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A NEW FAMILY FOR THE DIPLOPOD GENUS *FLORIDOBOLUS* (SPIROBOLIDA, SPIROBOLIDEA)

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The description by Causey (1957) of *Floridobolus*, a new genus of the order Spirobolida, makes one of the most important additions in recent years to the list of Diplopoda in North America. Through the kindness of Dr. Causey, I have been able to examine a male paratype of the generotype species *Floridobolus penneri*. Dr. Thomas Eisner of Cornell University has given me a small series of topotypes of the same species.

The unusual features of this genus first came to my attention in the course of work on a comprehensive revision of the family Spirobolidae. It is now apparent that *Floridobolus* cannot be assigned to the Spirobolidae, nor can it be placed in any of the other existing families of Spirobolida. Accordingly, a new family is here established and notes concerning *Floridobolus penneri* are presented. Particular attention is given to several fundamentally important characters not mentioned in the original description.

Floridobolidae, new family

Diagnosis: Distinguished from families of the Trigoniulidea (= Trigoniulidi, as defined by Brölemann, 1914, elaborating on the classification of Attems, 1909 and 1910) by the independent phallopods and the essentially linear arrangement of the telopodite, coxa, and coxal apodeme of each phallopod. Distinguished from all other families of the Spirobolidea except the Spirobolidae by the presence of well-developed coxae of the phallopods in addition to the universally occurring coxal apodemes. Differs from the Spirobolidae in the presence of a basal sclerite in the membrane between the gonopods, in the absence of true telopodites of the

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coleopods, and in the orientation of the coxae of the phallopods which run back through the body cavity to the vicinity of the tenth segment.

Floridobolus penneri Causey

Floridobolus penneri Causey, 1957, Proc. Biol. Soc. Washington 70: 206. (Male holotype and male paratype from "ten miles west of the Archbold Biological Station, U. S. Highway 70, Lake Placid, Highlands Co., Florida." Both specimens currently in the personal collection of Nell B. Causey, Fayetteville, Arkansas; Causey says "The holotype will be deposited in the American Museum of Natural History. . . .")

This is an unusually stout-bodied species in which the ratio L/W of adult specimens examined varies from about 6.1 to 7.9, the averages being 6.3 for females and 7.7 for males (it should be emphasized that these figures are based on very few specimens and will doubtless be modified as a result of future collecting). Lengths of adults examined range from 74 mm. to 92 mm.; widths from 10.8 mm. to 11.6 mm. Immatures of lengths 24 mm. to 53 mm. show approximately the same L/W ratios as do the adults. The body proportions, together with the exceedingly short legs which are hardly visible when the animal is walking, make *F. penneri* easily distinguishable at a glance from all other spiroboloid millipeds of eastern North America except *Narceus gordanus* Chamberlin.

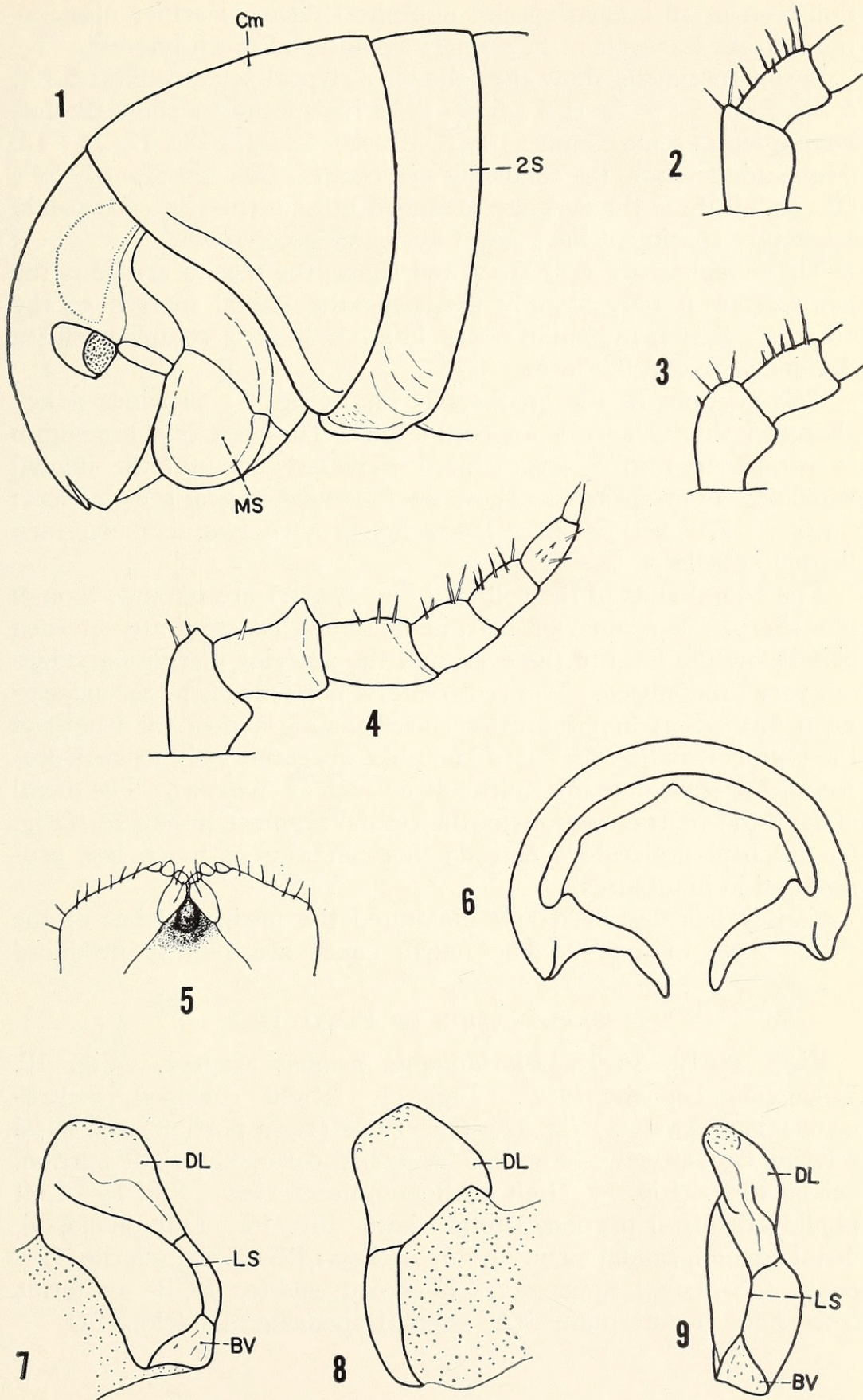
Segment counts for adults vary from 47 to 50. Surprisingly, four obviously immature specimens examined (including one only 24 mm. long) have 48 segments. This would seem to indicate that individuals of *F. penneri* early attain the full number of segments and that later molts must be primarily concerned with increase in

EXPLANATION OF PLATE I

Floridobolus penneri Causey. Fig. 1. Head and first two segments, lateral view. Fig. 2. Coxa and second segment of right third leg of female, cephalic view. Fig. 3. Coxa and second segment of right fourth leg of female, cephalic view. Fig. 4. Left sixth leg of male, caudal view. Fig. 5. Distal portion of gnathochilarium (drawing by Frances A. McKittrick). Fig. 6. Second segment of female, cephalic view. Fig. 7. Cyphopod, caudal view. Fig. 8. Cyphopod, cephalic view. Fig. 9. Cyphopod, lateral view. Abbreviations: BV—basal valve, Cm—collum or first segment, DL—distal lobe, LS—lateral suture, MS—mandibular stipes, 2S—second segment.

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PLATE I



size and with sexual maturation. This is different from the condition seen in all known species of Spirobolidae. Further observations on the life cycle of *F. penneri* would be of much interest.

Seven specimens show the following clypeal setae counts: 5 + 4, 5 + 5, 5 + 5, 5 + 5, 5 + 6, 5 + 6, 6 + 4. Five specimens show the following labral setae counts: 10 + 8, 10 + 10, 12 + 12, 12 + 12, 14 + 13. Three adults show the following eye counts: 52 + 57, 57 + 61, 59 + 60. In all three the eyes are arranged in nine rows in each patch. Immature specimens have fewer eyes and fewer rows.

The antennae are very stout and short; the second article is the longest but it only slightly surpasses the lateral margin of the clypeus. The mandibular stipes (Fig. 1, Ms) is rounded with a decidedly concave surface.

The mentum of the gnathochilarium (Fig. 5) provides a key character that will work for both sexes. The apex of the mentum is swollen to form a large raised convexity between the lingual lamellae. Four specimens show the following stipital setae counts: 6 + 6, 7 + 7, 7 + 8, 8 + 7. All specimens have two setae on each lingual lamella.

The lateral ends of the collum (Fig. 1, Cm) are narrow, though not sharp. The anterior margin is somewhat excavate on each side below the level of the eyes, and the anterior margining ridges are very pronounced. The ventrolateral portions of the second segment form short longitudinal carinae running almost the length of the segment, unlike the more knob-like and anteriorly located projections present in many Spirobolidae such as *Narceus*. The mesal ends of the ventral portions of the second segment in females (Fig. 6) are bent noticeably ventrad; this condition is much less pronounced in immatures.

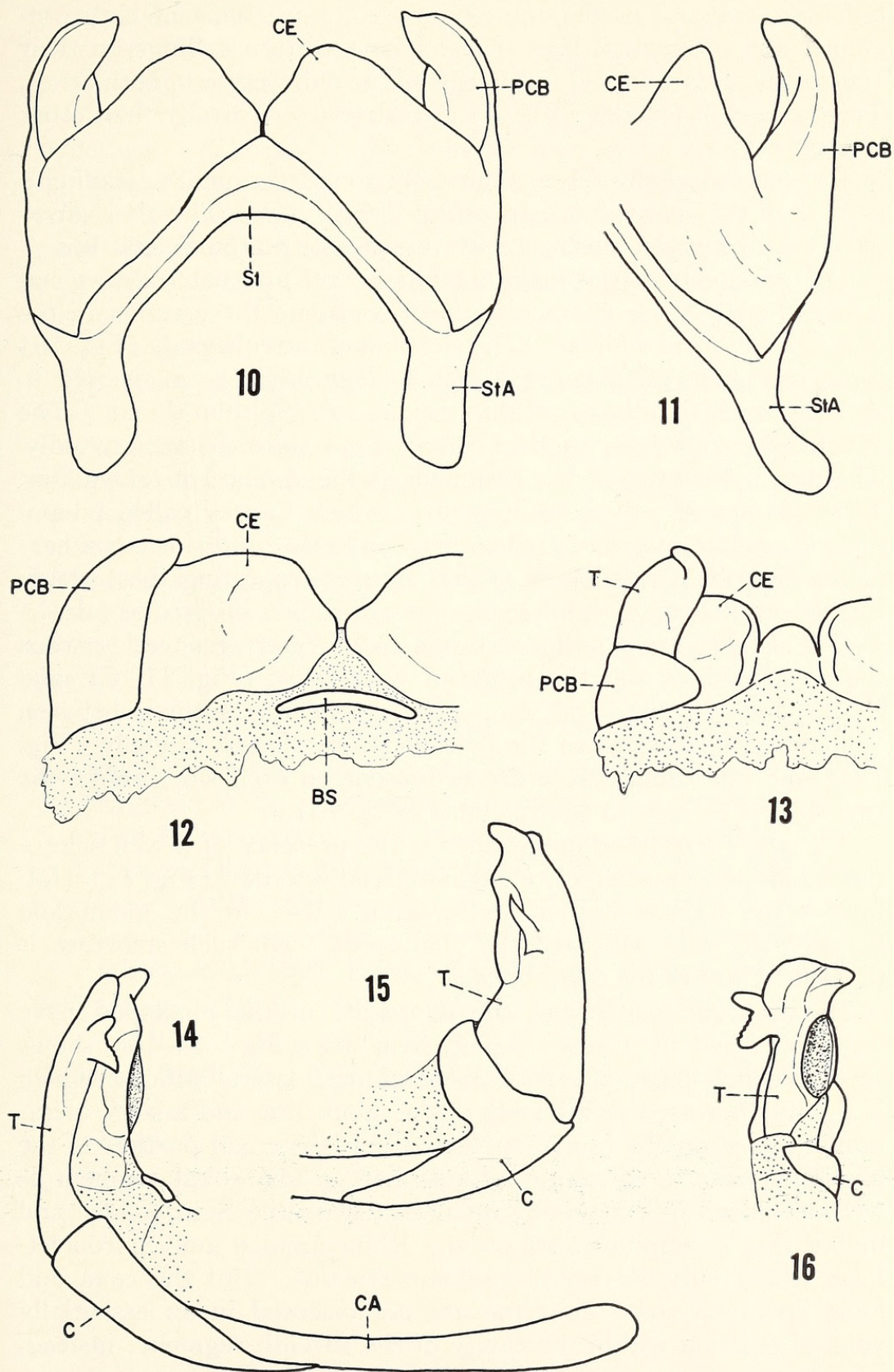
Causey has described and illustrated the uncinate lobes of the third coxae in males. The fourth coxae are slightly produced

EXPLANATION OF PLATE II

Figs. 10-12, 14-16, *Floridobolus penneri* Causey. Fig. 10. Coleopods, cephalic view. Fig. 11. Right coleopod, ventrocephalolateral view. Fig. 12. Coleopods (right portion) and basal sclerite, caudal view. Fig. 13. *Narceus*, coleopods, right portion, caudal view. Fig. 14. Left phallopod, mesal view. Fig. 15. Left phallopod, distal portion, lateral view. Fig. 16. Left phallopod, distal portion, caudal view. Abbreviations: BS—basal sclerite, C—coxa, CA—coxal apodeme, CE—coxal endite, PCB—posterior coxal bar, St—sternum, StA—sternal apodeme, T—telopodite.

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PLATE II



ventrad. Other pregenital coxae (Fig. 4) show only an indistinct knob-like trace of production. The second segments of both pregenital and postgenital legs of males have distal swellings on their ventral surfaces (Fig. 4). All legs are heavily setose in both sexes. Third coxae of females (Fig. 2) are narrower ventrally than other coxae (Fig. 3).

The tergum of the telson is broadly rounded caudally, leaving a portion of the anal valves exposed to dorsal view. The anal valves have evenly convex surfaces with no trace of marginal anal lips.

The gonopods of the male exhibit several unusual features and it is primarily these characters that necessitate the erection of the new family Floridobolidae. The sternum of the coleopods (Fig. 10) is narrow and resembles that seen in Spirobolidae as opposed to those in such families as Rhinocricidae and Spirobolellidae. The coxal endites are broad and in contact for a short distance mesally. The unusual feature of the coleopods is the absence of telopodites. The caudomesally directed structures which Causey called telopodites are apparently actually homologous to the posterior coxal bars of the Spirobolidae. There are no sutures separating these structures from the coxae (although some are shown in Causey's drawing) and there are no telopodite muscles. Short grooves between the coxal endites and the posterior coxal bars (Fig. 11, CE and PCB) end abruptly and cannot be considered sutures between podomeres. Thus, when the coleopods are viewed caudally (Fig. 12), only one caudal structure is present on each side, unlike the two structures seen in Spirobolidae (Fig. 13).

A character of basic importance is the presence of a well sclerotized, narrow, transversely elongate "basal sclerite" (Fig. 12) (following the terminology of Brölemann, 1914) in the membrane between the coleopods and the phallopods. No such structure is present in any of the Spirobolidae.

The unusual features of the telopodite of the phallopod have been described by Causey. The structure (Figs. 14-16) shows several distal lobes, a very thin, acuminate lateral process which is tightly appressed to the body of the telopodite, and a large membranous area on the caudal surface. It is the coxal portion of the phallopod that is of major interest here. The coxal segment is well-developed in a manner similar to that in the Spirobolidae and unlike that in families such as the Rhinocricidae and Spirobolellidae where only the coxal apodeme remains. But the coxa and long, spatulate coxal apodeme are not oriented in an essentially vertical position within the cavity of the seventh segment; instead,

they curve caudad from the base of the telopodite and run back through the body cavity to the region of the tenth segment. A belt-like portion of the coxa runs from the distolateral coxal surface around the caudal base of the telopodite.

The female cyphopods (Figs. 7-9) are simple, slightly elongate structures. A lateral suture, which runs ventrad from the area of the basal valve, branches about midway of the length of the cyphopod. The posterior branch runs ventromesad across the caudal plate; the anterior branch runs mesad a short distance to reach the membranous area at the base of the distal lobe of the cephalic plate. The surface of the extreme distal portion of the cyphopod is very faintly papillate.

The topotypic specimens in my collection were taken by Thomas Eisner, Roger S. Payne, and Jozef Nowosielski, June 20-28, 1958. The locality was very sandy with sparse palmetto vegetation. The millipeds were found crawling on the sand at night; they were inactive during the day, usually resting under pieces of wood or on old fence posts. The collectors were unsure whether this species ever burrowed deep into the sand in a manner similar to that seen in *Narceus gordanus* Chamberlin, which was abundant in the same area. The latter species was never found on the surface during the day.

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