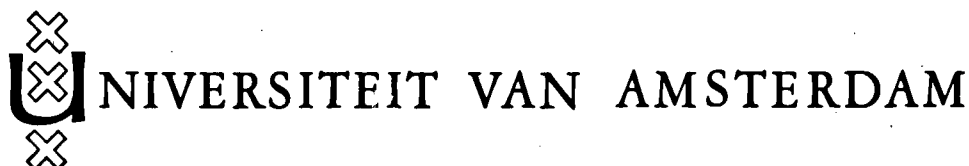


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MILLIPEDES FROM AUSTRALIA, 4: A NEW GENUS AND SPECIES OF THE

FAMILY DALODESMIDAE FROM TASMANIA

(DIPLOPODA, POLYDESMIDA) ¹⁾

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ABSTRACT

Description of *Gasterogramma psi* nov. gen., nov. spec., particularly characterized by the telopodite of the gonopods being torqued about 180°, so that the spermal channel curves along the caudal side of the telopodite towards the lateral side, from where it enters the solenomerite. A further particular feature is the distal prolongation of the prefemur into a separate process. An attempt is made at a correct homologization of the elements of the gonopods. The genus appears to be closely related to *Semmosoma* Silvestri, 1903, from Chile, and on that account seems to constitute the first clear taxonomic link between the dalodesmid faunae of Australia and South America.

INTRODUCTION

During a collecting trip through Tasmania (Jee-
kel, 1981) material of a rather peculiar look-
ing polydesmoid millipede was obtained. The spe-

cimens were conspicuous in particular by their
un-polydesmus-like habit: lack of distinct para-
nota and almost cylindrical body form, which
together with their pallid colour and sluggish
movements, somewhat suggested a worm or a dipte-
ron larva rather than a millipede. Closer study
revealed that we were dealing with a represen-
tative of the family Dalodesmidae belonging to
an undescribed genus and species.

¹⁾ Based on data accumulated through the aid of
a grant (WR 87-157) from the Netherlands
Foundation for the Advancement of Tropical
Research (WOTRO).

Gasterogramma nov. gen.

Diagnosis.-

Medium-sized Dalodesmidae with 20 somites and a normal poreformula.

Head without particulars; antennae of moderate length, clavate, the 6th antennomere longer than the 5th.

Collum without paranota; the sides almost perpendicular.

Somites very weakly constricted, almost cylindrical; the waist broad. Metatergites without sculpture.

Paranota weakly developed, ridgelike, only dorsally demarcated by a furrow in which the pores are situated.

Sternites much longer than wide, without particular modifications. Legs of moderate length, incrassate in the male and with dense setation of short stiff bristles on ventral side of podomeres 2 to 4 and dense granulation on ventral side of podomeres 5 and 6.

Anal somite without particulars.

Gonopods with coxae short, largely united to a syncoxite, with only the distal parts separated. Prefemur elongate, its basis incrassate, prolonged into a free process arising from the anterior side of the proximal part as a result of a torsion of about 180° around the main axis of the telopodite. The prefemoral process bears near its apex on the medio-posterior side a small rod-like process, supposed to be the tibio-tarsus. Femoral process large, arising from the caudal side of the prefemur, directed obliquely latero-distad, and curving finally mesad. Solenomerite small, arising between the bases of the femoral process and the prolongation of the prefemur. Spermial channel running from the medial side along the caudal side towards the lateral side of the telopodite.

Type-species.-

Gasterogramma psi nov. spec.

Remarks.-

The Dalodesmidae (= ± Sphaerotrichopidae s. Attems, 1940) is apparently the only diplopod family which has a typical circum-antarctic distribution. The group is well represented in South Africa, Australia and Tasmania, New Cale-

donia, New Zealand, and southern South America, and occurs rather sparsely in Madagascar and on some islands in the southwestern Pacific. The distributional pattern is typically gondwanian, and it seems quite likely that at one time the antarctic continent served as a bridge between the dalodesmid faunae of the various southern continents.

Unfortunately, the taxonomy within the family has not been worked out satisfactorily yet (cfr. Hoffman, 1980: 150), and a consistent system of tribes and subfamilies is not available.

From an examination of the literature (e.g. Attems, 1940) some points become more or less evident. In the first place it appears that the dalodesmid faunae of, for instance, South Africa or South America, are the result of a rather strong local radiation occurring after the isolation of the respective continents. This may eventually lead to the distinction of tribes largely consistent with the geographical isolation of the areas.

Looking at the faunae of the various continents one gets the impression that the African, Malagassy and part of the Australian faunae show a certain relationship. On the other hand it seems also that another part of the Australian fauna and the faunae of New Zealand, New Caledonia, and South America show a certain interrelationship too. But the picture is still very vague, and the problem should be studied by actual comparison of material from the areas involved.

Obviously one of the main obstacles in working out the internal classification of the Dalodesmidae is the absence of a comparative morphology and a consequent terminology indicating the homologous elements of the male gonopods. In several cases authors described and illustrated their species without any suggestion as to the identity of the distal branches of the telopodite, without indicating the course of the spermial channel, and sometimes even without identifying the solenomerite as such. Under these circumstances, often combined with inconsequences with regard to the choice of the aspect from which a gonopod was illustrated, renders an attempt at a homologization afterwards quite

difficult.

As compared to the gonopods of the Paradoxosomatidae, the dalodesmid gonopod is more highly evolved, lacking almost completely any reminiscence to the segmentation of an ambulatory leg. One of its particular features seems to be the elongation of the prefemur combined with an almost complete reduction of the femur. Some authors have named femur what, by evidence of a continuous setation cannot be separated from the prefemur, and must in fact be regarded as the distal part of the prefemur. The proximal node of the prefemur, regarded by some writers as the proper prefemur, seems to be only a somewhat incrassate condyle of the coxal-prefemoral joint.

The apparent absence of a demonstrable femoral section in the gonopods has as a result that the distal elements seem to arise from the apex of the prefemur. Obviously the femur is reduced to a thin and indistinguishable disc applied obliquely to the cephalo-distal side of the prefemur.

The distal elements of the dalodesmid gonopod seem functionally unrelated. A particular relation of the solenomerite to one of these branches, such as in many paradoxosomatids (tibiotarsus supporting and enveloping the solenomerite; femoral process supporting the solenomerite) does not exist.

In certain dalodesmid genera the telopodite of the gonopods becomes deeply split into several main branches, a process which has also occurred in various paradoxosomatids. This tendency often entails a dislocation of the basis of the branches of the telopodite, e.g. the basis of the tibiotarsus may be situated more proximally than the basis of the femoral process.

An other evolutionary tendency occurring in the Paradoxosomatidae as well as in the Dalodesmidae (e.g. in *Gasterogramma*) is a torsion of the telopodite, leading also to a considerable dislocation of the apical processes of the gonopods.

An evolutionary process not seen in the Paradoxosomatidae, but occurring at various places of the dalodesmid system, is the coalescence of opposite gonopods, involving generally the coxae, which merge into a syncoxite, and, occa-

sionally, the prefemora.

For the purpose of identifying the various gonopod elements in *Gasterogramma* I have adopted the hypothesis, that the course of the spermal channel is homologous in all polydesmoid millipedes, and that the location of the base of each process in relation to the spermal channel defines its morphological identity. More specifically, when viewed from the medial side, the basis of the tibiotarsus is situated caudad of the course of the spermal channel, the femoral process cephalad. This leads to the following conclusions with regard to the identity of the various gonopod elements in *Gasterogramma*.

As in many other dalodesmid genera the prefemur is basally somewhat inflated, and sparsely hairy. Beyond this inflation it is hairless, but it has a series of minute conical spines on the medio-caudal side. The torsion of the distal part of the prefemur leads to a situation in which the distal end is prolonged on the anterior side of the gonopod. The distal prolongation of the prefemur has a small spinelike rod on its caudal side. Since the base of this rod is situated essentially caudad of the course of the spermal channel in an untorted gonopod, it is regarded here as a vestige of the tibiotarsus. The larger caudal branch of the gonopod, diverging distally, arises cephalad of the course of the spermal channel in an untorted gonopod and on that account is regarded to be a femoral process. In between the femoral process and the prolongation of the prefemur emanates the solenomerite, a small, somewhat twisted wormlike process.

For the sake of comparing the present homologization, reference is made to the gonopod drawings given for the New Caledonian dalodesmid *Canacophilus chordeumopygus* Jeekel (1964). That species has no torted telopodite and no prolonged prefemur, so that tibiotarsus and femoral process have a more normal position.

Australia has ten described genera of the Dalodesmidae, all but one (*Sphaerotrachopus* Attems, 1911) monotypic. Three genera (*Agathodesmus* Silvestri, 1910, *Paurodesmus* Chamberlin, 1920, and *Atopodesmus* Chamberlin, 1920) were based on female material only, and the gonopods of two

more have not been illustrated so far (*Lissodesmus* Chamberlin, 1920, and *Tasmanodesmus* Chamberlin, 1920). After examination of the gonopod drawings of the other five genera (*Asphalidesmus* Silvestri, 1910, *Australopeltis* Johns, 1964, *Queenslandesmus* Verhoeff, 1924, *Sphaerotrichopus* and *Tasmaniosoma* Verhoeff, 1936) it becomes immediately clear that none of these genera has any particular relationship with *Gasterogramma*. As for the other five genera, all of these apparently have well developed paranota, virtually excluding a close relationship with the genus described here.

After perusal of the monograph by Attems (1940) one has to come to the conclusion that *Gasterogramma* comes closest to certain Chilean dalodesmids. A more recent study of the Chilean genera has been published by Demange & Silva (1976a, 1976b). From the illustrations in their papers one can infer that the torsion of the telopodite of the gonopods such as described here for *Gasterogramma*, occurs also in the species of the Chilean genus *Semnosoma* Silvestri, 1903, leading to a striking overall similarity of the 'caudal aspect of the gonopods. However, the prefemur in *Semnosoma* is not distally prolonged. As far as can be ascertained, *Semnosoma* is the only genus of Dalodesmidae besides *Gasterogramma* in which the gonopod telopodite is twisted leading to the peculiar spiral course of the spermal channel. It seems likely, therefore, that the new genus is closely related to *Semnosoma*. Eventually, the two may form the nucleus of a tribe for which the family-group name Semnosomatidae Brölemann, 1916, is available.

The generic and species names of the new taxon allude to the in situ aspect of the combined gonopods.

Gasterogramma psi nov. spec.

Material.-

Sta. 100. Hellyer Gorge, 32 km SSW Somerset, 25.XI.1980 (temperate rainforest (*Nothofagus*, *Eucalyptus*, *Dicksonia*) along the Hellyer River, under logs), ♂ holotype, 10 ♂ paratypes, 12 ♀ paratypes, 3 juv. ♂ paratypes (19 somites), 3 juv. ♂ paratypes (18 somites).

Description.-

Colour: Head pale brownish gray. The antennae pale brownish, the 3rd and more distal antennomeres a little infusate. Collum dull brownish gray. Somites variegated with brownish gray and whitish colour. A median whitish stripe dorsally, on each side included by a brownish gray band, which is narrowest at the posterior border of the metatergite, broadest in the anterior part of the prosomite. Laterally these stripes are bordered by a white band, running from the lateral side of the prosomite to the dorsolateral side of the metatergite. Sides brownish gray, broadest at posterior margin and including the entire paranotum. Lateroventrally the sides are whitish again, and finally above the sternites brownish gray. Venter and sternites brownish gray; the legs dirty yellowish white. Anal somite brownish gray, the epiproct whitish.

Width: ♂: 1.8-2.0 mm, ♀: 2.1-2.3 mm, juv. ♂ (19 s.): 1.7-1.8 mm; juv. ♂ (18 s.): 1.3-1.5 mm.

Head and antennae: Labrum moderately widely and moderately deeply emarginate. Clypeus rather convex, rather strongly impressed towards the labrum. Lateral border faintly convex, weakly concave near the labrum. Pubescence of headplate rather sparse in clypeus up to the middle of the vertex. Setae of moderate length. Lateral sclerites also sparsely setiferous. Frons broad, not demarcated from clypeus or vertex. Antennal sockets somewhat impressed, separated by 1.5 times the diameter of a socket of by 0.8 times the length of the 2nd antennomere. Post-antennal groove wide and shallow, the wall in front rather weakly prominent. Vertex transversely widely and evenly convex, smooth and shiny, longitudinally rather weakly convex. Vertigial sulcus weakly impressed, running upwards from one third of the length of the vertex between upper level of the sockets and the margin of the collum. Antennae of moderate length, moderately stout, distinctly clavate with the 5th and 6th antennomeres thickest. Antennomeres 2 and 3 subcylindrical, the 4th and particularly the 5th obconical. The 6th more barrel-shaped, and a little inflated. Pubescence moderate in the proximal antennomeres, becoming dense in the distal ones. Relative length of antennomeres 2 to 6: 1.00, 0.95,

0.70, 0.70, 0.90 (6th to 8th antennomere inclusive: 1.10).

Collum: Narrower than the head, reniform in dorsal outline. The anterior border faintly convex in the middle, more laterally a little more strongly rounded, and faintly concave again at the sides. Posterior margin faintly concave in the middle, faintly convex more laterally and straight or faintly concave at the sides. Sides of collum attenuate, the lateral margin reaching rather far downward, and almost evenly and narrowly rounded. Lateral margin with a moderately wide rim; the premarginal furrow disappearing near the lateral edge of the vertex. No premarginal furrow along posterior margin of sides. Collum smooth, shiny, with a transverse row of setae along the anterior margin, a transverse row of setae along the posterior margin and some setae on the middle surface; the setae rather short and unapparent. Surface longitudinally faintly and evenly convex, transversely moderately convex, slightly flattened in the middle, the sides about perpendicular.

Somites: Constriction very weak. The waist wide, sharply demarcated from prosomites, not demarcated from metatergites. Waist with some very fine somewhat undulate striae, but without distinct sculpture. Prosomites slightly dullish, scarcely more so than the metatergites. Metatergites smooth, without sulci or other sculpture; three transverse rows of setae, very short and unapparent, may be present. Sides smooth or irregularly wrinkled. No pleural keels.

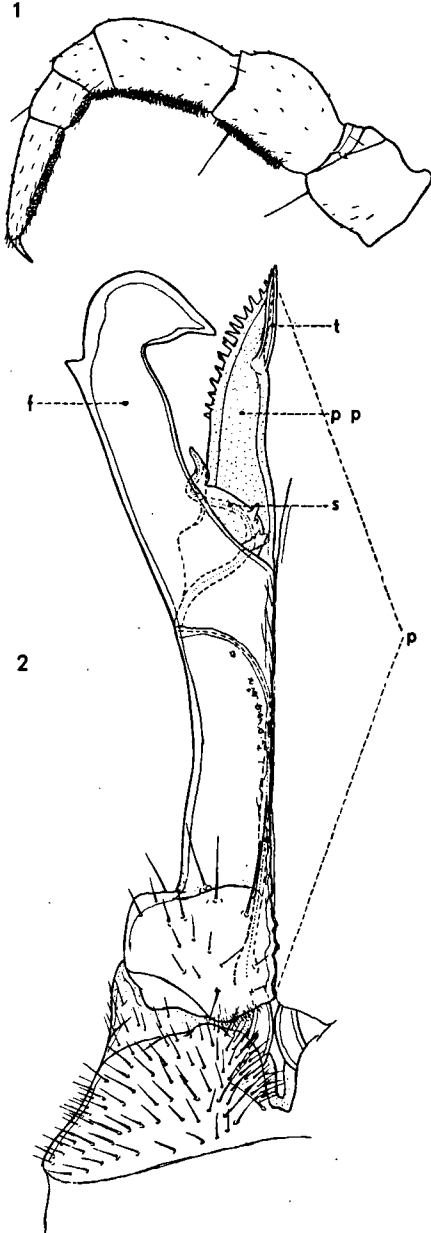
Paranota: 2nd somite a little narrower than the collum. 3rd and 4th somites each a little wider than the preceding. Paranota of 2nd somite on a very low level, just below the level of the widest part of the metasomal ring, and invisible from above. The paranota are ridge-like, only dorsally demarcated by a furrow, straight and not sloping. Anterior border widely rounded, more narrowly so at lateral edge, with a marginal rim and a premarginal furrow reaching the waist. No lateral teeth. The lateral margin faintly convex, the posterior edge minutely produced. Paranota of 3rd somite on a distinctly higher level than those of the 2nd, otherwise similar to those of 2nd somite. In lateral aspect the furrow is sloping

a little in caudal direction. Paranota of 4th somite similar to those of 3rd, the posterior edges of both minute and slightly produced. Paranota of the 5th and subsequent somites with lateral margin in dorsal aspect widely and almost evenly rounded; the posterior edge minute, only very slightly prominent, but not produced. Upper furrow faintly concave or straight; disappearing at a little distance from the waist, and, caudally at the posterior margin of the somite. Pores very small, situated in the furrow of the paranota, at about one quarter of the length of the metasomite from the posterior margin. Pores with a weak craterlike peritreme, facing dorsad and laterad. Pore formula normal.

Sternites and legs: Sternites of middle somites longer than wide (ratio 1.6 : 1.0). Cross impressions moderately developed, the longitudinal one rather wide and medially with an indicated furrow, the transverse furrowlike especially between the subsequent coxae. Surface smooth and shiny, the pubescence sparse with setae of moderate length. No sternal cones or other modifications. Sternite of 4th somite as wide as that of the 5th, with a deep median impression. Sternite of 5th somite not notably modified. Sternite of 6th somite deeply and widely longitudinally excavate down to level of metasomal ring. The transverse impression present only between the coxae of the subsequent legs. Only the coxal bases raised. Sternite of 7th somite with a subcordiform gonopod aperture, its lateral sides diverging cephalad and raised, crestlike. Anterior border faintly concave. Distance between posterior coxae moderately wide, with a wide median impression. Sternite of 8th somite not modified. Legs (fig. 1) of moderate length, the prefemora and femora incrassate. Prefemur dorsally subglobose, quite convex. The femur ventrally a little arched, dorsally rather convex, but convexity becoming gradually less in the second half of the body. Legs of the first two pairs notably smaller and not particularly incrassate. The coxa of the 2nd pair medially a little widened, and bearing mesad and a little distad a long rounded cone with setae. Pubescence of legs ventrally quite dense with short stiff setae up to the 4th podomere. and globular setae on tibia and tarsus. Dorsal pubescence unapparent in the proxi-

mal podomeres, sparse to weak in the distal podomeres. Relative length of podomeres 2 to 6: 0.85, 1.00, 0.30, 0.35, 0.80. The claw of moderate length.

Anal somite: Dorsal profile weakly convex. Epiproct with sides rather weakly concave, almost straight, rather weakly converging, but not parallel sided towards apex. Epiproct of moderate length, width and thickness. Setae



Figs. 1-2. *Gasterogramma psi* nov. gen., nov. spec., holotype ♂. 1: ambulatory leg of 7th somite; 2: right gonopod, caudal view. f: femoral process; p: prefemur; pp: distal prolongation of prefemur; s: solenomerite; t: tibiotarsus.

long, normally arranged, and on minute granules. Apex truncate, faintly emarginate. Paraprocts with moderately high and moderately wide rims. Setae on small and low tubercles. Hypoproct rather large subtriangular, sides concave at base, convex distally, continuously rounded. The setae on abortive tubercles.

Gonopods: (fig. 2) Free part of syncoxite posteriorly rather densely setiferous. Prefemur rather strongly incrassate and sparsely setiferous at base, but with numerous tiny hairs at the opening of the spermal channel. Distal portion of prefemur rather slender, not setiferous but with a series of tiny cones on medio-caudal side. Spermal channel running from the medial side of the base of the prefemur along its caudal side more distally towards the lateral side, entering the solenomerite in between femoral process and prolongation of prefemur. Solenomerite at base with some small tender triangular lobes. Prefemoral prolongation laterally fringed with small fingerlike lappets, its apex acuminate. Tibiotarsus small, rodlike, reaching about as far as the apex of the prefemoral prolongation. Femoral process well developed, diverging distad a little from the main axis, bearing laterally a small tooth, and curving mesad distally in the shape of a bird's head, distally reaching as far as tibiotarsus and prolongation of prefemur.

Female: Antennal sockets separated by 1.6 times the diameter of a socket or by 0.9 times the length of the 2nd antennomere. Relative length of antennomeres 2 to 6: 1.00, 0.85, 0.80, 0.65, 0.85 (6th to 8th inclusive: 1.10). Sternites a little less impressed than in the male, longer than wide (ratio 1.4: 1.0). Legs slender, in particular the 2nd and 3rd podomeres, which are not inflated. Pubescence of legs sparse, moderate distally, without the typical male setation. Relative length of podomeres 2 to 6: 0.95, 1.00, 0.30, 0.30, 0.80. Coxae of 2nd pair mediocaudally bearing an acuminate cone, rather broad at base. Epigynal structure consisting of a median triangular process, pointing cephalad and a little downward, separating two paramedian moderately deep emarginations, embracing the coxae. The posterior margin a little raised.

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