Papéis Avulsos de Zoologia

Papéis Avulsos Zool. S. Paulo, vol. 22, art. 25: 263-283 15.VIII.1969

CHELODESMID STUDIES. IV.

A SUMMARY OF THE TRIBE BATODESMINI, WITH THE DESCRIPTION OF A NEW SPECIES OF *BIPORODESMUS* FROM NORTHWESTERN BRASIL[1]

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Abstract

The group name Batodesmini of O. F. Cook (1896) is revived as a tribal designation for some chelodesmoid genera of northwestern South America that collectively correspond to the genus *Alocodesmus* in the sense of Attems, 1938, or the "Alocodesmus-Gruppe" of Verhoeff, 1938. The following genera are included: *Alocodesmus* Silvestri (with the synonyms *Dromodesmus* Chamberlin and *Maracayopus* Verhoeff), *Carlopeltis* Verhoeff, *Heteropeltis* Carl, *Dyoparyphe* (new name for *Amphipeltis* Carl, preoccupied), *Batodesmus* Cook, *Cordilleronomus* Attems, *Plusioporodesmus* Silvestri, and *Biporodesmus* Attems (synonyms, *Melanodesmus* Carl, *Ecuadopeltis* Verhoeff).

A key is given for the better-known genera, a catalog of the referred species — with synonymic and taxonomic notes in many cases, and a list of inadequately described generic names considered as also batodesmines (*Alassodesmus* Chamberlin, *Centrogaster* Attems, *Colombodesmus* Chamberlin, and *Cormodesmus* Chamberlin). Five species from southeastern Brasil, which have in the past been referred to *Alocodesmus*, are excluded from the genus and tribe, which reaches Brasil only in the extreme northwest. *Biporodesmus austrocrucis*, sp. n., is described from specimens taken at Cruzeiro do Sul, Acre, and notes and drawings are given for the curious species *Plusioporodesmus bellicosus*.

Members of the Batodesmini are regarded as the most specialized and divergent species of Chelodesmidae, and seem to have little affinity with typical members of the family in Brasil, Paraguay, and Argentina.

The chelodesmid fauna of Brasil and South America generally is composed largely of rather similar species that in previous years have been collectively referred to the old genus *Leptodesmus*. But in the Andean region (and northward into Central America) occur chelodesmids of quite distinctive facies which appear to be distinguishable as a separate taxonomic category within the family if in

1. A contribution from studies supported by grants G-21519 and GB-3098, from the National Science Foundation, Washington, D.C.

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fact not as a separate family-group. For many years I have been accumulating data on these divergent forms, and with the receipt of the first Brasilian member of the group — among material sent for identification by the Departamento de Zoologia — I am now encouraged to present an initial synoptic treatment of the various genera.

The Brasilian species at hand is represented by a long series of specimens from Cruzeiro do Sul, and was for some time regarded as the type of a hitherto unrecognized genus. Further reflection has convinced me, however, that it is in fact referrable to an interesting genus of rather specialized forms, for which the oldest available name appears to be *Biporodesmus,* proposed by Graf Attems in 1898 for a single species from Ecuador.

A considerable number of monotypic genera were later based upon closely related species by J. Carl in his well-known monograph on Colombian diplopods (1914); still others were added by Chamberlin (1923) and by Verhoeff (1938). Practically all of these generic names were combined by the archconservative Attems under the generic name *Alocodesmus.*

There exists among many systematists a curious antipathy toward monotypic or small genera. Such people wish to apply to all kinds of organisms an arbitrary standard based on certain well-known groups (*e.g.*, birds and mammals), so that a genus must have so many species to be considered as valid. To my view there is something unscientific about the application of any such principle on a universal basis. Perhaps those who wish to employ such a Procrustean principle do not reflect that evolutionary mechanisms may produce quite different affects among different groups, and that the size of a genus may well fluctuate during its evolutionary history(*). Another important factor apparently disregarded by the opponents of small or monotypic genera is that in certain groups of organisms we are still in the earliest stages of discovery, and it so often happens that the first species to be described from a given area may in fact represent previously unknown generic groups, all the more so in the case of soil animals with limited ranges. *Biporodesmus* itself is a good example of this: monotypic when proposed in 1898, it now contains at least nine species and undoubtedly will continue to grow as northern South America becomes better explored.

I now wish to revive an old Cook group name proposed more than 70 years ago and completely neglected since then. In his important but exasperatingly succinct paper "On the Xyodesmidae, a new family" (Cook, 1896) Cook united under the name Xyodesmidae a number of genera from West Africa and northern South America. The Neotropical members included *Batodesmus* (the type of a new subfamily), *Trachelodesmus,* and *Hypodesmus* (the last two making up a second new subfamily Trachelodesmini). I now strongly suspect that Cook's arrangement may be vindicated in toto, although perhaps with the reduction of his subfamilies to the rank of tribes. At any rate, *Trachelodesmus* is quite divergent

(*) Curiously enough, systematic botanists are not especially afflicted with numerical thinking, and do not seem to insist that because many genera of Compositae contain hundreds of species, the genera of more primitive plants must likewise be big in order to be "natural".

from other chelodesmoids, and has little to do with the various genera to be considered in the following pages under the group name

Tribe Batodesmini Cook

Batodesmini (as subfamily) Cook, 1896: 17.
"Alocodesmus-Gruppe" Verhoeff, 1938: 3.

Specialized chelodesmids endemic to the northern Andean region, characterized by a combination of the following features: segments 1-4 usually smaller than the 5th but not strikingly so, paranota well developed but without sharply defined peritrematic swellings, pores in normal sequence or in various stages of reduction; metaterga usually coriaceous or granular, often heavily tuberculate; epiproct broadened and with prominent conical tubercules, the paramedian tubercules of the basal series usually displaced posteriorly; tubercules of the distal series often projecting to or beyond level of epiproctal apex; hypoproct tuberculate or granular, broadened, with projecting paramedian tubercules, its outer end overlapped by conical basal lobes of the paraprocts, latter usually flattened with convex median area, mesal edges compressed and set off by a groove. Sterna normally as wide as length of femora, often with acute projecting sternal spurs near base of legs (but not subcoxal spines such as occur in xystodesmids and other polydesmoids). Legs long and slender, sparsely setose, the tarsus longest, fusiform, tarsal claws short and obscure. Stigmata dissimilar, the anterior stigmata distinctly the larger. Head heavily setose, antennal sockets with elevated rims, genae convex, laterally margined. Antennae long, slender, the 6th article largest and often somewhat incrassate, with a terminal sensory area on the outer side; 7th article globosely cylindrical, with a small outer sensory spot and the distal edge slightly inturned on two sides to separate the sensory cones into two diads.

Male characters: anterior legs with femora and often postfemora enlarged and glandular, at least the 3rd pair of legs with ventral adenostyles and sometimes the 2nd-6th legs are so modified; coxae, prefemora, and often femora provided dorsally with conspicuous, conical, setiferous tubercules; subtarsal pads occur sporadically; sterna of anterior segments unmodified.

Gonopods relatively small, projecting from a small transversely oval aperture contained entirely within the metazonite; central sternal element small or absent; coxa without dorsal apophysis and usually only two macrosetae; telopodite attached at a right angle and consisting of an elongated setiferous prefemur with large, dorsally located prefemoral process (simple or multiply branched), and a short acropodite made up basically of a solenomerite and adjacent tibial process (or parasolenomerite); this region of the gonopod is invariably provided on the outer side with a small cluster (2-6) of large and prominent macrosetae well separated from the much smaller setae of the prefemur.

As defined by the preceding characteristics taken collectively or in various combinations (few if any of the species demonstrate all of the stipulated features), the Batodesmini consists of an ensemble of easily recognizable species apparently confined to

extreme northwestern South America, from western Brasil and northern Peru to the vicinity of Caracas, Venezuela, and the Panama Canal Zone. The majority of named forms occur in Colombia.

Although considerable further investigation must precede a satisfactory treatment of the group, some preliminary notes and arrangements seem entirely desireable at this time to provide a taxonomic framework into which the new Brasilian *Biporodesmus* can be placed. As will be shown in a later paragraph, several species from São Paulo and adjoining states that were originally placed in *Alocodesmus* really do not belong in that genus, which is now known from Panama, Colombia, and Venezuela. The usual difficulties of poorly-described old species, and generic names based upon female specimens, afflict the batodesmines, and some time may pass before the group can be put into complete order.

The taxonomic histories of the various forms that make up this group have been somewhat checkered owing to the reaction of three quite different approaches to milliped classification. J. Carl, who initiated many of the generic names in his 1914 paper, based them largely upon modifications of body form in the type species. Count Attems, notably conservative as already mentioned, saw only general similarities in the gonopod structure and combined Carl's genera under the older name *Alocodesmus*. K. W. Verhoeff combined both genitalic and external characters to define genera and thus recognized about twice as many as did Carl.

My personal opinion is that Verhoeff came closest to the correct arrangement even though he worked largely from the literature and made some errors of commission as well as of omission! Attems was curiously inconsistent as regards his emphasis on various systematic characters, assigning great importance to variations in the pore distribution while tending to disregard other external modifications that would appear to have at least equivalent standing.

It appears to me that the distribution of ozopores is liable to extensive variation in certain groups of obviously related species while remaining quite stable in others, and for this reason we cannot adopt a universal criterion regarding this particular character: each group must be judged on its particular circumstances. In the more specialized batodesmine genera, I think that pore formula is at most a specific character.

The older practice of basing "genera" upon conspicuous and easy key-characters must now in my opinion be abandoned, and suprageneric groupings made on the basis of numerous characters in common rather than single features. As a result much of the published literature becomes useless and requires the re-examination of material, a procedure that has so far rarely engaged the attention of diplopodologists.

Key to the genera of Batodesmini

(omits several inadequately described generic names)

1. Gonopod coxa with a field of numerous long setae on the dorsal side; pore formula normal; paranota not incised, denticulate, or otherwise modified; anterior legs of males unmodified or with some of the femora slightly enlarged. 2

   Gonopod coxa without a field of numerous long setae; pore formula variable, the pores often missing; paranota fre-

quently modified from the normal polydesmoid outline; normally some of the anterior male legs with enlarged or otherwise modified coxae, prefemora, femora, and postfemora, the latter two podomeres with internal glands. 4

2. Solenomerite and tibiotarsus of gonopod set off by a prominent and conspicuous cingulum; prefemoral process trifid. ..... *Alocodesmus*

   Solenomerite and tibiotarsus not conspicuously set off from femur. 3

3. Gonopod lacking a tibiotarsal branch; prefemur short, its dorsal process widely separated from the acropodite. *Carlopeltis*

   Tibiotarsal branch present; prefemur of gonopod longer, its process originating near base of acropodite. (*Dyoparyphe*, see page 268, will probably key out here also) *Heteropeltis*

4. Gonopod coxae with two conspicuous dorsal macrosetae. 5

   Gonopod coxae without setae. 6

5. Sternum of 19th segment with two greatly elongated paramedian spines that extend beyond hypoproct; paranota small, immarginate; tibiae without ventrodistad pads subtending base of tarsi; segment 7 without ozopores. .... *Batodesmus*

   Sterna without elongated spines; paranota wide, laterally with at least some indication of margination; tibial pads present; pore formula normal. ..... *Cordilleronomus*

6. Both sexes with a large, median, peltate epicranial process; pores on segments 5, 7-19; postfemoral element of gonopod strongly reduced. ..... *Plusioporodesmus*

   Neither sex with epicranial process; pore formula normal or reduced; postfemoral element of gonopod of normal size for the tribe. ..... *Biporodesmus*

Alocodesmus Silvestri

Alocodesmus Silvestri, 1896: 5. Type species: *A. angustatus* Silvestri, by monotypy. Jeekel, 1952: 73.

Dromodesmus Chamberlin, 1923: 51. Type species: *D. longipes* Chamberlin, by original designation and monotypy.

Maracayopus Verhoeff, 1938: 4. Type species: *M. venezuelanus* Verhoeff, by original designation and monotypy.

Alocodesmus angustatus Silvestri

Alocodesmus angustatus Silvestri, 1896: 5. Holotype, ♂, Zool. Mus. Torino, from Punta Sabana, Panama. Carl, 1914: 897, fig. 123. Attems, 1938: 128.

Alocodesmus dromeus Chamberlin, 1922: 48, figs. 4-7. Holotype, ♂, U.S.Nat. Mus., from Culebra, Canal Zone, Panama.

Alocodesmus gracilicornis (Brölemann)

Leptodesmus gracilicornis Brölemann, 1898: 292, figs. 114-126. Holotype, ♂, Mus. nat. hist. natur. (Paris), from San Esteban, Venezuela.
Leptodesmus (Desmoleptus) gracilicornis; Attems, 1938: 31.
Maracayopus venezuelanus Verhoeff, 1938: 4, figs. 1-4. Holotype, ♂, Zool. Staatss. München, from Maracay, Venezuela.
Dromodesmus celer Chamberlin, 1950: 142, fig. 17. Holotype, ♂, Amer. Mus. Nat. Hist., from Rancho Grande, near Valencia, Venezuela.
Alocodesmus gracilicornis; Jeekel, 1952: 73.

Alocodesmus intermedius Carl

Alocodesmus intermedius Carl, 1914: 899, figs. 127-129. Syntypes, ♂♀, Mus. Genève, from Guadua, Magdalena, and Buenavista, Colombia.

Alocodesmus longipes (Carl), comb. n.

Dromodesmus longipes Chamberlin, 1923: 52, figs. 128-135. Holotype, ♂, Mus. Comp. Zool., from Fundacion, Colombia.

Carlopeltis Verhoeff

Carlopeltis Verhoeff, 1938: 3. Type species: *Alocodesmus alatus* Carl, 1914, by original designation and monotypy.

Carlopeltis alatus (Carl)

Alocodesmus alatus Carl, 1914: 900, fig. 130. Holotype, ♂, Mus. Genève, from "below Bodega central", Colombia.
Carlopeltis alatus; Verhoeff, 1938: 3.

Heteropeltis Carl

Heteropeltis Carl, 1914: 901. Type species: *H. luctuosus* Carl, by monotypy. Verhoeff, 1939: 3.

Heteropeltis luctuosus Carl

Heteropeltis luctuosus Carl, 1914: 902, figs. 131-133. Holotype, ♂, Mus. Genève, from coffee plantation at La Camelia, Colombia.

? **Heteropeltis serenus** (Silvestri), comb. n.

Alocodesmus serenus Silvestri, 1898: 57. Holotype, ♂, from Orocue, Colombia. Carl, 1914: 898, figs. 124-125.

Dyoparyphe, nom. n.

Amphipeltis Carl, 1914: 903. Type species: *Polydesmus nodosus* Peters, 1864, by monotypy and original designation.

Preoccupied by *Amphipeltis* Salter, 1863 (Crustacea). Verhoeff, 1938: 3.

Dyoparyphe nodosa (Peters), comb. n.

Polydesmus (Rhachidomorpha) nodosus Peters, 1864: 536. Holotype, ♂, Zool. Mus. Berlin, from "Neu Granada" (= Colombia), without more precise data.
Amphipeltis nodosus; Carl, 1914: 904, figs. 134-139. Redescription of holotype.
Alocodesmus nodosus; Attems, 1938: 135, figs. 159-160.

The exact status of this genus remains to be settled since the coxal setation of the gonopod is not known. On the basis of Carl's redescription of the type of *nodosa,* I am inclined to place it near *Alocodesmus* and *Heteropeltis,* perhaps closest to the former. The pore formula is normal, the anterior male legs scarcely modified, and postfemoral elements of the gonopods are set off by a prominent cingulum. In fact, it appears from Carl's drawings that there is a prominent flexion in the area between femur and postfemur, so that the seminal groove follows a sigmoid path instead of proceeding more or less directly up the median face of the telopodite as in all other known members of this tribe.

Batodesmus Cook

Batodesmus Cook, 1896: 16. Type species: *Rhachidomorpha alutacea* Peters, 1864, by original designation and monotypy. Carl, 1914: 906.

Batodesmus acceptus Carl

Batodesmus acceptus Carl, 1914: 907, fig. 143. Holotype, Mus. Genève, from Guaduas, Colombia.

Batodesmus alutaceus (Peters)

Rhachidomorpha alutacea Peters, 1864: 620. Holotype, ♀, Zool. Mus. Berlin, from Bogota, Colombia.
Batodesmus alutaceus; Cook, 1896: 16. Carl, 1914: 906, figs. 140-142.

Cordilleronomus Attems

Cordilleronomus Attems, 1931: 61. Type species: *C. pulvillatus* Attems, by monotypy and original designation.

Cordilleronomus pulvillatus Attems

Cordilleronomus pulvillatus Attems, 1931: 61, figs. 93-97. Holotype, ♂, Zool. Mus. Hamburg, from Paca, Ecuador.

Cordilleronomus ortonedae (Silvestri), comb. n.

Odontopeltis Ortonedae Silvestri, 1897: 12, fig. 36. Holotype, ♂, Zool. Mus. Torino, from Guayaquil, Ecuador.

Trienchodesmus ortonedae; Attems, 1938: 101, fig. 118.

A comparison of Silvestri's description and drawing with those published by Attems for his *C. pulvillatus* leaves little doubt that *ortonedae* is not only a batodesmine, but in all probability congeneric with *pulvillatus.*

Plusioporodesmus Silvestri

Plusioporodesmus Silvestri, 1898: 64. Type species: *P. bellicosus* Silvestri, by monotypy. Carl, 1914: 942.

This remarkable genus, known so far only from its type species, is one of the most specialized of American polydesmoids. The original description of *P. bellicosus* did not include illustrations, and Attems (1899: 354) concluded from the verbal account that the genus was related to *Platyrhacus.* Carl examined fresh material from Colombia and concurred in Attems' opinion although remarking some chelodesmoid characters in the anterior male legs and the gonopods.

In 1938, however, Attems relocated the genus to his family "Leptodesmidae" without comment, and a recent personal examination of material convinces me that *Plusioporodesmus* is in fact a highly modified batodesmine. The gonopods are similar to those of *Biporodesmus* except that the prefemoral process is much larger than the acropodite.

Probably the most remarkable single feature about *bellicosus* is the presence in both sexes of a large, subpeltate epicranial process that is reminiscent of those found in the males of certain scarab beetles. Carl postulated that the structure might be useful in the construction of an earthen egg capsule. I provide herewith a drawing made from one of Carl's specimens to show the size and form of the process, heretofore never illustrated.

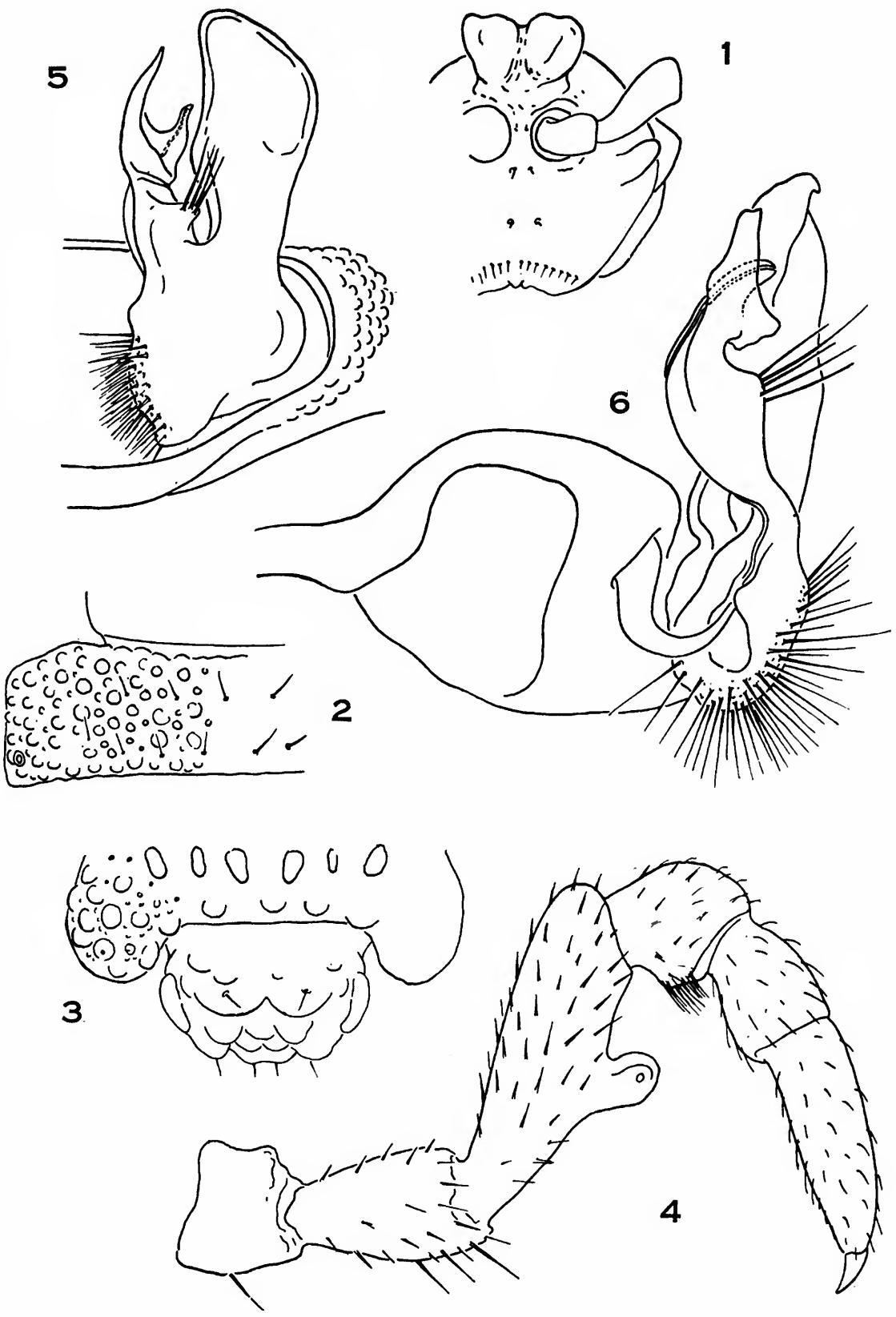
Plusioporodesmus bellicosus Silvestri

(Figs. 1-6)

Plusioporodesmus bellicosus Silvestri, 1898: 64. Carl, 1914: 942, figs. 205-206.

The British Museum (Nat. Hist.) contains the adult male from Buenavista reported by Carl; in April of 1960 I made some drawings and descriptive notes which are given here to supplement those published by that author in 1914.

Adult male, ca. 26 mm. in length; segment widths as follows: collum, 3.0 mm., 2nd, 4.0 mm.; 3rd, 3.8 mm.; 4th, 3.7 mm.; 6th, 3.5 mm.; 7th, 3.6 mm.; 15th, 3.5 mm.; 18th, 3.0 mm. Body long and slender (W/L ratio = 14.6%), narrowing from head down to 6th segment, thence broader and nearly parallel-sided back to 15th, gradually tapering back to epiproct. Paranota mostly transverse and rectangular, those of segments 2-4 bent slightly forward. Surface of metazonites roughly granular-tuberculate with three transverse rows of larger tubercules and two series of prominent setae (fig. 2). Paranota not margined, the pores opening through a small polished disc similar to that found in the Platyrhacidae, on segments 5 and 7-19.



Plusioporodesmus bellicosus Silvestri, specimen from Buenavista, Colombia: 1, front of head to show close-set antennae and prominent epicranial median process; 2, left side of midbody metazonite, dorsal aspect; 3, segments 19 and 20, dorsal aspect, only the most prominent tubercules shown; 4, leg of the 3rd pair, anterior aspect, setation diagrammatic; 5, left gonopod in situ, ventral aspect; 6, left gonopod, mesal aspect.

Paranota of segment 19 broadly rounded lobes set with prominent oval to rounded granules. Segment 20 (fig. 3) constricted at base, its sides convex, the setiferous tubercules hypertrophied and difficult to identify as to their series.

Legs relatively long and slender, the femora of legs 2-4 slightly incrassate, with prominent ventral process carrying a gland opening (fig. 4).

Head (fig. 1) with antennae set high and close together, the interantennal isthmus considerably narrower than diameter of an antennal socket. Genae with prominent laterally directed subspiniform process. Epicranium with large, flattened, distally bilobed process originating just above level of antennae.

Gonopod aperture small, transversely oval, lateral and posterior margins strongly elevated and heavily granulose. Gonopods small, not extending beyond front of 7th segment, basically similar to those of other batodesmines (including the presence of a cluster of ventrolateral macrosetae on the acropodite) but prefemoral process larger than usual and set laterad to the reduced acropodite instead of dorsad to it. See figures 5 and 6.

Biporodesmus Attems (*)

Biporodesmus Attems, 1898: 411. Type species: *B. platynotus* Attems, by monotypy.

Melanodesmus Carl, 1914: 908. Type species: *Polydesmus planus* Gervais, 1847, by monotypy. *Syn. n.*

Ecuadopeltis Verhoeff, 1938: 3. Type species: *Alocodesmus dentatus* Attems, 1931, by original designation and monotypy. *Syn n.*

Diagnosis: Moderate to large-sized batodesmines characterized primarily by gonopod details: coxa without any macrosetae; prefemur longer than usual, without a cingulum setting off the postfemoral region; prefemoral process long and simply acuminate or subspatulate distally, no branches or other modification. Anterior legs of males with femora (and often postfemora) enlarged and with ventral adenostyles; coxae of 3rd pair of legs often globosely enlarged ventrally; basal podomeres usually with acutely conical macrotubercules on the dorsal side. Paranota set high on sides, horizontal or prominently elevated, dorsum granular, paranota entire or variously modified but without lateral peritrematic enlargement; pore formula highly variable, pores in normal sequence, the series increased, reduced, or absent in closely related species.

Distribution: Colombia (2), Ecuador (3), northern Peru (3), and extreme northwestern Brasil (1).

Remarks: It is regrettable to revive an old generic name which is based upon the characters of only one of the nine presently-included species, but the great similarity of gonopod and other male characters enforces the conclusion that *B. platynotus* is indeed congeneric with various other species previously described chiefly in *Alocodesmus*. Within this group slight differences in paranotal

(*) *Dromodesmus homalus* Chamberlin (1941: 489) from northeastern Peru, is very likely a species of *Biporodesmus,* but the description of the female holotype is inadequate for making any kind of placement at this time.

shape and variations in the pore formula appear to be the only important species characters, and if the old tradition of basing generic names upon such details were continued, it would become necessary to recognize no less than four genera (with virtually identical gonopod structure) for the nine species here referred to *Biporodesmus*.

In my view, the ozopore formula of 5, 7, 9, 10, 12, 13, 15, 16, 17, 18, 19 must be regarded as primitive for the entire order Polydesmida, as this distribution occurs in more than 95% of the known species. Any departures, either toward reduction or loss of the pores or toward an increase in their number, appear to be associated with species that are manifestly specialized in other ways and should be regarded as concomittant specializations. It would therefore be incorrect to assume that the formula 5, 7-19 of *Plusioporodesmus* is a primitive retention (or atavism) by analogy with the continuous pore series that occur in other orders. Presumably in any sort of homonomously metameric arthropod, a mutation producing the increase in number of a repeated structure would be no more remarkable than one causing a reduction.

Artificial key to the known species of Biporodesmus

(based upon external characters)

1. Pore formula normal (pores on segments 5, 7, 9, 10, 12, 13, 15-19). 2
   Pore formula reduced, the pores on less than 11 segments. 7

2. Sterna, at least on posterior of body, with paramedian spines. ..... *dentatus*
   Sterna without or with at most minute subcoxal spiniform tubercules. 3

3. Prefemora with acute ventrodistal spine(s). 4
   Prefemora without ventrodistal armature. 6

4. Paranota directed upwards on most body segments; the middorsum appearing concave. ..... *austrocrucis*
   Paranota at most horizontal or only a few on anterior segments slightly elevated; middorsum appearing flat. 5

5. Paranota of midbody segments nearly quadrate in outline, the anterior corner rounded, the posterior subrectangular. ..... *planus*
   Paranota of midbody segments without anterior corner, the lateral edge forming a continuous broad arc from anterior paranotal base to the acutely produced caudal edge; posterior edge concave. ..... *pseudolivaceus*

6. Length of male about 40 mm. dorsum uniformly dark. *armatus*
   Length of male 24 mm. dorsum dark with posterior corners of paranota whitish. ..... *olivaceus*

7. Pores absent; paranota relatively small and on midbody segments directed obliquely caudal, with denticulate anterior and posterior edges, length of male about 24 mm. *aporus*
   Pores present on at least one segment; paranota large, transverse on midbody segments, the edges smooth or minutely denticulate; size 40 mm or greater. 8
8. Pores on one segment (5th) only. ..... *platynotus*
   Pores on five segments (exact distribution unknown as the only specimen was dried and disarticulated, but perhaps 5, 9, 12, 15, 17). ..... *gualianus*

Biporodesmus aporus (Kraus), comb. n.

Alocodesmus aporus Kraus, 1954: 32, figs. 36-43. Holotype, ♂, Mus. Senckenberg, from Km 42, road from Olmos to Jaen, Prov. Lambayeque, Peru.

Biporodesmus armatus (Verhoeff), comb. n.

Melanodesmus armatus Verhoeff, 1941: 16, figs. 10-13. Holotype, Zool. Mus. München, from "Batatalthal", Colombia [location unverified and the spelling is perhaps the German rendition of "Batatal Valley"?].

Biporodesmus austrocrucis, sp. n.

(Figs. 7-16)

Type specimens: Male holotype and paratypes of both sexes (DZSP 1041), from Cruzeiro do Sul, Acre, Brasil; collected in February, 1963, by M. Alvarenga; additional topoparatypes (RLH).

Diagnosis: Easily distinguished from other members of the genus by the characters stipulated in the foregoing key; the strongly elevated paranota and shortened gonopods are especially diagnostic.

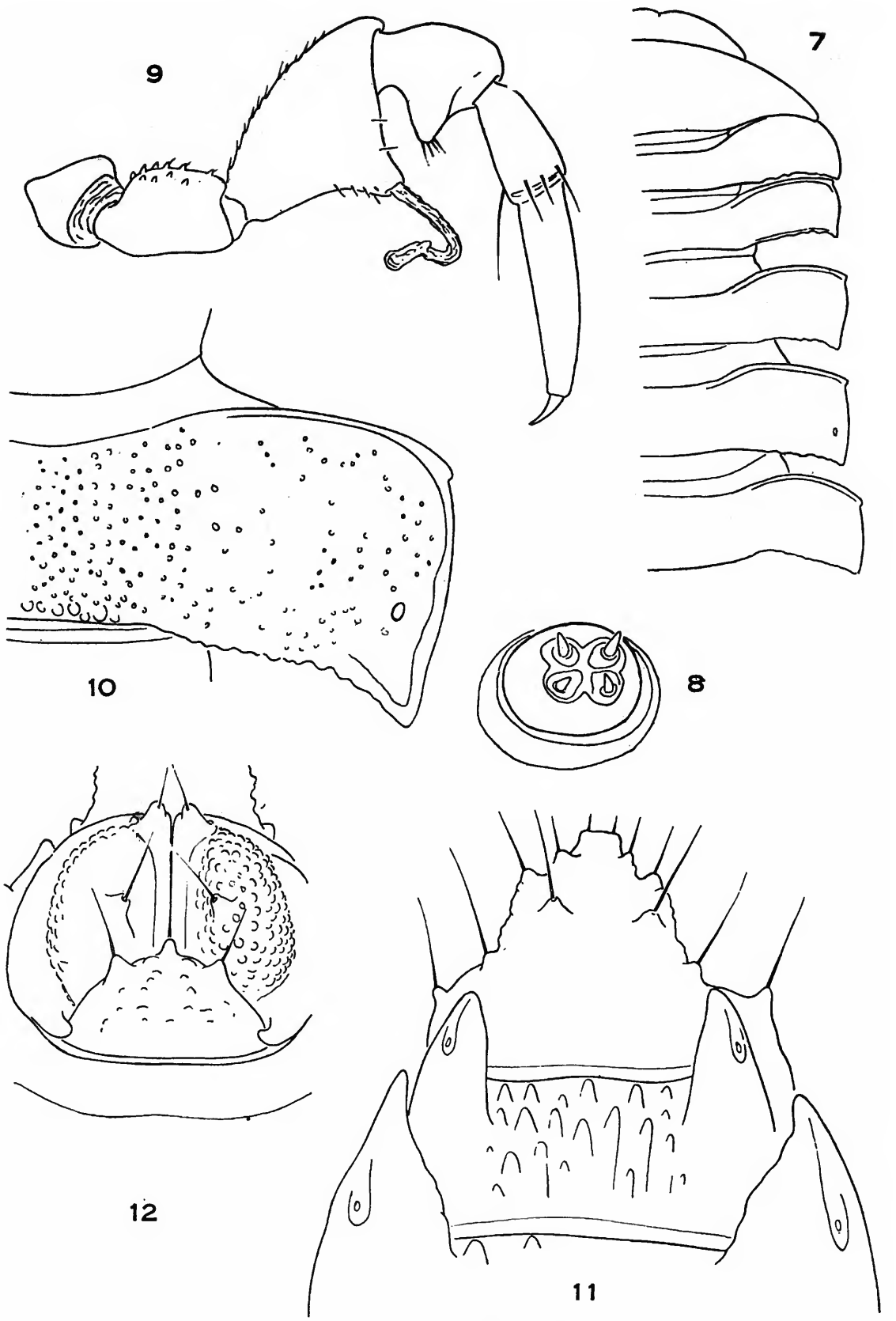
Description of holotype: Adult male, ca. 29.5 mm. in length (broken); width of selected segments across paranota as follows:

Segment	1	3.7 mm	Segment	10	4.3 mm
	2	4.0 mm		12	4.3 mm
	4	4.0 mm		14	4.2 mm
	6	4.1 mm		16	3.8 mm
	8	4.2 mm		18	2.6 mm

Width/length ratio at segment 10: 14.8%. Depth of segment 12, 2.5 mm, depth/width ratio at this segment: 58%.

Coloration considerably altered by alcohol, at present light brown dorsally with concealed parts of prozonites, legs, and sternal areas much paler brown; the animal probably dark brown in life. Paranota laterally margined with whitish.

Body relatively slender, the stricture deep and setting off the prozonite as a subglobose area less than half of which is telescoped into the proceeding metazonite. Paranota set high on body and on most segments elevated above the horizontal, imparting a curiously concave appearance to the dorsal surface.



Biporodesmus austrocrucis, sp. n., male holotype: 7, right side of first six body segments, dorsal aspect, surface texture not indicated; 8, apex of antenna showing 7th article and sensory cones, greatly enlarged; 9, leg of 3rd pair, anterior aspect, setation largely omitted, secretion shown emerging from adenostyle of the femur; 10, right paranotum of segment 10, enlarged, granulation approximately accurate; 11, posterior end of body, dorsal aspect; 12, hypoproct and paraprocts, ventral aspect. Figures 9-12 drawn to same scale (x 45), figure 7 much reduced (x 15), figure 8 enlarged (x 90).

Head prominently convex, mostly smooth except for the occipital region dorsally which is finely but distinctly striate; epicranial suture distinct, forked between the antennae, but not punctate. Genae convex below antennae, with relatively broad and flattened lateral margins; front of head evenly convex down to labral margins. Facial setae obscured by profuse secondary pilosity. Epicranial apparently 2-2, the two pairs set close together and the four setae forming a straight transverse series; supra-antennal 1-1, interantennal 1-1, genal about 3-3, the series essentially continuous with the clypeals but details impossible to make out with certainty; labral 7-7, the labrum not set off from clypeal region. Antennae set above middle of head and moderately separated (0.5 mm across interantennal isthmus), each antennal socket with an elevated, colorless, marginal flange, highest medially and dorsally.

Antennae moderately long (6.3 mm) and slender, extending back to middle of 4th paranota, considerably longer than greatest body width. Basal article with 10-15 scatterred setae on the dorsal and anterior sides, articles 2-5 somewhat more setose, article 6 invested with numerous pale, procumbent setae and provided with a poorly defined apical transverse area composed of numerous parallel rows of microsensillae. Article 7 short, cylindrical, slightly constricted at base, densely setose, with colorless, hemispherical sensory area at midlength on outer side; distal edge slightly inturned on two sides, partly separating the four sensory cones into two diads. Lengths of antennomeres: lst, 0.5 mm, 2nd, 1.25 mm, 3rd, 1.20 mm, 4th, 1.0 mm, 5th, 1.0 mm, 6th, 1.15 mm, 7th, 0.60 mm.

Collum nearly flat, its lateral ends horizontal and strongly curved caudad; anterior and posterior edges virtually parallel middorsally, in going laterad the anterior edge describes an even arc around to the subacute apex, posterior edge concave laterally and thus accentuating the caudal production of the apex. Dorsal surface minutely coriaceous with scatterred microtubercules; middorsal area distinctly depressed; upper side of lateral ends slightly convex with more prominent tuberculation. Anterior marginal ridge distinct medially nearly to the middorsal line; laterally not quite attaining the produced apex. Entire posterior edge with small but distinct elevated rim which is laterally modified into three subterminal marginal tubercules on each side.

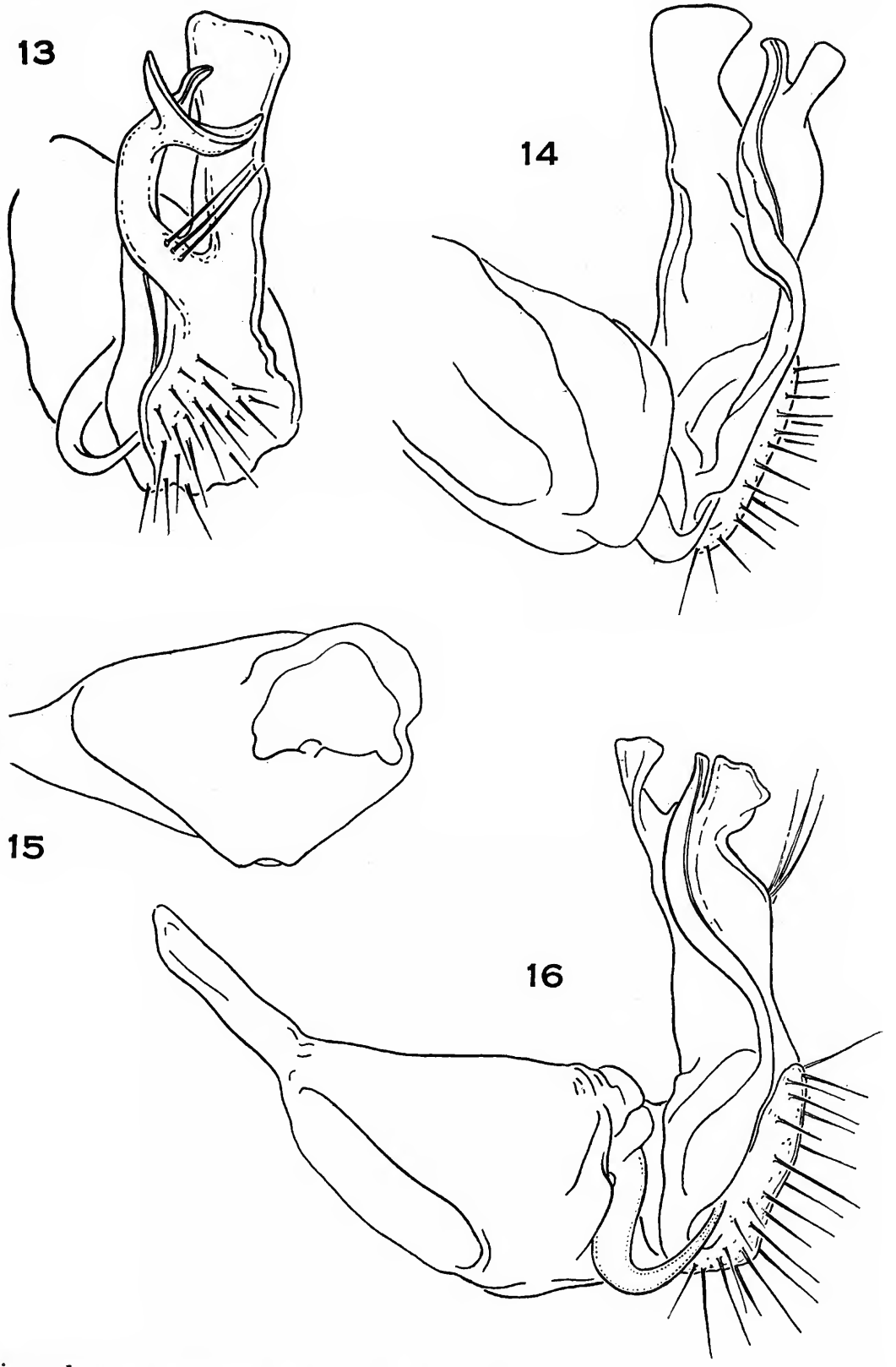
Segments 2-18 basically similar in structure, devided into two prominent subsegments by an unusually well-developed stricture, only about half of the prozonites is telescoped into the preceeding metazonites. Surface of prozonites appearing smooth, microscopically chagreened in texture. Paranota relatively large and elevated above the horizontal to nearly 30° on some anterior segments. Paranota of segments 2-4 distinctly shorter than the following although fully as broad, essentially transverse and much longer laterally than at the base (fig. 7). Upper surface of metaterga coriaceous-granular in texture with scattered larger tubercules. Entire posterior edge of paranota tuberculate or denticulate, lateral edges nearly straight and smooth except for small but distinct tooth at anterior corner (fig. 10); scapulorae entirely marginal, the rim strongly turned upward and anterior side set with numerous microtubercules in one or two series (strigilate), this rim followed by a deep anterior depression of the paranotal dorsal surface which is elsewhere dominantly convex. Paranota of segments 5-17 similar

in shape and size, posterior edge of segment nearly straight as far back as 10th segment, thereafter posterior edge of paranota becoming increasingly oblique caudally; the anterior edge is convexly transverse back to 10th segment beyond which it becomes obliquely slanted caudally and nearly parallel to posterior edge. Dorsum of paranota more tuberculate on posterior segments and the posterior edge more prominently incised into irregular complex marginal lobes, about 6-10 on each side of body. A distinct peritreme not developed, ozopores opening on a flat, polished area in posterior half of the paranota and well removed from lateral edge; pores large and distinct, the formula normal. Dorsal surface of segments 18 and 19 with prominent irregular transverse series of elongated tubercules which on segment 19 are produced distally into subconical projections.

Telson large and robust, setae originating from hypertrophied tubercules in two transverse series of 3-3 and 2-2 (= the usual apical group of 4 setae), the paramedian tubercules of the basal series displaced posteriorly to the base of the corresponding tubercules of the distal series (figure 11). Paraprocts strongly convex medially, this discal elevation minutely but densely tuberculate with a prominent conical basal setiferous tubercule; distal edges of paraprocts strongly compressed and elevated, set off by a distinct basal groove, their surface densely punctate, each with a setiferous tubercule near the upper end. Hypoproct large, transversely ellipsoid with a small median tubercule and two large conical paramedian tubercules, surface very finely textured and sparsely tuberculate, the outermost ends overlapped by conically projecting lobes from outer basal corners of the paraprocts (fig. 12).

Legs long and slender, distal third of femora visible from above when extended laterally, attached to moderately elevated, smooth, nearly glabrous podosterna which are unusually broad for a chelodesmid (intercoxal width = length of femora). No transverse or median impressions and no trace of subcoxal lobation; a single row of 6-8 brown setae extending across between the coxae of the two pairs of legs. Podosterna medially indented posteriorly, leaving a small median ventral tuberculate area on each segment, anteriorly podosterna slightly convex and overhanging stricture, these areas with a small field of scattered short setae. Coxae short and unmodified, each with an unusually long macroseta at its base on the ventral side; dorsal surface with 3 or 4 acutely conical tubercules, each with a seta on the outer side at base. Prefemora cylindrical with a short, acute, curved spine at the ventrodistal end; dorsal surface with 8-12 conical tubercules as on the coxae. Femora long and slender, gradually enlarged distally with scattered sparse short setae. Postfemora and tibiae cylindrical, about twice as long as wide, sparsely setose. Tarsi long and fusiform, widest near midlength, more profusely setose than preceeding segments, with 6-8 greatly elongated pale setae originating above base of tarsal claw and extending far beyond it as a kind of loose silky brush. Tarsal claw short, straight, and unmodified, about 1/8th as long as tarsus. Relative length of podomeres: $3 = 6 > 2 > 5 = 4 > 1$.

Sides of metazonites unmodified, sparsely tuberculate, the texture more prominent near bases of legs. Stigmata dissimilar in appearance, the anterior 50% larger than posterior, both with slightly elevated rims, the dorsal angles of which produced late-



Biporodesmus austrocrucis, sp. n., male holotype: 13, left gonopod in situ, slightly oblique ventromedial aspect; 14, the same gonopod, dorsomedial aspect; 15, the same gonopod, isolated coxa, ventromedial aspect; 16, the same gonopod, medial aspect.

rally into prominent acute spines similar in size and appearance to the projecting coxal condyles, giving the effect under low magnification of a series of four conical spines in a row above coxal bases. Stricture becoming increasingly deep down sides and across ventrum, partly overhung by anterior base of podosterna (including the anterior stigmata).

Anterior legs virtually unmodified. lst pair strongly reduced in size and about half as large as 2nd. Sternum of 2nd pair loosely attached to pleurotergum of 3rd segment; the coxae with low and indistinct lobes containing the gonopores. 3rd pair of legs set moderately close together, the sternal width of segment 4 approximately 0.4 mm. Sternum of segment 5 and those following abruptly wider, about 1.0 mm between the coxae, but no sternal lobes or other processes are developed. Coxae of 3rd legs with low rounded basal lobe only; femora of these legs greatly enlarged and grandular, of the form shown in figure 9, postfemora with prominent ventral lobes. Remaining legs unmodified, no special lobes or processes or tibial pads evident; tarsal claws small and simple.

Gonopod aperture small (about 0.6 × 1.0 mm.), transversely oval, contained entirely within the metazonite and scarcely displacing the stricture anteriorly; lateral ends with high flanges, posterior edge slightly elevated, sternum between 8th pair of legs flat and with a transverse row of setae. Gonopods short, not extending to sternum of 6th segment, of the form shown in figures 13-16. Tracheosternal apodemes moderately long, no trace of central sternal remnant. Coxae subcylindrical, about as large as telopodite, apparently lacking dorsal macrosetae. Cannula narrow basally, thickest near the first basal curve, thence tapering gradually to its minute lanceolate tip, originating from an obtuse shallow notch on distal edge of the coxa on the medial side (fig. 15); basal condyle small, hemispherical, the opposed side of coxal edge expanded and laminate.

Telopodite short, not attaining anterior edge of 7th segment, the abbreviation chiefly localized in the distal half as the prefemur appears to be of normal proportion for the Batodesmini generally. Prefemoral process broad, spatulate, distally truncate, slightly longer than the acropodite elements. Latter composed of a short, digitiform solenomerite and a much broader, subcalyciform tibiotarsal rudiment placed ventrad to it; the acropodite best seen in ventral aspect (fig. 13) where distinguishable as an isolated curved branch with the characteristic long macrosetae on ventral side at base.

Female structurally similar to male except for the usual sexual differences: legs much more slender and sterna broader, their width exceeding length of prefemora. Cyphopods small, composed of two short valves and a minute cupulate receptacle. Sympleuron of 3rd segment narrow, simple, not modified into any type of distinct epigynal structure.

Biporodesmus dentatus (Attems), comb. n.

Alocodesmus dentatus Attems, 1931: 59, figs. 83-92. Holotype, ♂, Zool. Mus. Hamburg, from the Loja Valley, Ecuador.
Ecuadopeltis dentatus; Verhoeff, 1938: 3.

Biporodesmus gualianus (Brölemann), comb. n.

Batodesmus gualianus Brölemann, 1919: 272, figs. 40-42, 52-53. Holotype, ♂, Mus. Nat. hist. natur. Paris, presumably from Ecuador but no locality stipulated in the original description aside from that implicit in the specific name.

Biporodesmus olivaceus (Kraus), comb. n.

Alocodesmus olivaceus Kraus, 1954: 31, figs. 26-31. Holotype, ♂, Mus. Senckenberg, from Hacienda Taulis, Dept. Lambayeque, Peru (6.50 S, 79.10 W).

Biporodesmus planus (Gervais), comb. n.

Polydesmus planus Gervais, 1847: 111. Holotype, ♀, Mus. Nat. hist. natur. Paris, from Colombia, without precise locality.
Melanodesmus planus; Carl, 1914: 909, figs. 144-151. Recorded from Buenavista and Guaduas, in the central part of the country. Verhoeff, 1941: 16.
Alocodesmus planus; Attems, 1931; 57; 1938: 132, figs. 153-54. Kraus, 1954: 31-33.

Biporodesmus platynotus Attems

Biporodesmus platynotus Attems, 1898: 412, figs. 342. Holotype, ♂, Naturh. Mus. Wien, from Ecuador ("Cordillera"). 1931: 42, fig. 64; 1938: 64.

Biporodesmus pseudolivaceus (Kraus), comb. n.

Alocodesmus pseudolivaceus Kraus, 1954: 31, figs. 32-35. Holotype, ♂, Mus. Senckenberg, from Km 42 on the road from Olmos to Jaen, Dept. Lambayeque, Peru.

Batodesmid genera of uncertain position

Centrogaster Attems, 1898: 409. Type species: *Polydesmus (Oxyurus) sanctus* Karsch, 1881. Known so far only from the type species, a large batodesmid from Santa Marta, Colombia. Unfortunately, *C. sanctus* is based upon a female specimen, and will certainly remain in doubt until topotypic material can be obtained. It appears to be distinct, however, and probably not be found to conflict with any of the various genera later based upon Colombian species.

Colombodesmus Chamberlin, 1923: 53. Type species: *C. catharus* Chamberlin, by original designation. This generic name was based upon two new Colombian species, *catharus* and *lygrus,* both known only from female specimens. Both forms are from San Lorenzo, and eventually the discovery of topotypic males will make possible a resolution of the status of this genus.

Cormodesmus Chamberlin, 1923: 57. Type species: *C. hirsutellus* Chamberlin, by original designation. Although known from the

male sex, this species remains in some doubt until a re-examination of the type can be made; some of the characters suggest it may be more closely related to the typical trachelodesmines. There is, however, no doubt that *Cormodesmus* is a valid and easily recognizable genus.

Alassodesmus Chamberlin, 1923: 59. Type species: *A. reductus* Chamberlin, by original designation. Known only from the defective type specimen which lacks the head and first seven segments. Possibly a trachelodesmine rather than a batodesmine, but the exact status of the name cannot be determined from the published information.

Species incorrectly referred to the Batodesmini

The following taxa have been in one way or another either directly or by implication referred to the group of genera here regarded as the Tribe Batodesmini. Although their correct generic and tribal status cannot be fully established at the present in all cases, it does seem desireable to document their exclusion from the group under discussion.

Rhachidomorpha brasiliae Brölemann, 1902: 95. Originally referred to *Rhachidomorpha* solely because of the subspiniform and elevated paranota, this species was subsequently moved to *Alocodesmus* by Attems (1938: 133). In 1955 *brasiliae* was made the type of a new genus, *Obiricodesmus,* by Schubart. Perhaps this genus is related to *Gonioleptodesmus;* in any event it has nothing to do with the batodesmines.

Rhachidomorpha bicolor Brölemann, 1902: 98. Known only from the female holotype, and regarded by Schubart as probably the female sex of the preceeding species. It was tentatively included in *Alocodesmus* by Attems in 1938.

Leptodesmus (Rhachidomorpha) corniger Brölemann, 1904: 87. Described from São Paulo. First referred by Attems (1931: 57) to *Alocodesmus,* later (1938: 35) to *Leptodesmus.* Aside from paranotal shape, this species appears to be a typical chelodesmine, although its generic position remains to be established.

Alocodesmus nitidus Attems, 1931: 58. Described from Guayaquil and subsequently made the type of a new genus, *Guayapeltis,* by Verhoeff (1938: 3). The status of this species has already been noted by me (1959: 230), it is a typical chelodesmine and has no batodesmine characters. Whether *Guayapeltis* is a valid genus must be established by further studies; it seems related to *Inconus* of Chamberlin (1941) from Peru.

Alocodesmus mammatus Attems, 1943: 442. Based on specimens from Teresópolis, Rio de Janeiro. A restudy of the types in the Senckenberg Museum confirms that the species is not an alocodesmid, but probably referable to *Obiricodesmus.*

Alocodesmus yporangae Schubart, 1946: 308. Based on specimens from the Iporanga Caverns, in the southeastern part of São Paulo. This species is clearly not a batodesmine, and should be referred to the vicinity of *Obiricodesmus* if in fact not actually placed within that genus.

The reallocation of the five preceeding Brasilian "Alocodesmus" species not only clarifies the taxonomy within the Chelodesmidae, but also disposes of a zoogeographic anomaly of a typically north-Andean group having representatives in southeastern Brasil. At the present, the only batodesmine known to occur in Brasil is the new *Biporodesmus* described in this paper from Acre, in the extreme northwestern part of the country.

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