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Description of *Macroperipatus valerioi* n. sp. fron Costa Rica, and comments on the genus *Macroperipatus* (Onychophora: Peripatidae)

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Abstract: A new species, *Macroperipatus valerioi* Morera-Brenes & León, is described from Río Damitas, 16 Km north of Puerto Quepos (9° 34' N, 84° 10' W), Costa Rica. The inner jaw bears 2 accessory teeth, the first more developed and with 13 denticles. Outer jaw with only one accessory tooth. Fourth creeping pad of fourth and fifth lobopods is slender and curves itself around the nephridial tubercle, which remains free and directed towards the right side of the third and fourth pads. Fourth pad complete or broken in a single individual. Uniform dorsal color brown in life. This species appears to be closely related to *Macroperipatus geagi* (Bouvier) from South America.

Clark (1913 a) raised the *torquatus* section of *Peripatus* (sensu lato) to generic status as *Macroperipatus*. Brues (1911) published a key to that taxon, to which several species have been added. Annotated species checklists can be found in Clark (1913 b) and Peck (1975). Other literature pertinent to the genus: Bouvier (1899, 1905); Brues (1911, 1925); Clark (1913a, 1913b, 1937); Clark and Zetek (1946); Von Kennel (1885, 1886) and Marcus and Marcus (1955).

The biology of species of *Macroperipatus* is practically unknown, except for *M. acacioi* of Minas Gerais (Brazil) (Campiglia *et al.* 1973, 1975, 1982, Lavallard *et al.* 1973, 1974, 1975 a, b, c, Amaral *et al.* 1980. Campiglia 1976, Lavallard 1981) and a study of feeding habits of *M. torquatus* which began recently (Read 1985). The systematics of Costa Rican onychophorans is currently under study by the senior author and collaborators, and *M. valerioi* is the first of several new species to be described.

Macroperipatus valerioi n. sp.

Type: Museo de Insectos, Universidad de Costa Rica.

Locality: Costa Rica: Río Damitas, 16 km north of Puerto Quepos (9° 34' N; 84° 10' W), altitude 600 m. Data: 22-January-1965: A. Wille & M. E. Bozzoli.

Etimology: *M. valerioi* Morera & León, 1986 is dedicated to the Costa Rican naturalist and arcachnologist Carlos E. Valerio.

Diagnosis: inner jaw with 2 accesory teeth, first more developed and with 13 denticles. Outer jaw: only one accesory tooth (Fig. 1a, c). In fourth and fifth pairs of lopods, the fourth creeping pad is thin and twists around the urinary tubercle, which is free and outerly bound. Fourth creeping pad complete or broken (Fig. 2a).

Description: 8.5 mm long, 0.5 mm max. height, 0.85 mm max. width, female, 34 pairs of lobopods. Color (alive): uniform brown in dorse (A. Wille, 1985, pers. com.). Preserved in FAA: light beige, lighter ventrally. Eyes oval (0.2 x 0.29 mm). Antennae 0.6 mm long, more than 50 segments. No aparent frontal organs. Preserved with mouth evaginated; lips: a pair of tubercles plus superior and inferior ones (not paired). Labrum with 9 denticles, the eighth bicuspidal (Fig. 1b). Outer blade of jaws with one accesory tooth (Fig. 1a). Lobopods with 4 creeping pads, except last 3 pairs which are rudimentary. All feet with 2 anterior and one pos-

terior papillae, which have at least two bristles. Opening of coxal gland long and slender. Lobopods 1.5-3 mm long and 0.18-0.36 mm wide. Body segments with 12 dorsal skin folds each, 7 of which reach ventral side (the rest incomplete). Primary and accessory papillae projecting from square or oblong bases, with traverse folds divided by shallow groves. Bases 0.07-0.43 mm long in each fold. Mid-dorsal line wide, made by a parallel sequence of bases without papillae or with very small papillae, and not by a traverse crevice across folds. Line chanalized between two papillae, primary and accesory (Fig. 3a). Primary dorsal papillae uniserial and similar in size, like a round or conic breast, topped by a thin, almost cylindrical cone, with terminal bristles (Fig. 4a). Accessory papillae conic, topped by a cone identical to that of a primary papillae (Fig. 4b). Size of cones is variable but smaller than primary cones. Rarely biserial (Fig. 2a, 4a). Primary papillae normally separated by one or several secondary papillae, with no obvious pattern. Ventral fossae as usual.

Natural History: found below fallen log, forest near Damitas river, in Premontane Rain Forest in Holdridge's (1978) system.

DISCUSSION

Bouvier divided American onychophores as "andicoles" or "caräibes". The latter with 3 papillae in lobopods, two anterior, one posterior. Urinary papilla of lobopods IV and V below third arc of creeping pads, deeply insert the fourth. It was subdivided in three groups corresponding to the currently accepted genera *Macroperipatus* Clark, *Epiperipatus* Clark and *Peripatus* (Guilding) (s. str.). An eyeless genus described recently, *Speleoperipatus* Peck, is closely related to the latter two. These taxa are a natural group also defined by the presence of 12 folds per segment. *Plicatoperipatus* Clark seems to derive from it by duplication to 24 folds per segment. *Macroperipatus* is characterized by the quadrangular base of primary dorsal papillae, which are separated by straight grooves that run parallel with axis of body; body folds apparently divided by grooves, and accessory papillae usually few and small (Peck, 1975). With the exception of accessory papillae, *M. valerioi* fits in *Macroperipatus*. Bouvier (1899b) mentions the high variability in size of accesory papillae of *M. geagi*, as we found in *M. valerioi*. Clark (1939) says of *M. insularis* that the less developed accessory papillae outnumber primary papillae. This also occurs in *M. acacioi* (Marcus & Marcus, 1955) and *M. valerioi*. This supports inclusion of the new species in *Macroperipatus*, as does the clearly quadrangular base (of papillae) if compared with Central American *Epiperipatus biolleyi*, *E. isthmicola*, and *Peripatus ruber* which have rounded bases, and with *M. geagi* of Colombia. We could not examine types of *M. geagi* and *M. perrieri* (currently studied by H. Ruhberg, Hamburg Museum), but used Bouvier's (1899) drawings and a specimen of *M. geagi* from Colombia kindly provided by H. Ruhberg. In distribution, the quadrangular base of papillae of *M. valerioi* is similar to that of *M. acacioi* (Marcus & Marcus 1955: Fig. 3d). Geographically, the closet *Macroperipatus* are *M. geagi* (French Guiana, perhaps ranging to Panamá), *M. Torcuatus* (Trinidad) and *M. perrieri* (México). Primary dorsal papillae of *M. valerioi* are different from those of *M. perrieri* because they lack terminal cones and are short and piramidal. *M. perrieri* lacks accessory papillae. Accessory papillae in *M. valerioi* are breast like (rounded or conical), and topped by a conic cylinder. This is similar in *M. geagi*, where they are markkedly conical and topped by a long cone (Bouvier 1899). Mid-dorsal line is wide in *M. valerioi* and is not a depression, both conditions in contrast with *M. perrieri* but similar to *M. geagi*, in which the line is chanelized between two small papillae only, however (Bouvier, 1899). Pattern of papillae of oral tubercles makes the mouth different from that of *M. geagi*. Jaws of *M. valerioi* differ from those of *M. perrieri* and *M. geagi* (one accessory tooth. Fig. 1d), and from *M. torcuatus* (second accessory tooth more developed. Fig. 1g)*. Pattern of creeping pad arcs different from those of *M. torcuatus* and *M. perrieri* in which there are signs of a fifth are (Fig. 2e) (see Bouvier 1899).

Urinary tubercle is different from *M. geagi*, where it is overloaded inward and from *M. perrieri* and *M. acacioi*, because *M. valerioi* has the tubercle, separated from 3 and 4 arcs (Fig. 2a,b) while in the former three species the tu-

* However, in *M. torcuatus*, the jaws are variable to the extent that one individual may differ in left and right jaw structure (H. Ruhberg 1985: pers. comm).

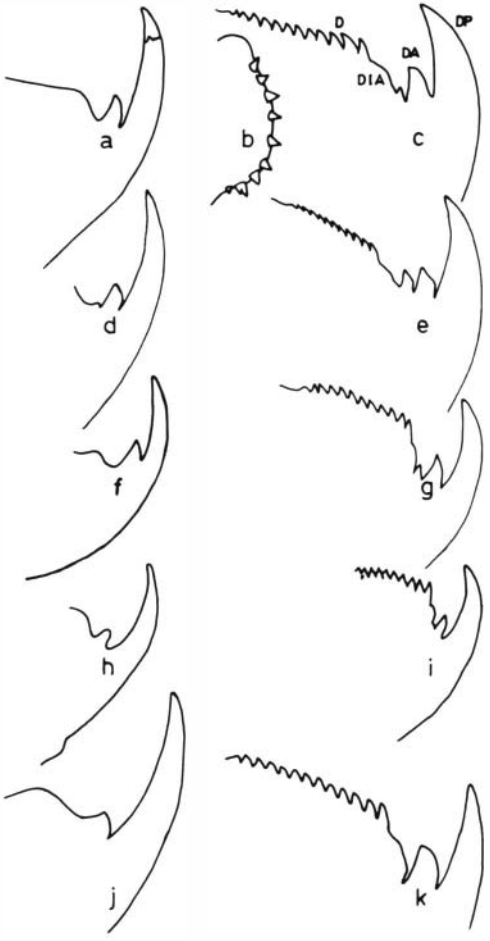

Fig. 1. DP: main tooth, DA. accessory teeth, DIA: diasterma, D: denticles. *Macroperipatus valerioi:* (a) outer blade (40x) (b) labrum (52x) (c) inner blade, (40x); *Macroperipatus torcuatus,* (d) outer blade, (e) inner blade, (40x), (Bouvier, 1905); *Macroperipatus guianesis:* (f) outer blade, (g) inner blade, (no scale), (Evans, 1903); *Macroperipatus acacioi:* (h) outer blade, (i) inner blade, (bar . 100 μm) (Marcus & Marcus, 1955); *Macroperipatus perrieri* (j) outer blade, (k) inner blade, (106x), (Bouvier, 1899).

bercles are united (Fig. 2e,g) or free but closely surrounded (Fig. 2c,d).

On August 10, 1966, S. Peck collected at Rincón de Osa, Costa Rica (under a log, 50 m altitude, Tropical wet forest, Holdridge, 1967), an onychophoran which he determined as *M. geagi* (originally described from French Guiana). However, we suspect that the low vagility of the group precludes genetical flux in large ranges, and Peck's specimen may rather be *M. valerioi,* which has close morphological affinities with *M. geagi* .

RESUMEN

Se describe *Macroperipatus valerioi,* una nueva especie de Río Damitas, 16 Km norte de Puerto Quepos, en la costa del Pacífico de Costa Rica. *M. valerioi,* sp. n., está relacionado con *M. geayi* (Bouvier) de Sur América, del cual difiere por poseer un color pardo uniforme en el dorso; por la curvatura de la delgada cuarta almohadilla pedal de los pares cuarto y quinto de lobopodios (ésta rodea al tubérculo nefridial que permanece totalmente libre y recargado al lado posterior); por la presencia de dos dientes accesorios, el segundo con menor desarrollo que el primero, y por tener de 12 a 13 dentículos en la sierra de la mandíbula interna. El tipo es una hembra de 34 pares de patas.

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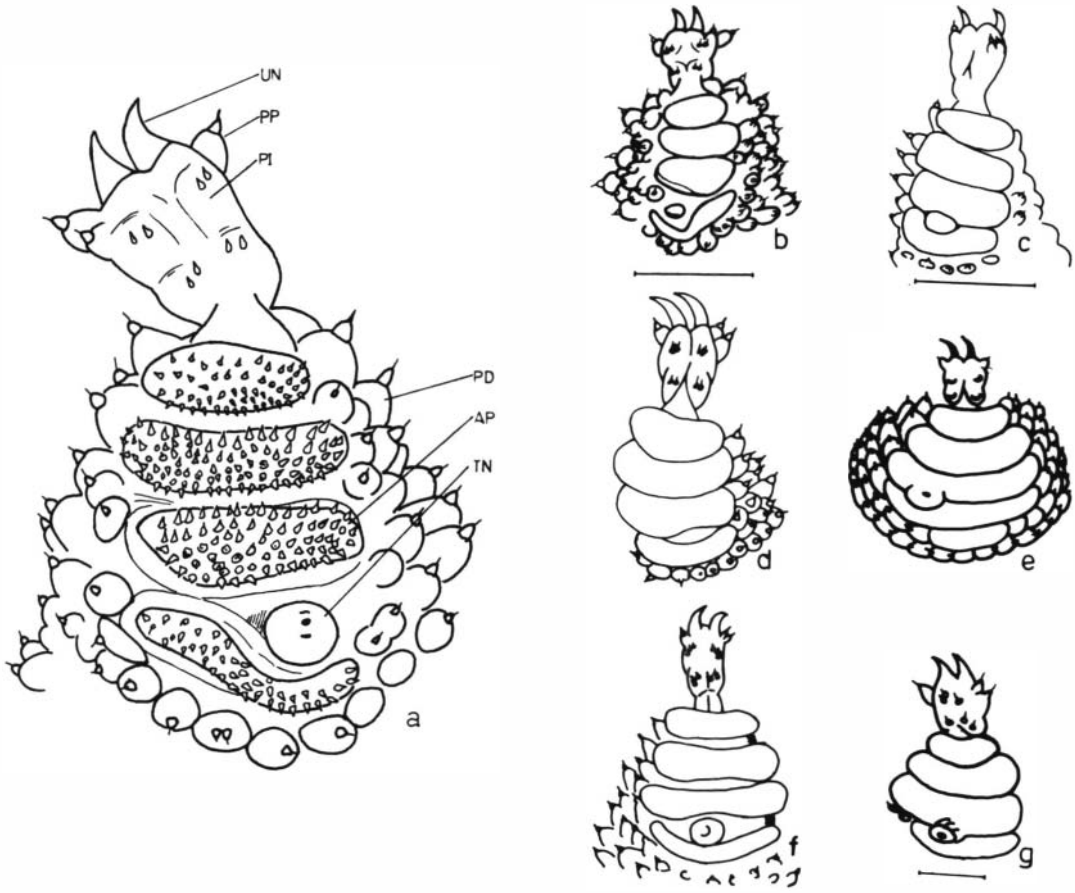

Fig. 2. Position of nefridial tubercle in 4 and 5 pairs of lobopods. (lower view). UN: nail, PP: pedal papilla, PI: "foot", PD: dermal papilla, AP: (pedal) creeping pad, TN: nefridial tubercle. *M valerioi:* (a) fourth left lobopod, (b) fifth right lobopod (barr: 50 μm), *M. geagi:* (c) fifth right lobopod of a Colombian specimen, (d) fifth right lobopod of the type (from French Guiana), 27.5x, (Bouvier, 1899); *Macroperipatus perrieri:* (e) fourth left lobopod, (31x), (Bouvier, 1899), *Macroperipatus guianensis:* (f) fourth lobopod, (no scale), Evans, 1903); *Macroperipatus acacioi:* (g) fourth lobopod, (bar : 50 μm), (Marcus & Marcus, 1955).

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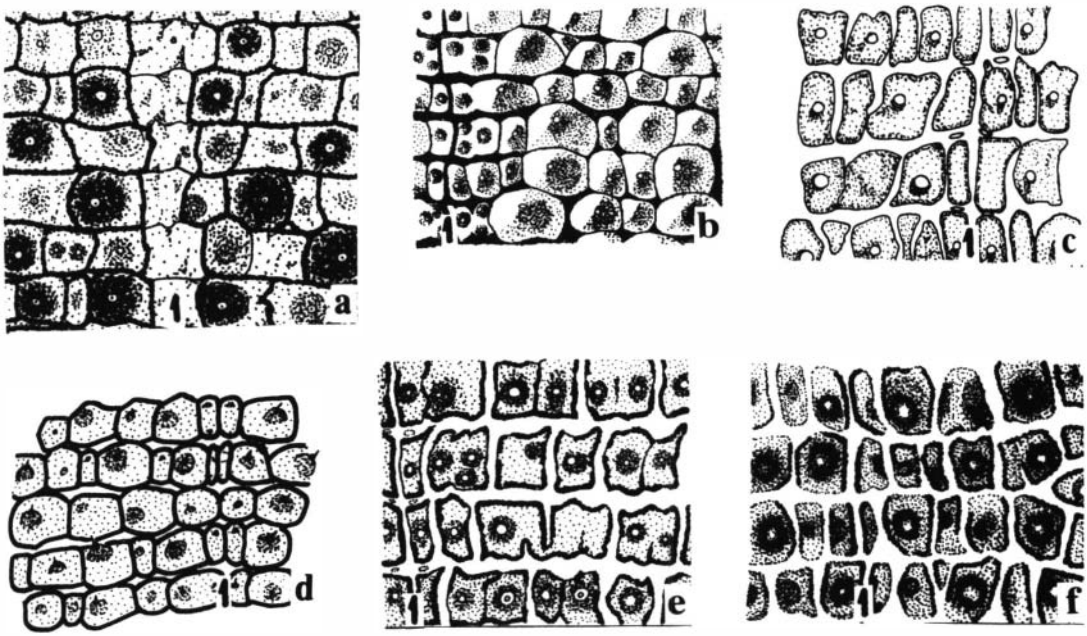

Fig. 3. Upper view of dorsal teguments. Arrow: middle dorsal line. (a) *Macroperipatus valerioi* (26x); (b) *Macroperipatus perrieri* (31x), (Bouvier, 1899); (c) *Macroperipatus guianensis* (no scale), (Evans, 1903); (d) *Macroperipatus acacioi* (bar : 200 μm), (Marcus & Marcus, 1955); (e) *Macroperipatus torquatus* (20x), (Bouvier, 1899); (f) *Macroperipatus geayi* (24x), (Bouvier, 1899).

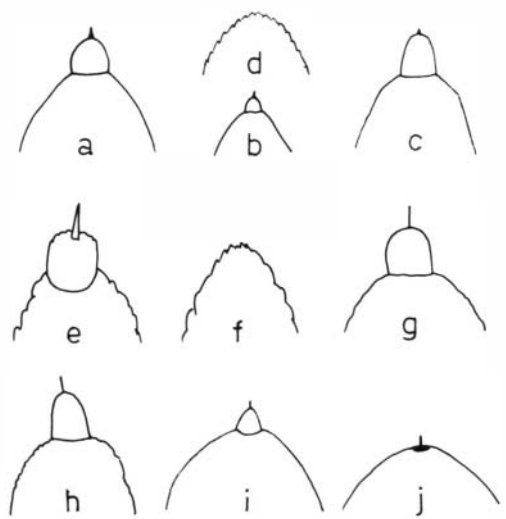

Fig. 4. Lateral view of dorsal papillae in adults (no scale). *Macroperipatus valerioi:* (a) principal papillae, (b) accessory papillae; *Macroperipatus geagi:* (c) principal papillae, (d) accessory papillae; *Macroperipatus acacioi:* (e) principal papillae, (f) accessory papillae, (Marcus & Marcus, 1955); *Macroperipatus insularis:* (g) principal papillae, (Arnett, 1966); *Macroperipatus i. clarki:* (h) principal papillae, (Arnett, 1966); *Macroperipatus guianensis:* (i) principal papillae, (Evans, 1903); *Macroperipatus perrieri:* (j) principal papillae, (Bouvier, 1899).

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