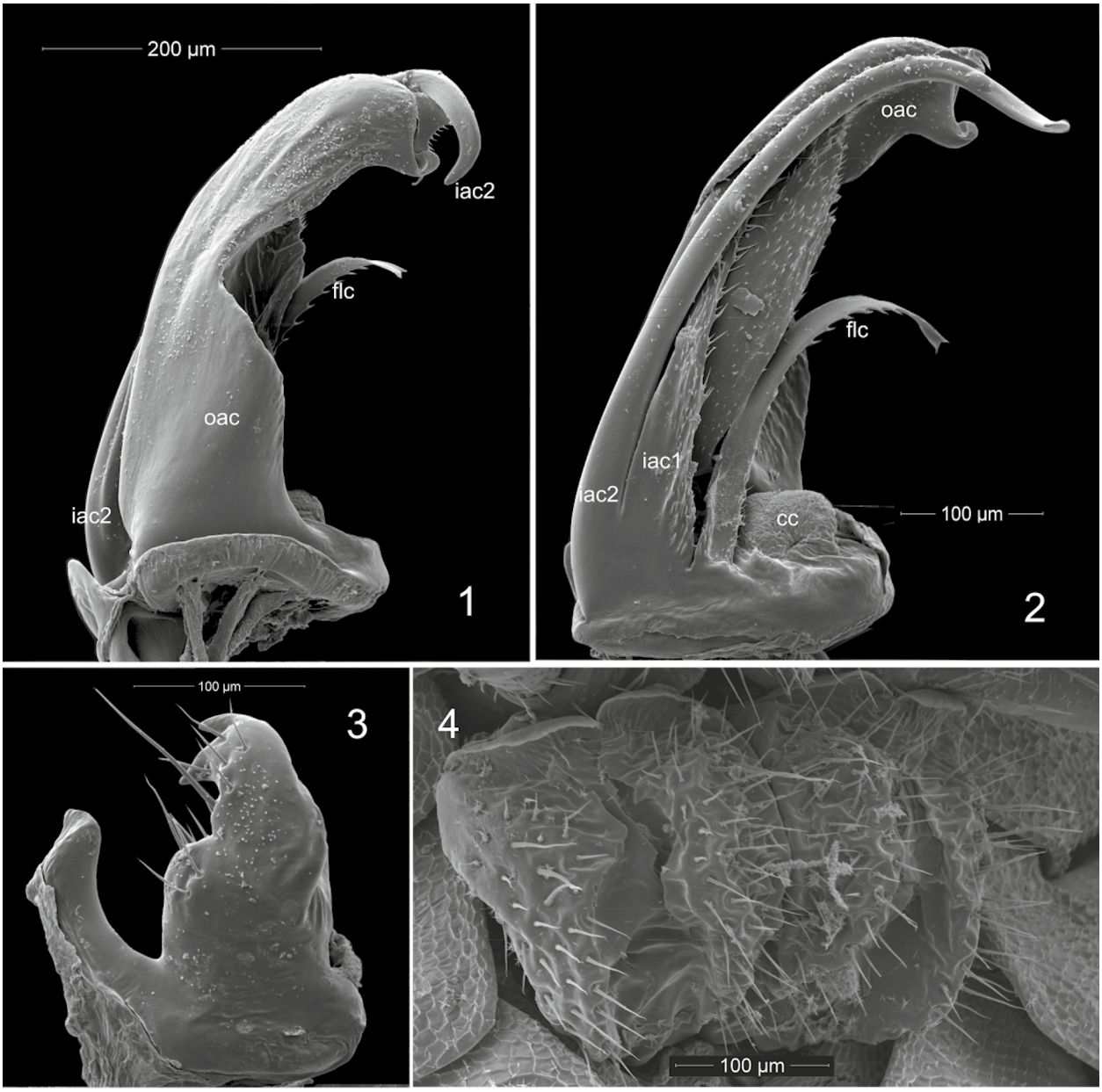
Figures 1–9

**Examined material.** Male holotype and juvenile paratypes from California, San Diego Co., Palomar Mountain State Park, Weir Trail, 33.3435°N, 116.9072°W, 1395 m asl, collected 26 March 2017, by C. Richart, B. J. Stacey, C. Lee, M.Salkiewicz & C. DeGroot; two female paratypes from Pauma Valley, Mount Palomar, 33.3417°N, 116.9044°W, 1427 m asl, collected 12 February 2017 by C. Richart, B. J. Stacey & J. Keller. Types deposited in the Virginia Museum of Natural History, Martinsville, Virginia (VMNH). Parts of the male holotype and a female paratype are mounted on SEM stub WS39-17, deposited with the types.

**Etymology.** The specific epithet is a noun in apposition referring to the type locality.

**Diagnosis.** Differing from *Apterourus horizontalis* and *A. serratus* in the details of the gonopods. The lateral branch of the inner angiocoxite (**iac2**, Fig. 1, 2) is longer than the outer angiocoxite (**oac**) and is sharply hooked in *A. palomar*, while it is shorter than the outer angiocoxite and straight or slightly curved in the other two species. The inner branch of the inner angiocoxite (**iac1**, Fig. 2) bears many thin cuticular fimbriae in *A. palomar*, but is smooth in *A. horizontalis* and *A. serratus.* The ninth legs of males (Fig. 3) are distally bifid in *A. palomar*, not so in the other species. The posterior paranotal lobes are reduced in both males and females of *A. palomar* in comparison to both congeners (Fig. 5, 6).

**Description.** *Male holotype* (Fig. 6). Thirty rings. Color of preserved specimens white, in life presumably as in Fig. 5. Length, 7.0 mm, greatest width 0.6 mm. Head densely set with many short, brushlike setae. Six black ommatidia in two rows of two and four. Antennae clavate. Collum narrower than ring two, paranota directed




**Figures 1–4.** *Apterourus palomar*, **n. sp.**, holotype male. **1)** Right gonopod, lateral view. **2)** Left gonopod, mesal view. **3)** Left leg 9, posterior view. **4)** Female genitalia, ventral view. Abbreviations: **cc**, colpocoxite; **flc**, flagellocoxite; **iac2**, outer branch of inner angiocoxite; **lac1**, inner branch of inner angiocoxite; **oac**, outer angiocoxite.

anteriorly. Rings progressively wider to ring six, then uniform in width to ring 18–20, then narrowing. Paranota with posterior lobe almost obsolete. Segmental setae (Fig. 7) long, slightly curved, shaft with five longitudinal grooves, tips blunt with a few small teeth; setae in row across anterior margin of metazonite, lateralmost seta slightly displaced posteriad, arising from prominent socket above posterior lobe of paranotum. Sculpture of metazonites (Fig. 8) consisting of small polygonal cells limited by ridges with rows of small, toroidal tubercles. Paranota progressively less distinct after ring 18, absent posterior to ring 24. Segmental setae becoming longer, thinner posterior to ring 20. Telson short, even-margined, bearing two spinnerets. Paraprocts with two marginal setae (Fig. 9). Pregonopodal legs slightly crassate. Gonopods (Fig. 1, 2) with angiocoxite divided; outer branch


**Figure 5.** Living specimen of female *Apterourus palomar,* **n. sp.** Photograph courtesy of Marshal Hedin.

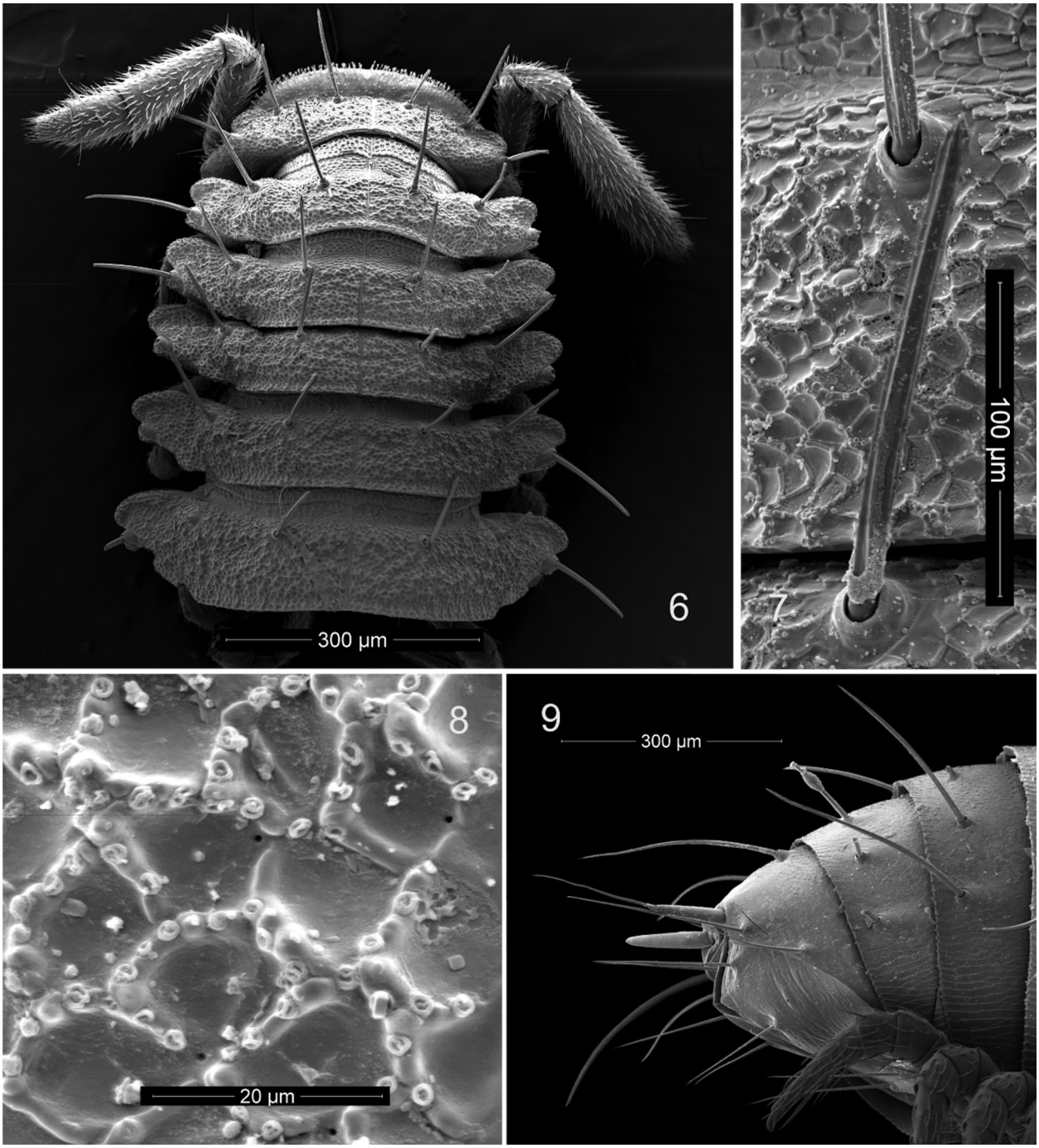
(**oac**) broad, sheathing thinner, rodlike inner branches. Tip of outer branch with prominent blunt hook. Inner angiocoxite with two branches, the outer smooth, curved, longer than outer angiocoxite, apically hooked (**iac2**, Fig. 1, 2); inner branch of inner angiocoxite shorter, fimbriate, basally flattened (**iac1**, Fig. 2). Flagellocoxite (**flc**) curved, median edge toothed. Colpocoxite (**cc**, Fig. 2) low, moundlike. Ninth legs (Fig. 3) highly reduced, not visible if undissected, covered by gonopods, consisting of fused sternum, coxa and telopodite, apically bifid. Tenth and eleventh legs with coxal glands, tenth legs with coxae elongated.

*Female paratype*. As male in nonsexual characters. Female genitalia as in Fig. 4. A living female is illustrated in Fig. 5, which shows also the color pattern of an unpreserved specimen.

**Distribution.** Known only from the two type localities.

**Notes.** The female genitalia are illustrated in Fig. 4, but do not seem to differ in any respect from those of *A. serratus* (Fig. 3C, Shear 2003).

Mt. Palomar is part of the Southern California Coast Ranges, and its highest point is 1872 m (6142 ft.) asl. The upper reaches of the mountain ridge are heavily forested. Mt. Palomar is famous for the Palomar Observatory, which houses the 200-inch Hale telescope. The male types were collected in a forest of *Pseudotsuga* Carrière, *Calocedrus* Kurz, and *Abies* Mill., from forest litter and woody debris. Pauma Valley, where the two female paratypes




**Figures 6–9.** *Apterourus palomar*, **n. sp.**, holotype male. **6)** Head, collum and rings 2–6, dorsal view. **7)** Segmental seta. **8)** Sculpture of dorsal surface of metazonite. **9)** Telson, lateral view.

were taken, is 7.6 km southeast of the state park where the males were found. The females came from a forest of *Abies, Calocedrus, Pseudotsuga* and *Quercus* L., and like the males were found in forest litter and woody debris.

Observations on iNaturalist (accessed 10 August 2025) supported by photographs, indicate a wider distribution for *Apterourus* than previously known—though the northern and southern limits, Monterey County in the north and Mt. Palomar in the south, remain the same (Fig. 10). Records between these two localities could


**Figure 10.** Distribution of *Apterourus* in California. Triangle, *Apterourus serratus.* Circle, *Apterourus horizontalis.* Square, *Apterourus palomar.* Inverted triangles, records of unidentified *Apterourus* species supported by photographs in iNaturalist.

represent additional species, but specimens are not available. Photographs taken by Marshal Hedin of San Diego State University show juvenile *Apterourus* (probably *A. palomar*) associated with *Lasius* sp. ants, though any relationship is unclear. Like all chordeumatidans, *Apterourus* species are not protected by secretions from repugnatorial glands. The long segmental setae, however, show small droplets at their tips. The secretion is evidently produced from the setal socket and conveyed to the tip of the seta by the parallel grooves. In the chordeumatidan genus *Zygonopus* (Trichopetalidae) this secretion has been shown to be sticky and consisting mostly of protein (Shear 2015). It could be a deterrent to predators like ants.

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