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CHELODESMID STUDIES III

NOTES ON THE STATUS OF *GONIOLEPTODESMUS*, THE DESCRIPTION OF A NEW SPECIES FROM MINAS GERAIS, AND A KEY TO THE PRESENTLY KNOWN MEMBERS OF THE GENUS (DIPLOPODA, POLYDESMIDA) [1]

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ABSTRACT

Gonioleptodesmus, described by Schubart as a subgenus of *Leptodesmus*, is redescribed and considered at generic level. A key to the known species of the genus is given, based on the male gonopod structure. A new species, *Gonioleptodesmus schubarti*, from Sete Lagoas, Minas Gerais, is described.

The nominal "genus" *Leptodesmus* has for decades reigned as one of the outstanding examples of a taxonomically undefined, morphologically heterogeneous genus. Most of the other "catch-all" genera of early diplopodologists have by now been fragmented into smaller natural groups, but since most of the work on South American polydesmoids has come from the pen of two notably conservative authorities, *Leptodesmus* remains at the present largely a great unwieldy ensemble of dissimilar forms. In recent years Dr. Otto Schubart began the work of splitting of various aberrant species into new genera, or in some cases subgenera, but was able to make only the merest start before his untimely death in 1962.

With the receipt of abundant, well-preserved Brasilian chelodesmids sent for identification by Dr. G. R. Kloss of the Departamento de Zoologia, I have been compelled to examine *"Leptodesmus"* with a critical eye, and believe that the time is certainly opportune for some preliminary revisionary work. Obviously a great number of species remain to be discovered in Brasil and adjacent countries, and a considerable number of existing names must remain in doubt owing to inadequate descriptions, but eventually a start at synthesis must be made, and I personally feel that the sooner this be done, the better.

The present note is concerned with a group of species originally described by Dr. Schubart in *Leptodesmus*, but later assembled by him into a discrete subgenus *Gonioleptodesmus*. In my

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opinion, this group is certainly worthy of generic recognition, and there is no defensible reason to prolong its submersion under *Leptodesmus* particularly when it is recalled we still do not know the generic characteristics of the type species of that old name: Pocock (1909) reminded students of the Diplopoda that the original type specimen of *Polydesmus (Leptodesmus) carneus* de Saussure, 1859, was an immature male, and that the subsequent redescription of a species under the name *carneus* by Carl (1903) cannot be presumed to be correct. Yet Carl's identification was never later challenged, and recent concepts of *carneus* have been based entirely upon the Carl description. It is certainly regrettable that Pocock selected *carneus* as type of *Leptodesmus*, thereby commencing a difficulty which may be extremely tedious to eventually solve.

Genus **Gonioleptodesmus** Schubart, new status

Leptodesmus "Grupo D" Schubart, 1946: 187.

Leptodesmus subgenus *Gonioleptodesmus* Schubart, 1958: 29. Type species: *Leptodesmus gasparae* Schubart, 1944, by original designation. Proposed for seven species, one of them new.

Diagnosis: Small to moderate sized chelodesmoids, basically uniform reddish or brownish in coloration, with moderate paranota, normal pore distribution, tibial pads on anterior legs of males, and with the greatest width usually occurring near the midbody.

Gonopod aperture moderate, oval, chiefly contained in the metazonite, its lateral and posterior edges elevated and flared. Sternum eliminated and the coxae in contact medially; coxae with acute apophysis and two macrosetae on the dorsal side, no ventromedial setae present. Solenite small, slender, with a distinct angulation on the outer edge. Prefemur elongated, about half the total length of telopodite, and with a relatively long, simple, laminate prefemoral process; remainder of telopodite set off by a fairly distinct suture as an unmodified acropodite, with a distinct solenomerite arising on the mesal side, thence curving dorsad in front of the apex of the tibiotarsal area of the acropodite, sometimes partly enveloped by it.

Distribution: Southern Brasil, from Minas Gerais as far south as Rio Grande do Sul; most of the known species occur in São Paulo and Paraná.

Species: Eight species are known that appear to be referable to this genus, and a ninth is herewith added to the list. Except for this present novelty, all of the species were described by Dr. Schubart in various papers, and type specimens of six species are in the collection of the Departamento de Zoologia.

Gonioleptodesmus araujoi (Schubart)

Leptodesmus araujoi Schubart, 1946: 171, fig. 4. Type locality: Rodriques Alves, Mun. São Manuel, São Paulo.

Leptodesmus (Gonioleptodesmus) araujoi; Schubart, 1958: 29.

Gonioleptodesmus camellatus (Schubart), new combination

Leptodesmus camellatus Schubart, 1954a: 102, figs. 15, 16. Type locality: Taió, Mun. Rio do Sul, Santa Catarina.

Gonioleptodesmus gasparae (Schubart)

Leptodesmus gasparae Schubart, 1944: 351, figs. 20-23. Type locality: Estação Experimental de Caça e Pesca, Mun. Pirassununga, São Paulo; Schubart, 1952: 413. Records for Mun. Analândia and Mun. Pirassununga, São Paulo; Schubart, 1955: 516. Records for Mun. Pirassununga and Mun. Olímpia, São Paulo.

Leptodesmus (Gonioleptodesmus) gasparae; Schubart, 1958: 29.

Gonioleptodesmus hippocampus (Schubart)

Leptodesmus hippocampus Schubart, 1944: 355, figs. 24-26. Type locality: Usina Corumbataí, Mun. Rio Claro, São Paulo; Schubart, 1955: 516.

Leptodesmus (Gonioleptodesmus) hippocampus; Schubart, 1958: 29.

Gonioleptodesmus iguazuensis (Schubart)

Leptodesmus iguazuensis Schubart, 1954b: 136, fig. 14. Type locality: P. Iguazu, Prov. de Misiones, Argentina. Holotype: Mus. La Plata.

Leptodesmus (Gonioleptodesmus) iguazuensis; Schubart, 1958: 29.

Gonioleptodesmus paranaensis (Schubart)

Leptodesmus paranaensis Schubart, 1954a: 100, fig. 14. Type locality: Caviuna, Mun. Rolândia, Paraná. Holotype: Mus. Paranaense.

Leptodesmus (Gonioleptodesmus) paranaensis; Schubart, 1958: 29.

Gonioleptodesmus repandus (Schubart)

Leptodesmus (Gonioleptodesmus) repandus Schubart, 1958: 29, fig. 4. Type locality: Ponta Grossa, Mun. Pôrto Alegre, Rio Grande do Sul.

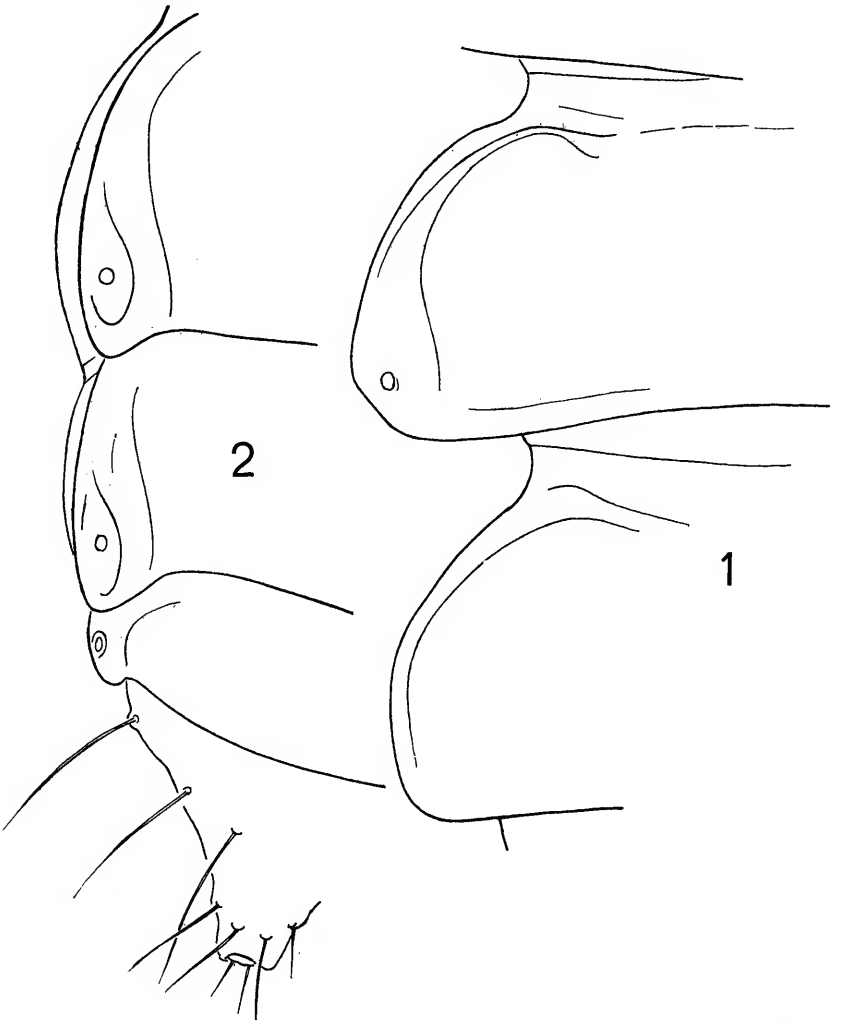
Gonioleptodesmus schubarti, sp. n.

(Figs. 1-4)

Type specimens: Male holotype and female paratype (DZ 2131, 2132), from "Instituto de Pesquisas Agronômicas do Centro-Oeste", Sete Lagoas, Minas Gerais, Brasil, collected in November 1963 by Gertrud Rita Kloss; two topoparatypes with the same data (RLH), originally DZ 2133-34.

Diagnosis: A species of *Gonioleptodesmus* characterized primarily by features of the gonopod, falling into Group "c" (page

40) with *G. stramineus*, in which the prefemur is more than half of the total length of the entire telopodite, the prefemoral process essentially straight, simple, and not twisted, and the acropodite (? tibiotarsus) is provided with a distinct triangular lobe on the dorsomedial side. The more proximal location of this lobe distinguishes *schubarti* from its related form *stramineus* (see key to species, page 41).



Gonioleptodesmus schubarti, sp. n., holotype ♂: 1: left paranota of segments 10 and 11, dorsal aspect; 2: epiproct and left side of segments 17-19, dorsal aspect.

Description of holotype: Adult male, 23.5 mm in length; the widths of selected segments (across paranota) as follows:

Segment	1	2.9 mm	Segment	10	3.2 mm
	2	3.0 mm		12	3.1 mm
	4	3.0 mm		14	2.9 mm
	6	3.0 mm		16	2.8 mm
	8	3.0 mm		18	2.0 mm

Width/length ratio at segment 6: 12.8%. Depth of segment 12, 2.5 mm, depth/width ratio at this segment: 80.6%.

Coloration uniformly light reddish brown; legs and antennae paler.

Paranota set high on body, nearly horizontal, less than 1/4 the diameter of body cylinder, those of segments 2-4 overlapping, the others separated. Stricture without distinct transverse suture. Surface of prozonites and metazonites with numerous minute punctations, otherwise completely smooth.

Head entirely smooth and polished; width across genal apices 2.3 mm, genae without evident median depression. Labrum depressed, colorless, but not otherwise set off from remainder of head. Facial setae as follows: epicranial 2-2, supra-antennal 1-1, interantennal 1-1 subantennal 1-1, genal 5-5, frontal 5-5, clypeal about 7-7; labral about 10-10. Epicranial suture not especially prominent, and without a row of punctures; entire surface of head smooth and polished.

Antennae long (5.8 mm.) and slender, extending caudad to posterior edge of 4th segment, slightly longer than greatest body width. Antennal articles slender, slightly clavate distally, nearly glabrous except the distalmost three, articles, 2-6 similar in size and appearance, the actual lengths as follows: lst, 0.2 mm, 2nd, 1.0 mm, 3rd, 1.1 mm., 4th, 1.1 mm, 5th, 1.1 mm, 6th, 1.0 mm, 7th, 0.1 mm. 7th article semiglobose, with a rounded sensory organ on the outer side, the distal edge inturned and separating the sensory cones into two unequal diads.

Collum wider than head, the lateral ends depressed, the surface smooth and polished. Anterior edge set off by a fine lateral rim as usual, the posterior edge continuous with surface.

Anterior body segments not strongly middorsally, their paranota set relatively high and nearly transverse, only slightly directed cephalad, both corners broadly rounded. Paranota of midbody segments with the anterior corner suppressed, the lateral edge curving evenly caudolaterally from the stricture (fig. 1). Paranota of segments 17-19 becoming abruptly smaller, those of 19th merely small lateral lobes just large enough to contain the pores, and set much lower on sides than those of 18th (fig. 2).

Scapulorae poorly developed and submarginal on all segments, the anterior surface of paranota visible in dorsal aspect; peritremata small, ovoid, and occupying caudal half of paranota edge; pores opening dorsolaterally, located in posterior fourth of each peritreme. Limbus narrow and unmodified.

Epiproct short, subtriangular, with the usual two whorls of setae (fig. 2). Paraprocts nearly flat, smooth, unmodified, the margins compressed but not dorsally enlarged. Hypoproct broad,

subtriangular, unmodified, with a median projection and two smaller paramedian setiferous tubercules located at its base.

Sides of segments unmodified except for an oblique longitudinal tuberculate ridge above bases of the legs of segments 2 through 6. Stigmata in the form of elongated vertical slits, distinctly raised above segmental surface, the anterior about 50% larger than the posterior, latter distinctly separated from the posterior coxal condyle. Stricture sharply defined down sides and across ventrum, porzonite forming a slightly overhanging edge.

Legs attached to moderately elevated podosterna, latter sparsely setose and unmodified. Sternum of 2nd pair of legs moveably attached to pleurotergum of 3rd segment as usual in the family, the coxae with low, rounded, seminal lobes. Sternum of segment 5 relatively broad, with a deep transverse groove and a much shallower longitudinal median groove, but no distinct sternal knobs formed. Sternum of segment 6 broad, depressed between coxae of the 7th pair of legs.

Gonopod aperture normal in size, largely contained in the metazonite, so that the stricture is only slightly displaced anteriorly. Edges of aperture strongly elevated and flared distally except in front where about flush with segmental surface. Sternum of segment 7, between 8th pair of legs, smooth, almost concealed by the caudally flared posterior rim of the gonopod aperture.

Legs moderately long and slender, with the vestiture most profuse on dorsal and ventral sides of segments, and becoming longer and more prominent on the distalmost segments. Prefemora essentially cylindrical, not strongly arched on the dorsal side. Relative lengths of podomeres: $3>6>5 = 2>4 = 1$. Anterior legs with prominent tibial peds subtending the tarsi on legs 1 through 10. Tarsal claws nearly straight, unmodified.

Gonopods (figs. 3, 4) small, the telopodites projecting cephalad and parallel to each other, only the apical ends of the coxae project from the aperture. No sternal remnant evident, the sternal apodemes elongate and slender, gradually tapering distally. Coxae nearly cylindrical, with a moderate apophysis on the dorsal side and two dorsal macrosetae, no mesal setae present. Solenite relatively small and slender, its outer curvature with a small lobe near the end. Telopodite short and rather robust, set at a right angle on the coxa; prefemur about 45% of the total telopodite length, with a moderately long, thin, apically spatulate prefemoral process nearly as long as the prefemur itself. Acropodite forming an angle of about 145° with the prefemur, with two distinct divisions, the mesal carrying the seminal groove and terminating in a dorsally recurved, falcate solenomerite, the lateral somewhat larger and distally lobed, supporting the end of the solenomerite. The mesal division is produced at about its midlength into a prominent subtriangular laminate process apparently homologous to a similar lobe in *G. stramineus* Schubart.

Paratype: Female, collected with holotype, about 23 mm in length; widths of selected segments across paranota as follows:

Segment	1	2.9 mm	Segment	10	3.2 mm
	2	3.0 mm		12	3.3 mm
	4	3.1 mm		14	3.0 mm
	6	3.0 mm		16	3.0 mm
	8	3.0 mm		18	2.1 mm

Width/length ratio at segment 12: 14.3%. Depth of segment 12, 3.0 mm, depth/width ratio at this segment 90.9%.

Similar in coloration and structural details to the male except as follows: podosterna relatively wider, antennae shorter, not extending beyond middle of 3rd segment; metatergites distinctly

Gonioleptodesmus schubarti, sp. n., holotype ♂: 3, left gonopod, mesal aspect; 4, left gonopod, dorsomesal aspect.

more coriaceous in texture, with smaller and more depressed paranota. Ventral edge of 3rd segment not modified behind base of 2nd pair of legs.

Gonioleptodesmus stramineus (Schubart)

Leptodesmus stramineus Schubart, 1956: 359, fig. 3. Type locality. Lapa Vermelha, Mun. Lagoa Santa, Minas Gerais.
Leptodesmus (Gonioleptodesmus) stramineus; Schubart, 1958: 29.

SPECIES GROUPS

The members of this genus are essentially similar in external structure, size, and coloration. There appears to be some specific variation in the development of processes on the pregonopodal sterna, but such differences are to some extent subjective, and the best species criteria reside as usual in the formation of the male gonopods.

There is no single feature about these appendages that provides a diagnostic character, but the general appearance of the gonopods is distinctive. They are smaller than average for the family, and the telopodite is scarcely if any longer than the coxae. The solenite is distinctly angular just before its insertion into the prefemur, and in this respect approaches the condition seen in even more dramatic form in the related genus *Oncoleptodesmus*. The nine species of *Gonioleptodesmus* are not easy to arrange in subgeneric groups; several of them are obviously similar in gonopod stricture but at least four are disjunct and do not seem to be very closely related to any species known at the present. We can arrive at a preliminar arrangement as follows:

Group a. Solenomerite a broad laminate blade extending beyond the end of the tibiotarsus; prefemoral process about two-thirds as long as acropodite and twisted about 180 degrees. This group includes.

G. gasparae (São Paulo)
G. hippocampus (São Paulo)
G. paranaensis (Paraná)

Group b. Gonopod similar to the preceeding except the solenomerite smaller and shorter; tibiotarsus relatively broader.

G. iguazuensis (Misiones, Argentina; also certainly in Paraná)

Group c. Acropodite with a large triangular subterminal lobe on the medial side, extending over end of prefemoral process.

G. stramineus (Minas Gerais)
G. schubarti (Minas Gerais)

Group d. Gonopod with a triangular femoral process on the lateral side, nearly as long as the prefemoral process which it parallels.

G. araujoi (São Paulo)

Group e. Telopodite with a moderately large subterminal minutely spiculiferous lobe on the lateral side; prefemoral process about as long as telopodite and not twisted.
G. repandus (Rio Grande do Sul)

Group f. Solenomerite broad and laminate, extending beyond end of tibiotarsus, latter much broader than in other members of the genus, gonopod resembling that of group a except the prefemoral precess is not twisted.
G. camellatus (Santa Catarina)

There are of course numerous ways to organize the preceeding groups depending upon which gonopod characters are emphasized most. The following key to species of *Gonioleptodesmus* represents an attempt to achieve a natural arrangement, taking the disjunct forms out first, but it must be remembered that no key is so good as reference to drawings of the gonopods for the identification and grouping of species.

KEY TO THE SPECIES OF *Gonioleptodesmus*, BASED ON THE MALE GONOPOD STRUCTURE

1. Telopodite with a prominent, subtriangular femoral process on the lateral side, extending nearly to apex of the prefemoral process ..... *araujoi*
   Telopodite without a femoral process 2

2. Prefemur short, less than half of the total length of telopodite, not extending distad beyond base of the prefemoral process 3
   Prefemur longer, more than half total length of telopodite, extending distad to about midlength of prefemoral process 5

3. Tibiotarsus short, scarcely longer than prefemoral process, its distal edge exceeded by the solenomerite .... *camellatus*
   Tibiotarsus longer, forming a concave shield that contains the solenomerite 4

4. Prefemoral process shorter than tibiotarsus, acuminate in mesial aspect, with a prominent basal lobe .... *iguazuensis*
   Prefemoral process as long as tibiotarsus, apically broad and rounded in mesial aspect, without a basal lobe; tibiotarsus with a prominent spiculate lobe on the lateral side ..... *repandus*

5. Tibiotarsus with a prominent laminate deltoid lobe on the mesial side; prefemoral process straight 6
   Tibiotarsus without a lobe on the mesial side; prefemoral process rotated 180° so that the distal half is on the opposite side from the basal half 7

6. Mesal deltoid lobe of tibiotarsus placed apically and concealing solenomerite, latter extending beyond end of tibiotarsus ..... *stramineus*

Mesal deltoid lobe of tibiotarsus placed subapically, solenomerite entirely visible and extending beyond end of tibiotarsus ..... *schubarti*

7. Outer edge of solenomerite entire, smooth ..... *gasparae*
   Outer edge of solenomerite denticulate 8

8. Solenomerite elongate, the seminal groove sinuately curved ..... *hippocampus*
   Solenomerite short, the seminal groove arcuately curved ..... *paranaensis*

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