

## A new gomphodesmid millipede from Gambia (Diplopoda, Polydesmida)

by

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Some years ago I received from the Imperial Institute of Entomology, London, a small collection of millipedes from Gambia. The material had been taken in connection with damage observed to crops of groundnuts (*Arachis hypogaea* L.), and almost entirely consisted of specimens of the genus *Peridontopyge* Silvestri (Spirostreptida, Odontopygidae). Apparently the odontopygids were mostly responsible for the damage. Taxonomic interest, however, focussed on a probably harmless and casually picked-up male specimen of a species of the family Gomphodesmidae which proved to be new to science.

### *Sphenodesmus occidentalis* nov. spec.

#### Material.

Gambia, Kanefia, 11 July, 1955 (coll. C. R. WALLACE), ♂ holotype.

#### Description.

Colour. — Pale brown, the lower part of the head, the venter and the legs, as well as the lateral keels brownish yellow.

Width. — 8.3 mm.

Head and antennae. — Labrum narrowly and rather weakly emarginate in the middle, distinctly tridentate. Clypeus weakly convex, rather weakly impressed towards the labrum; the lateral borders almost straight or faintly convex. Head-plate smooth and shiny, setiferous only above the labrum and up to the level of the antennal sockets; frons and vertex hairless; between the antennal sockets a narrow transverse zone of fine longitudinal striae. Antennal sockets separated by about two times the diameter of a socket or by approximately the length of the 2nd antennomere. Postantennal groove well developed, the wall in front rather weakly prominent. Vertex rather weakly convex. Vertigial sulcus running downward to between the antennal sockets, weakly impressed, deepest in the middle. Antennae of moderate length, rather slender. Length of the antennomeres:  $2 > 3 = 4 = 5 > 6$ ; the 6th antennomere about two thirds of the length of the 2nd. The 2nd, 3rd and 6th antennomeres of subequal width, the 4th and 5th slightly narrower. Pubescence rather weak in the proximal antennomeres to rather dense in the distal ones. Apex with ten sensory cones.

Collum. — Considerably broader than the head. Anterior border straight or even faintly concave in the middle, weakly rounded more laterad. Anterior border shading off without distinct edge into the widely rounded lateral border. Latero-posterior edge almost right-angled, narrowly rounded. Posterior border widely

emarginate in the middle, widely convex laterally. Marginal rim moderately wide along the lateral border, narrowing along the anterior border and disappearing just before the middle. Posterior border of keels also narrowly rimmed. Transverse convexity of collum moderate and even; the lateral keels directed a little ventrad, their surface weakly convex, but at the base slightly concave. Surface of collum smooth or very weakly leathery in the middle, shiny. Sculpture becoming rather coarsely rugulose-granulose on the lateral keels. Along the anterior margin, behind the vertex, a row of four small and rather indistinct granules. At about one third from the anterior margin and parallel to that margin a wide transverse impression.

Somites. — Constriction rather weak. Stricture narrow, not sharply demarcated from either pro or metasomites, dorsally with a faint striation down to the level of the keels, smooth below that level. Prosomites somewhat dull, the covered part smooth, the free part minutely rugulose, especially ventrally. Metatergites with the same sculpture as the collum, though somewhat coarser medially, in particular in the posterior somites. No trace of a transverse furrow or depression, no granules. Sides metatergites finely but distinctly rugulose-granulose. Pleural keels present up to the 7th somite, represented by complete, granular ridges. In the 8th somite only a slight swelling, which disappears in the 9th and 10th somites.

Lateral keels. — Rather strongly developed, situated at about the middle of the sides. The 2nd somite somewhat wider than the collum, and somewhat narrower than the 3rd somite. The 4th somite somewhat wider than the 3rd and somewhat narrower than the 5th. Keels of the 2nd somite rather strongly declined like those of the collum. Anterior border thrust forward a little, widely rounded. Latero-anterior edge rather narrowly rounded. Lateral border almost straight. Latero-posterior edge about right-angled, narrowly rounded. Posterior border widely rounded at the base of the keel, widely emarginate more laterad. Marginal rim laterally somewhat wider than that of the collum; the rims along the anterior and posterior margins narrow but distinct. Keels of the 3rd somite subsimilar to those of the 2nd, but the anterior margin a little more strongly rounded. The latero-posterior edge obtuse-angled, narrowly rounded. The keels a little less declined. The posterior margin scarcely rounded at the base, and less emarginate laterally. Keels of the 4th somite similar to those of the 3rd. The anterior margin not thrust forward and almost straight except for a basal rounding. The posterior margin simply weakly emarginate. Keels almost horizontal. Keels from the 5th somite onwards horizontal (fig. 1). The anterior margin weakly shouldered at the base, widely rounded, more narrowly rounded laterally and shading off into the lateral margin which is weakly convex. Latero-posterior edges gradually becoming more acute-angled towards the posterior end of the body. Posterior margin widely emarginate to straight, generally with a very slight notch at the base. Posterior margin weakly and irregularly serrulate. This serrulation also, but more weakly, present in the keels of the 2nd to 4th somites. Marginal rim of moderate width, those of the poriferous keels about one and a half times as wide as those of the poreless keels. Pores dorso-lateral, situated in a slight excavation, present in the 5th, 7th, and 9th to 19th somites.

Sternites and legs. — Sternites of the middle somites about one and a half times broader than long. Median impression very wide and deep, so that the

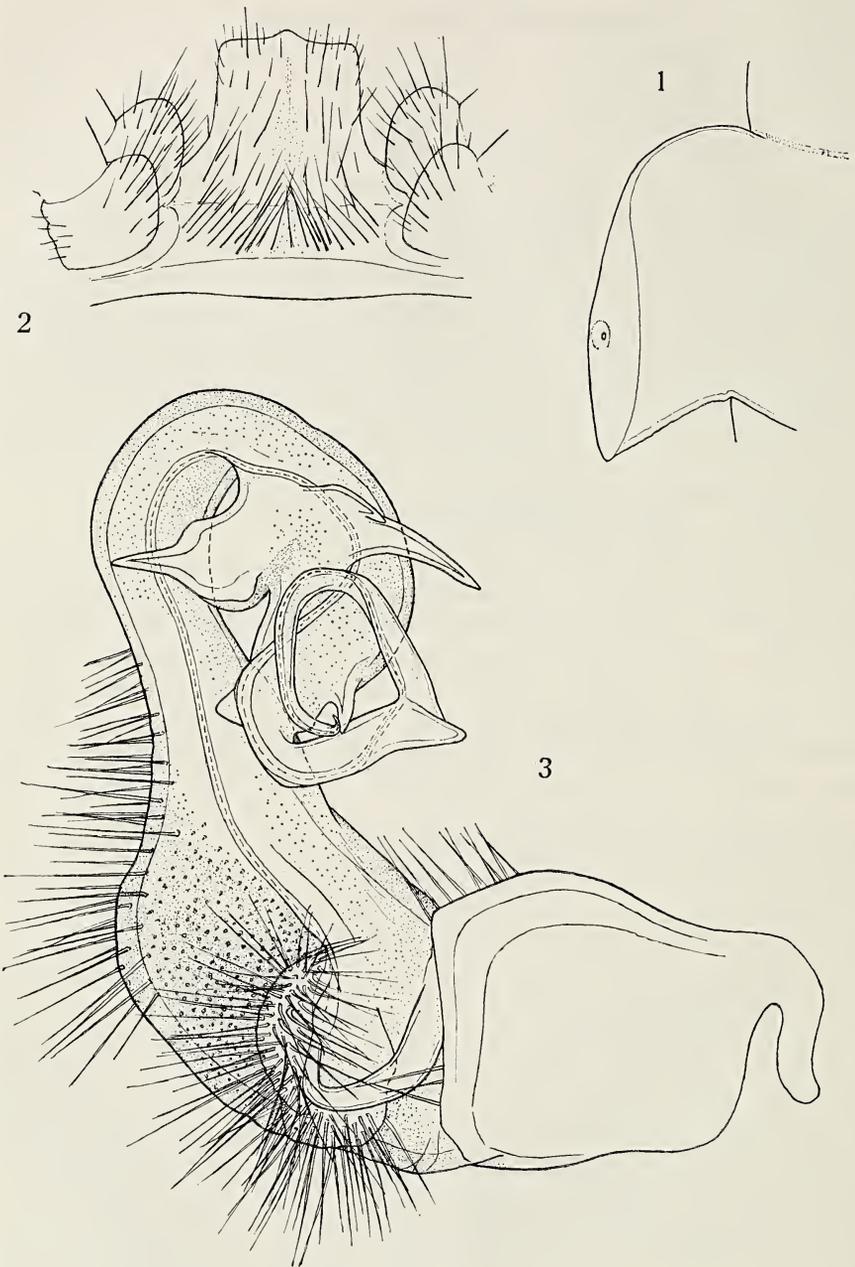


Fig. 1—3. *Sphenodesmus occidentalis* nov. spec., ♂ holotype. —1: sternite of the 6th somite, ventro-caudal aspect. 2: left lateral keel of the 10th somite, dorsal aspect. 3: right gonopod, mesal aspect.

middle of the sternite is scarcely raised above the ventral level of the metasomal ring. Transverse impression deep and narrow, but present only near the bases of the legs. From about the 16th somite onwards the impression is almost obsolete. Sternites provided with two pairs of transverse crests. Surface of sternites finely leathery in the median impression. Pubescence weak or almost absent. Sternite of 6th somite (fig. 2) with a large, subrectangular process between the anterior legs, which is directed cephalad and ventrad. Between the posterior legs the sternite is deeply and widely concave, lacks transverse crests, and is rather densely set with mostly long hairs. Sternite of the 8th somite with the transverse crests between the posterior pair of legs strongly raised. A similar condition, although less pronounced, exists in the 9th and 10th somites. Legs of moderate length, not particularly slender. Length of podomeres:  $3 > 6 > 5 > 4 > 2 > 1$ ; the 6th podomere somewhat less than half the length of the 3rd, the 5th only a little shorter than the 6th. Coxae of the legs of the 6th and 7th somites ventro-distally subhemispherically produced. Prefemora in the anterior half of the body strongly bulging dorsally, almost triangular in outline. In the second half of the body the dorsal bulge decreases and disappears, although the prefemora still remain somewhat incassate. First six pairs of legs with small subapical tarsal pads, the tarsal claws not reduced. Pubescence of legs in general moderate, but the ventral side of the three proximal podomeres, and the dorsal side of the three distal podomeres, especially of the tarsi rather densely setiferous.

Anal somite. — Surface rugulose. Epiproct short and broad, horizontal; a transverse depression at its base. The sides straight, converging at almost right angles. The end rather broadly truncate. The lateral preterminal setae on distinct granules. Paraprocts rugulose. Rims not conspicuously broad, but rather high. Upper setae on small tubercles on the rim; the lower pair, on the surface near the rim, also on low tubercles. Hypoproct broadly triangular, the posterior edge obtusely angular. The sides weakly rounded, the end mucronate. Setae on low tubercles, projecting slightly behind the border, but not equalling the median mucro.

Gonopods. — Gonopod aperture very large, not constricted, extending over the prosomal area and leaving a narrow bridge in front. Gonopods (fig. 3) of the usual gomphodesmid type. Coxa short and very thick, with an anterior setiferous area. Telopodite with the prefemur piriform, the base very thick, the basal part medially deeply excavated, forming together with the opposite gonopod a deep, cup-like concavity. Prefemoral setae grouped in two areas: one densely set area on the rounded cushion at the base of the spermal channel, and one elongate area of more widely set hairs on the posterior side of the prefemur. The basal concavity is furnished with minute thorns. Distad of the knee the telopodite is provided with a node produced caudally into a process shaped like a bird's head (obviously homologous to the process called "Kniedorn" in a number of descriptions by ATTEMS), and anteriorly into an elongate triangular and slightly curved process (obviously ATTEMS's "Innendorn", judging from its position with respect to the spermal channel). Telopodite distad of the node much elongate, bearing three small lappets. Of these, the proximal one which arises from the outer side of the curvature appears to be homologous to the process called "Aussendorn" by ATTEMS. For further details see the drawing.

Female. — Unknown.

Location of type material.

Zoölogisch Museum, Amsterdam.

Remarks.

The present classification in the family Gomphodesmidae largely goes back to the work of COOK (1899). For the most part it is based on non-gonopod characters, e.g. the number of sensory cones on the apical antennomere, the presence or absence of sternal processes in the male, etc. The comparative morphology of the gonopods has scarcely been worked out so far, perhaps because of the extremely complicated structure of the gonopod telopodite which wholly lacks even traces of an articular subdivision.

However, the taxonomic evaluation of the characters used by COOK has changed since, and it seems certain that an intensive comparative study of the gonopods of the species of *Astrodesmus* Cook, 1896, *Aulodesmus* Cook, 1896, *Gomphodesmus* Cook, 1896, *Neodesmus* Cook, 1897, *Sigodesmus* Cook, 1897, and *Sphenodesmus* Cook, 1896, will result in a considerably different classification.

For the present purpose, to avoid confusion, I have adopted the current taxonomy, according to which the new species belongs in the genus *Sphenodesmus*. Two species have been previously referred to this genus, viz. *S. rugulosus* Cook, 1896, from Tanganyika, and *S. wabonicus* (Attems, 1899), from Kenya.

From both species *occidentalis* differs in the absence of a concavity in front of the gonopod opening in which the telopodites rest in their normal position, and in the presence of distinct sternal crests. *S. wabonicus* differs furthermore from *occidentalis* in the smoothness of the metatergites, in the strong development of the setiferous tubercles of the hypoproct, which project behind the median edge, and in the simpler structure of the gonopods. *S. rugulosus*, in the sculpture of the metatergites and in the gonopods, seems to come nearer to *occidentalis*, but it is a much smaller species (width 4.2 mm), has a subsemicircular sternal process in the 6th somite and allegedly lacks pleural keels.

The specific name of the new species was chosen to underline its western occurrence, not particularly as regards its congeners, but more in relation to the distributional pattern of the Gomphodesmidae as a whole. Up till now only a single gomphodesmid had been recorded from the westernmost region of Africa: *Astrodesmus makrotichus* (Attems, 1901), from Portuguese Guinea, Bissão. This species was based on a single female specimen; its reference to *Astrodesmus*, therefore, is wholly arbitrary. The description, as far as it goes, matches nicely the morphology of *S. occidentalis*, except that I cannot bring ATTEM'S statement, that the posterior edges of the lateral keels from the 4th somite onwards are obtuse-angled, into agreement with the new species.

The records of these two species are geographically quite isolated. Going to the east along the coast of West Africa the first country where gomphodesmids have been collected is Togo, from where COOK (1899, p. 681) mentioned some juvenile specimens of an unidentified species. Furthermore, two species have been

described from Cameroons Mountain region, viz. *Aulodesmus figlinus* (Cook, 1899) and *Aulodesmus viduus* (Cook, 1899). From there to the Cape of Good Hope no Gomphodesmidae have been recorded.

This paucity of records from the Atlantic coastal region of Africa may be partly due to inadequate exploration. However, recent comprehensive publications by SCHUBART (1955), based on material from Guinea and Cote d'Ivoire, and by KRAUS (1958), on collections from Angola, do not report any gomphodesmids, although the species of this family by their rather conspicuous size can hardly be overlooked even by a non-specialized collector.

From Cameroons Mountain going north-east the first locality is Tikem (Tchad) from where DEMANGE (1957) recorded *Aulodesmus falcatus* (Karsch, 1881). From there to the east we find the Seribah Ghattas, in the Bahr-el-Ghazal region of the Sudan, the type locality of *A. falcatus*. These two localities represent the northern boundary of what appears to be a continuous main area of the family.



Map of Africa showing the approximate distributional area of the Gomphodesmidae as it is known to-day (broken line), and the area of the rain forest (dotted; after P. W. RICHARDS, *The tropical rain forest*, Cambridge, 1952).

From here towards the south the Gomphodesmidae becomes more and more a dominant element of the polydesmid fauna to attain its largest degree of differentiation in the region of Kenya, Tanganyika and the upper Congo basin. South of the Zambesi river this differentiation is much smaller, and the area narrows down to a zone along the eastern coast of South Africa.

In the map of Africa reproduced herewith the approximate area of distribution of the Gomphodesmidae and the area of the tropical rain forest are marked out. It seems that the geographical distribution of the family is for a large part determined by ecological factors, inasmuch as the area coincides roughly with the regions occupied by savanna vegetation. The area of the tropical rain forest is largely avoided.

Therefore, I suppose that the isolated occurrence of *S. occidentalis* and *A. makrotrichus* in reality is due only to insufficient exploration of the hinterland of most West African countries. Probably time will show that the Gomphodesmidae occupies the whole savanna area south of the Sahara from Gambia to the Sudan.

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Dit 126 pagina's tellende en met 10 platen geïllustreerde deel van de bekende serie is gewijd aan de ondergang van de zeeden in het departement Var, vooral in het kustgebied van de Middellandse Zee. De grote uitbreiding van deze boom stamt uit de 19de eeuw, toen de vele bossen met steeneiken ten onder gingen door brand en ziekte. De zeeden heeft daarop de opengekomen plaatsen ingenomen.

Door de strenge koude van februari 1956 gevolgd door ernstige droogten waren de bomen zeer verzwakt. Bovendien had sneeuwval veel takbreuk veroorzaakt. De parasieten hebben zich hierna op catastrofale wijze kunnen vermeerderen. Het is de schrijver uit een tweejarig onderzoek gebleken, dat ook met chemische middelen de plagen niet te bestrijden zijn.

Afgezien van de gegevens over de drie belangrijkste parasieten, nl. *Blastophagus piniperda* (L.) (Coleoptera, Scolytidae), *Pissodus notatus* F. (Col., Curculionidae) en *Matsucoccus feytaudi* Ducasse (Hemiptera, Coccidae) is het werk voor Nederlanders van belang om de klimatologische gegevens over de verschillende delen van het door velen bezochte departement.

Het interessante boek maakt een zeer verzorgde indruk. — KR.

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