

A new milliped genus of the family Chelodesmidae (Diplopoda: Polydesmida) from Cuba

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Abstract: A new genus and three new species of milliped of the family Chelodesmidae are described. Relationships with the genus *Leiomodesmus* Loomis, 1938, and *Granmadesmus* Perez-Asso, 1990, from Cuba are defined, and also with *Biaporus* Loomis, 1941 and *Synecheporus* Loomis, 1941, from the Dominican Republic.

Introduction

The diversity and abundance of millipeds of the family Chelodesmidae on the island of Cuba is considerable. The genera *Amphelictogon* Chamberlin, 1918, and *Cuboctesmus* Chamberlin, 1918, are widely represented in many different ecosystems and are characterized, first of all, by their large size, which makes field collecting fairly easy. This, nevertheless, has not translated into an extensive collection of autochthonous chelodesmid millipeds, the species of which do not seem closely related to the before mentioned genera.

In Cuba these chelodesmids are represented by the genera *Leiomodesmus* Loomis, 1938, and *Granmadesmus* Perez-Asso, 1990, both so far monotypical. In this paper a new genus is described, with 3 new species closely related to *Leiomodesmus* and *Granmadesmus* reflecting the high diversity of the group in Cuba.

Methods

Measurement of specimens (in millimeters) was made of total length from the head to the apex of the epiproct. Width was taken at the seventh segment; mensural data are presented as mean (range). Representation of color patterns is schematic. Gonopod microphotographs are made with a scanning microscope JEOLJSM-T330.

Taxonomy

Plicatodesmus new genus

Diagnosis. Size small, less than 20 mm length. Dorsal surface convex, smooth, without transversal furrow over the metazonite; paranota without teeth or marginal nodules; much reduced, anterior ones twisted downwards. Pore formula normal: 5, 7, 9-10, 12-13, 15-19; or unusual. Males with a sexual modification: a triangular scale at the articulation between the fifth and sixth leg segments, covering the basal and ventral part of the tarsus. Epiproct with two minute apical projections. Gonopods with prominent coxal processes, visible in situ; femur more or less cylindrical; the union with the prefemur with a notable fold, the femur thereby being under the postfemur; much toggled at the external margin; prefemoral process simple, laminar, narrow at the apex.

Type species

Plicatodesmus turquino new species

(Figs. 1A, 3C, 4)

Types. Museo Nacional de Historia Natural, La Habana, Cuba (M.N.H.N.Cu.): Holotype male 1304; top of Pico Turquino (1974 m over sea level), Sierra Maestra, Santiago de Cuba; L. D. Beltran, July 5,

1989. Additional material. M.N.H.N.Cu.: Male 1306, female 1307; top of Pico Turquino; under stones, in antropized zone; E. Alfaro and R. Thomas; August 10, 1989. Male 2516; top of Pico Turquino; under stones, in antropized zone; A. Avila; September 16, 1991.

Etymology. The generic name alludes to the notable fold present in the gonopod's telopodite; the specific epithet refers to the type locality.

Diagnosis. Pore formula normal. Gonopods as shown in Fig. 1A; femur almost cylindrical, somewhat widened at the terminal portion; union of femur and postfemur has a notable fold; postfemur toggled at the exterior margin, interior margin much curved and lobeless, external margin with rounded subterminal lobe, apex much pointed; prefemoral process narrow at the basal portion, wide and laminar at the central portion and very narrow and pointed at the terminal portion.

Holotype. Dimensions: 15 x 1.85. Color pattern uniform, tergites, pleurites and sternites reddish brown (Fig. 3C); head with the vertex very light brown, without ornaments of feeble marks or grooves; yellowish brown under the frons; legs and antennae yellowish brown. Dorsal surface convex, smooth, lustrous; anterior angle of the second segment is placed under the lateral angle of the collum; poriferous segments with reduced paranota; non-poriferous segments with paranota still more reduced, with but a slight fold; apex of the epiproct with two very small projections. Small conical tubercles between the fourth pair of legs. Legs with triangular scale that covers the basal and ventral part of the tarsus; femur with a ventral nodule from the third pair of legs to the last of segment II.

Variability. Males (n=2), large 16.0 (15.0-17.0), wide 1.88 (1.85-1.95); female (n=1), large 18.0, wide 2.4. Head with vertex very light brown or reddish brown like the rest of the body; female with vertex somewhat bulky. Legs and antennae yellowish brown or reddish brown towards the basal articles. Apex of epiproct with two minute projections in male and female. Males have legs with modifications, like holotype; females without modifications. Male specimen 2516 does not have conical tubercles at the sternum, between the fourth pair of legs.

Distribution. Known only from type locality (Fig. 5).

Plicatodesmus baire new species
(Figs. 1B, 3B, 4)

Types. M.N.H.N.Cu.: Holotype female 1517, paratypes male 1514, females 1515-1516, 1518-1519, juvenile 1520, La Pimienta, 2 km South La Tabla, Baire, Santiago de Cuba, at the base of karst walls, under stones and leaves, in coffee plantation, A. Perez-Asso and E. Alfaro, August 15, 1989.

Etymology. The specific epithet alludes to the region to which the type locality belongs.

Diagnosis. Pore formula is normal. Gonopods as shown in Fig. 1B; femur cylindrical; union with postfemur with notable fold, postfemur toggled at the external margin, internal margin curved and with a pronounced large subterminal digitiform appendix; external margin without lobe; postfemur apex short, acute; postfemoral process not laminar, but twisted; terminal portion narrow and sharp.

Holotype. Dimensions: 10.6 x 2.55. Collum with white central band and brown spots on the sides; segments with white prozonites but with a portion in contact with the light brown metazonite; metazonites with a brown horseshoe-shaped mark, with the central portion white (Fig. 3B); pleurites light brown; sternites yellow; antennae light brown; legs yellowish. Dorsal surface convex, smooth and lustrous; paranota of anterior segments bent downwards, all reduced, pores on a slight thickening of the margin; epiproct with two minute appendixes at the apex.

Variability. Male, length 10.3, width 2.2; females (n=5), length 10.9 (10.2-12.3), v-width 2.53 (2.40-2.80). Females with vertex slightly bulky and finally grooved. Epiproct with two minute appendixes at the apex, in both sexes. Females with sternal cavity of segment 3 very wide. Male with triangular scale covering the basal and ventral portion of the tarsus; femurs of legs from anterior half of body with a very small basal ventral lobe; pronounced cylindrical tubercles at the sternum, between the fourth pair of legs.

Distribution. Known only from type locality (Fig. 4).

Note: I choose designating a female holotype since the only collected male had to be dissected to extract the

gonopods; this specimen, nonetheless has been preserved.

Plicatodesmus mariana new species.

(Figs. 2A, 3A, 4)

Types. M.N.H.N.Cu.: Holotype male 1987, paratypes males 1981-1986, females 19882003, juveniles 2004-2005, Limoncito (200-500 m above sea level), Sierra de Mariana, Guantanamo, in leaves from woods on karst terrain, A. Perez-Asso, June 19, 1990.

Etymology. The specific epithet refers to the region where the type locality is.

Diagnosis. Pore formula unusual; pores present only on segments 5, 9, 12, 15, and 17-19. Gonopods as shown in Fig. 2A; femur almost cylindrical; external margin with a prominent subterminal rounded lobe; union with the postfemur has pronounced fold; postfemur toggled to exterior margin; internal margin curved, with a prominent subterminal rounded lobe; external margin with wide central lobe; apex of postfemur shortly digitiform and rounded; prefemoral process narrow at basal portion, very wide and laminar at center and abruptly narrow and acute at terminal portion.

Holotype. Dimensions: 15.7 x ~.85. Collum white; prozonites white at their anterior portion and light brown at the terminal one; metazonites light brown at their anterior portion and white at the center and rear (Fig. 3A); sternite white; epiproct white; legs light brown; antennae light brown, terminal articles darker brown; and head with vertex finely ornamented not bulky, with marked median furrow. Dorsal surface convex, smooth, lustrous, lacking transverse furrow over the metazonite; paranota much reduced, bent downwards on anterior segments; lateral angle of collum slightly covers anterior margin and anterior angle of the paranota of the second segment. Apex of epiproct with two minute projections. Sternum between fourth pair of legs with prominent cylindrical tubercles. Legs with unmodified femur; triangular scale covering basal and ventral tarsus present on almost every leg.

Variability: Males (n=7), length 15.01 (14.6-15.7), width 1.81 (1.75-1.85); females (n=15), length 16.66 (15.7-17.8), width 2.20 ~2.10-2.35). Collum com-

pletely white or with two small very light brown spots on the sides of the median dorsal line. females lack tubercles on sternum between the fourth pair of legs, and lack triangular scale covering part of tarsus.

Distribution. Known only from type locality (Fig. 4).

Note: One of the most constant characters of the family Chelodesmidae is the presence of pores on the paranota of segments 6, 7, 9-10, 12-13 and 15-17, which is the normal pore formula. Loomis (1941a), however, described the monotypic genera *Blaporus* (pore formula 5, 7-13, 15-19) and *Synecheporus* (pore formula 5, 7-19) from the Central Mountain range of Dominican Republic, asserting that their formulae were unique within the Chelodesmidae. We must also consider that these taxa comprise relatively small specimens (21-25 mm) with reduced paranota and gonopods structurally similar to those of *Plicatodesmus*, mostly the prefemoral process.

In 1990 Perez-Asso described the monotypic genus *Granmadesmus* for Cuba, with the unusual pore formula 5, 7-19, alike *Synecheporus*, or also with a continuous poriferous formula 5-19 (both formulae are present in the same species).

There is no doubt that the pore formula is an extremely constant diagnostic character in the family Chelodesmidae, but this group of genera (*Blaporus*, *Synecheporus*, *Granmadesmus* and *Plicatodesmus*) which are apparently related in their morphology and distribution are an exception (*Granmadesmus minor* has both pore formulae). For this reason we choose to include in *Plicatodesmus* species with normal and unusual poriferous formulae, ignoring the standard in studies of Chelodesmidae procedure of assigning to different genera species with different poriferous formulae. Moreover, if we compare the gonopods of the three species described in *Plicatodesmus* we find no reason to place *P. mariana* within a different genus.

Granmadesmus minor Perez-Asso

(Figs. 2B, 3D, 4)

Granmadesmus minor Perez-Asso, 1990:65-70, figs. 1-3.

Examined Material. M.N.H.N.Cu.: Male 241 (holotype), males 242-246 (paratypes), Cueva Fustete, Niquero, Granma. Personal collection of A.R. Perez

Asso (A.R.P.A.): Males 247-251, female 254: Cueva Fustete, Niquero. Males 235-236, females 238240; Ensenada El Real, Niquero. Female 1654; Punta Escalereta, Niquero. Males 1668-1670, females 1671-1674; juveniles 1675-1704; Cueva Fustete, Niquero.

Diagnosis. Pore formula unusual; pores generally present in segments 5, 7-19, or, in some specimens, 5-19; paranota not much pronounced, but posteriorly reduced, and those of the anterior segments not bent downwards, but straight. Males with a triangular scale covering the basal and ventral part of the tarsus only on the legs of the anterior region of the body. Epiproct does not show the two minute apical appendixes. Gonopods with a well developed and coarse coxa; femur short, much widened at the terminal portion; union with the postfemur with a pronounced fold, such that the femur is above the postfemur; external margin slightly toggled; internal margin almost straight; postfemur large, wide, with a thick edge at the external margin; prefemoral process simple, laminar, wide and truncated at the apex (Fig. 2B).

Distribution. Coastal cliffs from Cabo Cruz to Pilon, Granma (Fig. 4).

Note. *Granmadesmus* differs from *Plicatodesmus* in having the tarsal scale only on the legs of segments 2 to B, sometime, to segment 9, where they are minute. Pore formula is generally 5, 7-19; some specimens, however, show pores at segment 6, which then produces a continuous poriferous formula 5-19. The sternum between the fourth pair of legs does not present tubercles. Color pattern of *G. minor* is unique in having the collum completely white, with a brown spot on either side of the median line, or with a central brown spot; segments 2, 6, 8, 11, 14 and 17 are generally white; segments 4, 10 and 13 brown (sometimes also the third); segments 3, 7, 9, 12, 15, 18 and 19 with a white prozonite, and brown metazonite; and segments 5 and 16 with a brown prozonite and white metazonite (Fig. 3D).

Leiomodesmus flavocinctus Loomis

Leiomodesmus flavocinctus Loomis, 1938:458-460, fig. 16. Torre, 1974:7. Hoffman, 1979:t54. Gonzalez & Golovatch, 1990:22.

Examined Material. Museum of Comparative Zoology, Harvard University, Cambridge, MA. (M.C.Z.): Female (holotype) no number.

Note. Loomis described the genus based on a female specimen collected by P. J. Darlington, at Yunque de Baracoa, in July 1936. This specimen showed characters not present in any other chelodesmid genera from this hemisphere, thereby justifying the validity of the new taxon without the need to examine males. These characters are almost complete lack of paranota and metazonites without transversal depression (Loomis, 1938). Two very short collecting trips to Yunque de Baracoa (July 1989, and May 1992) have not yielded a single specimen of this species. Expeditions to "nearby" territories of Holguin and Guantanamo provinces have produced a few specimens no doubt belonging to this same genus, though not necessarily to the same species; in fact, they belong to two species, similar in most characters, but with quite distinct gonopods. It thus seems that *Leiomodesmus* is not a monotypic genus, and it seems advisable not to describe the new species, until males of *L. flavocinctus* are found.

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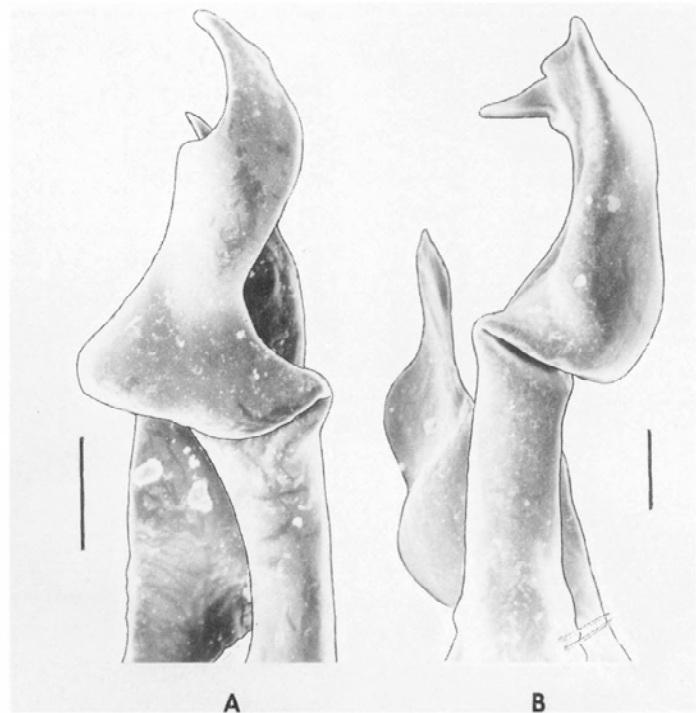


Fig. 1A: Gonopod (right) of *Plicatodesmus turquino* n. sp., ventral aspect. 1B. Gonopod (left) of *Plicatodesmus baire* n. sp., ventral aspect. (Scale line = 100 μ)

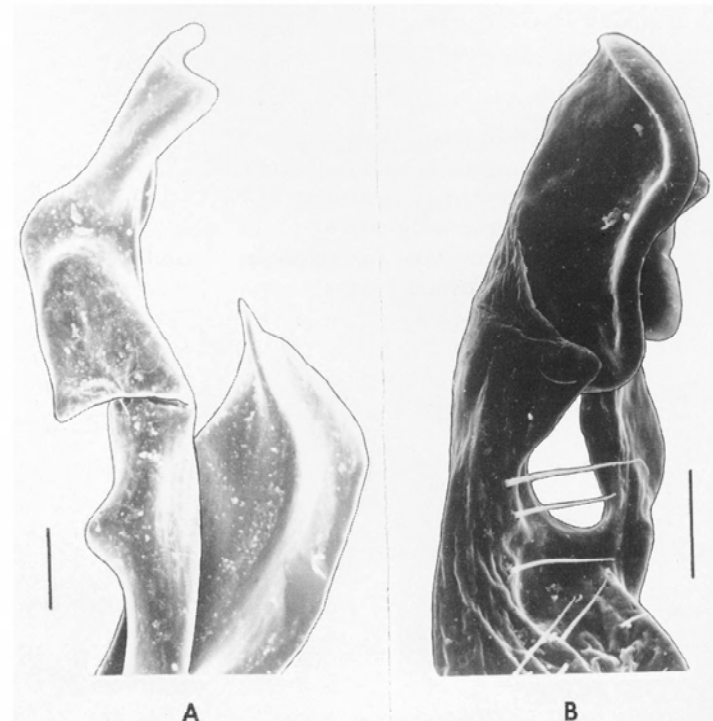


Fig. 2A: Gonopod (right) of *Plicatodesmus mariana* n. sp., ventral aspect. 2B. Gonopod (left) of *Granmadesmus minor*, ventral aspect. (Scale line = 100 μ)

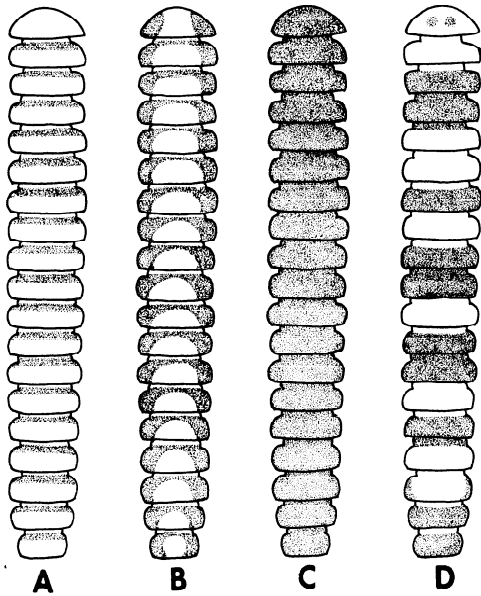


Fig. 3: Color patterns. A. *Plicatodesmus mariana*, new species. B. *Plicatodesmus baire*, new species. C. *Plicatodesmus turquino*, new species. D. *Granmadesmus minor*.

- ▲ *Plicatodesmus turquino*
- △ *Plicatodesmus baire*
- ▼ *Plicatodesmus mariana*
- *Granmadesmus minor*
- *Leiomodesmus flavocinctus*
- *Leiomodesmus*? spp.

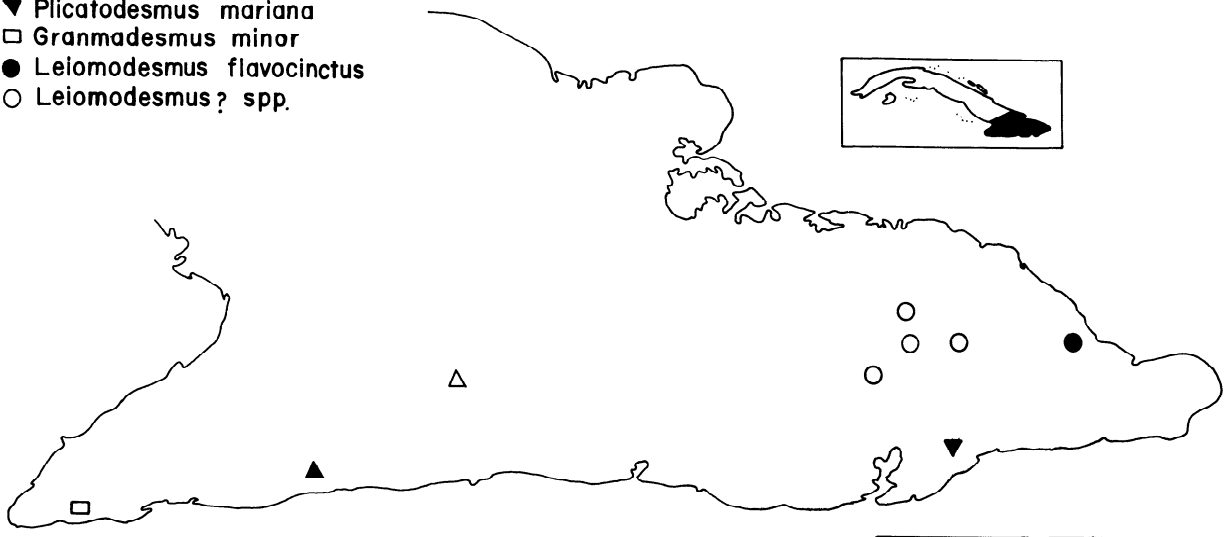


Fig. 4: Geographical distribution of *Plicatodesmus turquino*, new species; *P. baire*, new species; *P. mariana*, new species; *Granmadesmus minor*, *Leiomodesmus flavocinctus*, and *L.*? spp. Scale line = 100km.