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A NEW GENUS AND SPECIES OF BOPYRID ISOPOD INFESTING ALPHEID SHRIMPS OF THE GENUS *SYNALPHEUS* IN THE WESTERN ATLANTIC OCEAN

by

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With 3 text-figures

Abstract

Bopyrione synalphei, new genus, new species, a parasite of *Synalpheus goodei* Coutière in the northeastern Gulf of Mexico, *S. bousfieldi* Chace, *S. pectiniger* Coutière and *Synalpheus* spp. in Haiti and *Synalpheus* sp. in Curaçao, is described. A member of the bopyrid subfamily Bopyrinae, whose diagnosis is slightly amended to accommodate it, it is closely allied to the genera *Bopyroides* Stimpson and *Bopyrina* Kossmann. Re-examination of the holotype of *Bopyroides woodmasoni* Chopra, 1923, a parasite of *Synalpheus neomeris* (de Man) in the Andaman Islands, indicates that it is also assignable to *Bopyrione*.

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Dr. R. Cornet made available the material from Haiti which he had collected, and Prof. A. Veillet provided collection data for it. Mr. David K. Camp of the Florida Department of Natural Resources (designated FDNR) furnished material which had been collected by the "Hourglass" expeditions out of that institution. Drs. Eddy Westinga and Paul Hoetjes of the Zoölogisch Museum, Amsterdam (ZMA) lent material collected in Curaçao. Dr. Fenner A. Chace, Jr., of the National Museum of Natural History, Smithsonian Institution (USNM) identified the hosts of the Haitian material, and Dr. Thomas E. Bowman provided other specimens for comparison. Dr. K. Tiwari of the Zoological Survey of India, Calcutta, lent the holotype

of *Bopyroides woodmasoni*. Financial support for the preparation of this report was provided to one of us (JCM) by the National Science Foundation under grant number DEB- 76-20102 administered through the Bermuda Biological Station for Research, Inc., of which this is scientific contribution number 821.

Bopyrione new genus

Generic diagnosis. — Female: Subovate in outline, only moderately distorted; head distinct, deeply set into pereon, bearing palpless maxilliped and pair of pointed projections on each side of posteroventral border; oostegites nearly covering brood pouch, first one with long posterolateral point and unadorned internal ridge; pereopods with blunt dactyli and large bases; pleon of 5 or 6 obscurely separated pleomeres, their separations not indicated by lateral indentations; pleopods as uniramous slightly extended tapering flaps, generally in 4 pairs; no lateral plates or uropods. Male: Body about twice as long as broad, with irregular margins; head variably set off from pereon, with prominent eyes; most or all pereomeres with midventral tubercles; pleon of 4 indistinctly separated pleomeres, lacking pleopods and uropods. Parasite of *Synalpheus* spp.

Gender feminine. Type-species, *Bopyrione synalphei* new species.

Bopyrione synalphei new species (figs. 1-3)

"Bopyrid isopods" [in part]. — Hoetjes, et al., 1976: 33 [Curaçao; infesting "snapping shrimp"].

Material examined. (Hosts determined by F. A. Chace, Jr., except as indicated.)

Infesting *Synalpheus goodei* Coutière, L. G. Abele, det. of host. "Hourglass" Fishery Sta. C, Gulf of Mexico, 70 km west of Egmont Key, Florida, 27°37'N, 83°28'W, 36.6 m, 8 September 1966: 1 ♀, FDNR.

Infesting *Synalpheus bousfieldi* Chace. Mer Frappée, southern part of Bay of Port-au-Prince, Haiti, in sponge *Spheciospongia* sp., R. Cornet, coll., May 1960, March, May, June 1961, May 1964: 7 ♀♀, 3 ♂♂, USNM.

Infesting *Synalpheus pectiniger* Coutière. Same locality as *S. bousfieldi*, March, May, June 1961: 4 ♀♀ (including 1 immature).

Infesting *Synalpheus* sp. (near *S. goodei* Coutière). Same locality as *S. bousfieldi*, May 1960, 1961: 1 ♀, 1 ♂.

Infesting *Synalpheus* sp. (near *S. longicarpus* (Herrick)). Same locality as *S. bousfieldi*, May 1960, May, June 1961, May 1964: 10 ♀♀, 4 ♂♂, 1 cryptoniscan larva, Rijksmuseum van Natuurlijke Historie, Leiden (RMNHL), including holotype ♀, RMNHL Crust. I 5907, and allotype ♂, RMNHL Crust. I 5907; other specimens (RMNHL Crust. I 5908).

Infesting *Synalpheus* sp. In sponge *Spheciospongia vesparia* (Lamarck), 3 m, St. Michielsbaai, Curaçao, 13 April, 1976, E. Westinga and P. Hoetjes, colls. and dets. of hosts: 4 ♀♀, ZMA.

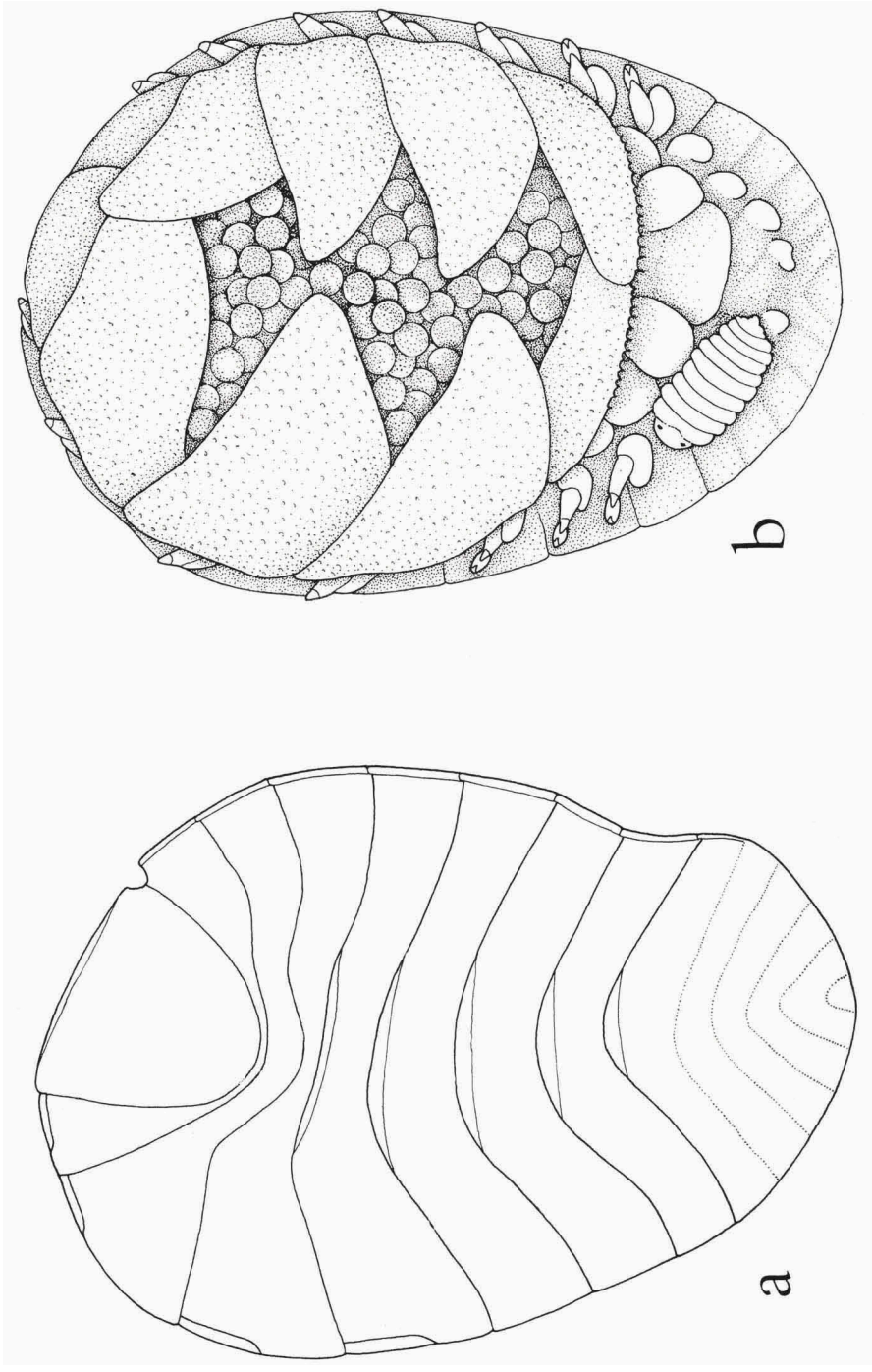

Fig. 1. *Bopyrione synalphei*, n. g., n. sp., holotype female. a, dorsal view; b, ventral view, with male attached (× 28).

Description of holotype female (figs. 1, 2a-e, 3)

Length 3.9 mm, maximal width 2.8 mm, head length 1.0 mm, pleon length 1.2 mm. Distortion of body axis 39°. Body subovate, nowhere curving abruptly (fig. 1).

Head semioval, distinct from pereon but deeply embedded in it, with rounded marginal notch separating head and pereon on short side of body. Frontal lamina absent, but anterior margin of head creased. Eyes prominent. Antennae 1 and 2 (fig. 2a) of three and one articles respectively, both with several setae along margins. Maxilliped (fig. 2b) completely lacking palp or setae to indicate it. Posteroventral border (fig. 2c) bearing two pairs of pointed subequal lateral projections, lateral ones inserted above medial ones; medial region slightly convex and entire except for tiny central notch.

Pereon broadest across pereomere 3. All pereomeres separate but not demarcated laterally. Dorsolateral bosses indistinct. Coxal plates very narrow and not present on all borders. Ventrally, pereomeres well defined, with prominent longitudinal groove through middle of each. Oostegites (fig. 3) almost enclosing brood pouch, those of each pair subequal in size; oostegite 1 (figs. 2d, 3a, b) with anterior and posterior segments nearly equal in size and separated by unadorned convex internal ridge; oostegites 2-4 (fig. 3c-h) pointed antero-medially; oostegite 5 (fig. 3i-j) with long setae along whole posterior margin. Pereopods (fig. 2e) all nearly equal in size, bearing fine setae; all with reduced dactyli and anteriorly produced bases.

Pleon smoothly rounded, with no marginal indications of segmentation (fig. 1). Lateral plates completely absent. Six pleomeres present but discernible only after staining. Large medial swellings on anterior pleomeres ventrally. Pleopods as uniramous pointed projecting flaps progressively smaller posteriorly, three on longer side, four on shorter side; each pleopod on longer side larger than its opposite. No uropods.

Description of allotype male (fig. 2f-h)

Length 0.73 mm, maximal width 0.34 mm, head length 0.14 mm, pleon length 0.15 mm. Margins rather irregular, though roughly subparallel (fig. 2f).

Head elliptical, much wider than long, but markedly narrower than first pereomere; head extending deeply into pereon but distinct from it. Eyes large and prominent. Antennae 1 (fig. 2g) of opposite sides almost touching, each of three articles; antennae 2 (fig. 2g) of two articles; all antennae bearing many setae. Maxillipeds not discernible.

Pereon broadest across pereomere 5. All pereomeres of nearly same length,

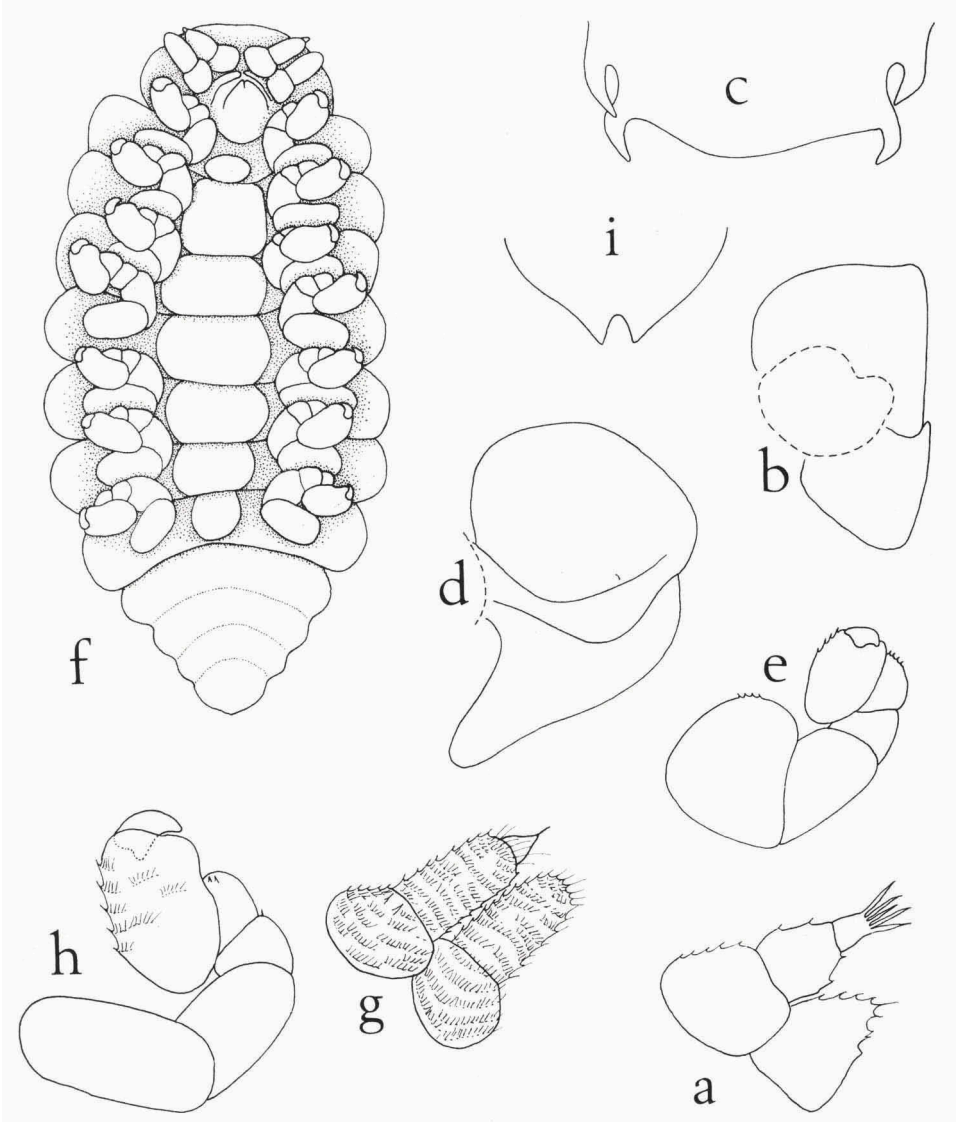

Fig. 2. *Bopyrione synalphei*, n. g., n. sp., holotype female (a-e), allotype male (f-h). a, antennae (× 175); b, maxilliped (× 41); c, posteroventral border of head (× 32); d, oostegite 1 (× 31); e, pereopod (× 105); f, ventral view (× 123); g, antennae (× 314); h, pereopod (× 328); i, end of pleon of cryptoniscan larva (× 190).

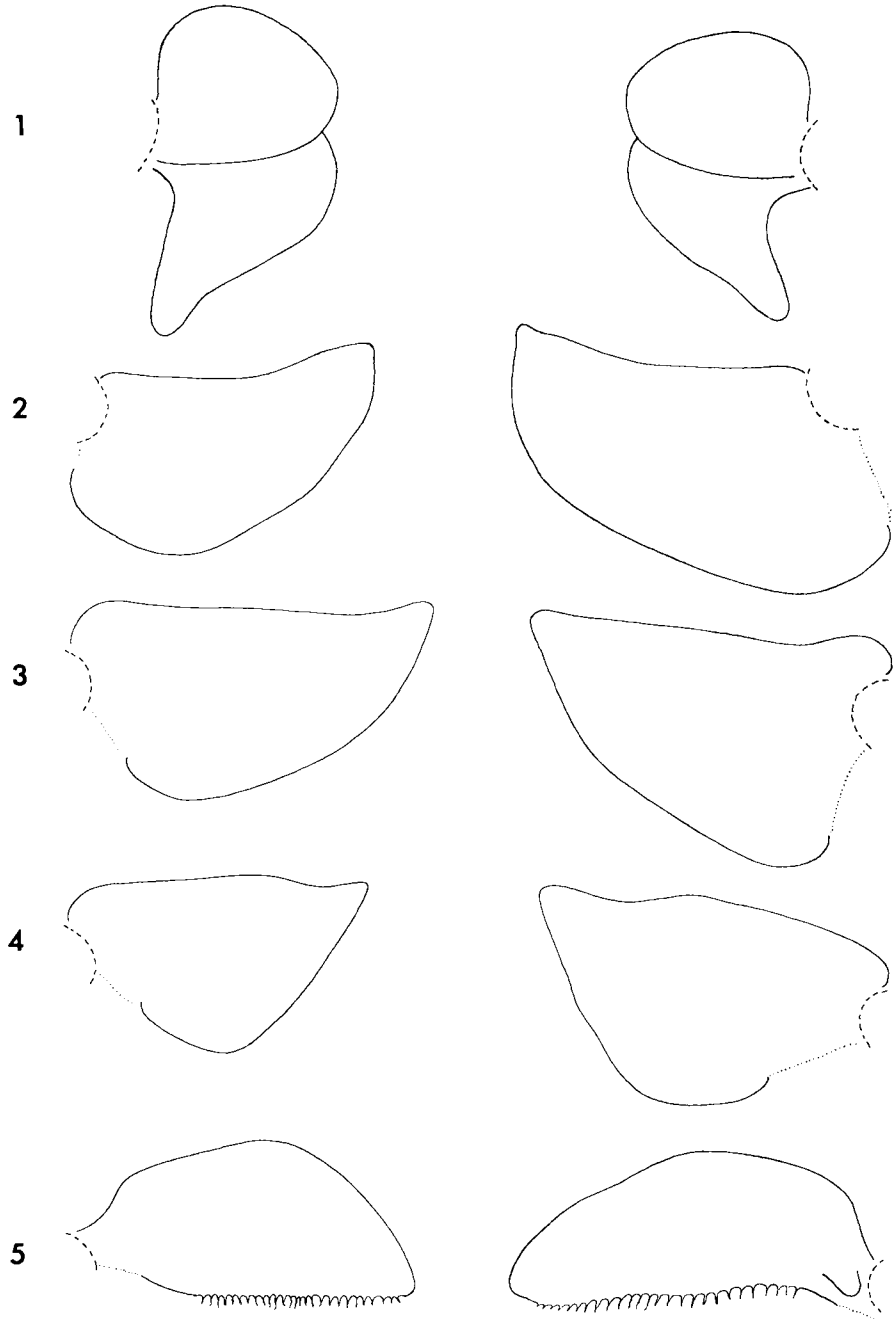

Fig. 3. *Bopyrione synalphei*, n. g., n. sp., holotype female, oostegites. 1, first pair; 2, second pair; 3, third pair; d, fourth pair; 5, fifth pair. (All × 30).

all with conspicuous midventral projections, those on pereomeres 1 and 7 much reduced. Pereopods (fig. 2h) increasing slightly in size posteriorly, but all rather small and stocky; dactyli proportionately somewhat larger anteriorly; lines of small setae on propodi and sparse larger setae on distal margins of carpi.

Pleon of four pleomeres, all visibly separated ventrally, but only first one set off from others dorsally; lateral margins plainly demarcating all four pleomeres. No pleopods or uropods, but ill-defined swellings on ventrolateral regions of pleomeres.

External margins of head, pereomeres and of pleon thickly covered by minute setae.

Description of cryptoniscan larva (fig. 2i)

Length 0.6 mm. Eyes indistinct. First article of first antennae with three points on posterior margin, third article with five or six aesthetascs. No maxillipeds. Simple dactyli on all pereopods. Pleon bearing midventral spines. Exopodites of first pair of pleopods each bearing five plumose setae and one small smooth external seta; endopodite of fifth pair each with two setae. Uropods with endopodite half as long as exopodite, ending in small external tooth and well-developed internal tooth and large seta three times as long as appendage; exopodite bearing large medial tooth distally, two rather long thin lateral teeth and one bristle exceeding its length. Terminal pleomere (fig. 2i) difficult to assess, but evidently with posteromedial notch similar to that of *Bopyrus squillarum* (Latreille), as described by Bourdon (1968).

Variations

Females. — Lengths 1.8 to 4.3 mm, ratios of length to width 1.28 to 1.58. Distortion 18° to 47°, unrelated to body size. Heads showing variable degrees of fusion with pereons, and medial projections of posterolateral borders of heads occasionally rudimentary. Pereons sometimes with indistinct segmentation anteriorly and variously developed dorsolateral bosses. Pleons of five or six pleomeres, their separations always difficult to see; short (ratio of length to body length 0.25 to 0.37) and clearly broader than long (ratios 1.30 to 1.64), both ratios unrelated to total size. Usually four pairs of pleopods present, but occasionally, as in holotype, one pleopod of final pair on either side lacking. (One female with five pleomeres on long side and only two on other side.) Immature female with head proportionately larger and its oostegites proportionately smaller than in mature females and its pleomeres rather will defined laterally .

Males. — Lengths 0.55 to 1.00 mm, very small relative to accompanying

females (ratios of lengths of males to females 0.20 to 0.30), body stocky, with segments closely appressed, always nearly twice as long as wide (length/width ratios 1.96 to 2.19). First pair of antennae usually close together, in one case actually touching, in another case well separated. Midventral tubercles on pereomeres poorly defined but always present; in two specimens final ones appearing bilobate. Pleon somewhat narrower than final pereomere, short (ratios of pleon length to overall length 0.19 to 0.27) and broader than long (width/length ratios 1.22 to 1.44). Separation of first two pleomeres more or less apparent dorsally, with one to five pleomeres indicated laterally.

Discussion

Of the parasites examined, the distortion of 26 females was determined. Of these, 13 were dextral (occurring in the right branchial chambers of their hosts and distorted so their right sides were longer) and 13 sinistral. Among the hosts, as is characteristic of alpheids, either one claw or the other is markedly the larger; among 23 host shrimps available for examination, the left claw was the larger in 19 cases, a deviation significant at a probability of less than 0.005 (chi-square test). Unfortunately, we do not know the usual proportions of right- or left-"handedness" for the species involved or even for the total samples taken in this instance. There was no correlation between the hosts' "handedness" and the distortion of their parasites, and in one case a single host specimen was bilaterally infested. The lengths of 23 females were plotted against the carapace lengths of their respective hosts; the resultant regression equation was female length (♀ L) = 0.552 × host length (HL) + 0.239 mm; the correlation coefficient (r) was 0.795, indicative of a fairly high degree of correlation. When the single very immature female (one of two on a single host) was excluded, the resultant regression equation was ♀ L = 0.603 × HL + 0.051 mm, r = 0.869. Similarly the lengths of the 8 males were plotted against those of their mates, with this result: ♂ L = 0.134 × ♀ L + 0.233 mm, r = 0.706.

The new genus *Bopyrione* is closely similar to *Bopyroides* Stimpson, which is represented by two valid species infesting boreal hippolytid and pandalid shrimps, *B. hippolytes* (Krøyer) and *B. cluthae* (Scott). It differs from both of these in that the females of *Bopyroides* have heads shorter than broad, first antennae of three articles, second antennae of five articles, maxillipeds with palps, first oostegites not produced into posterolateral points, pleomeres distinctly separated dorsally and laterally, and pleopods as small knobs rather than as flaps. The males of *Bopyrione* differ from those of *Bopyroides* in that the latter are proportionately longer, their antennae have more articles, the meri and carpi of their pereopods are fused, they have no midventral pereonal tubercles, and there is no indication of pleomeres.

A third species assigned to *Bopyroides, B. woodmasoni* Chopra, was incompletely described (Chopra, 1923), so it was necessary for one of us (RB) to reexamine it before it was possible to comment on it. (Unfortunately, the male had been lost before it could be described, so it is even more poorly known.) It is a parasite of *Synalpheus* sp., possibly *S. neomeris* (de Man) in the Andaman Islands. Regrettably, the holotype is in poor condition, most of the oostegites being absent or torn. It is clear, though, that the second oostegite is well-developed and directed toward and reaching the median line, so it is probable that the oostegites closed the brood pouch, in contrast with other species of *Bopyroides*. Further, Chopra's description and what remains of the holotype make it evident that the head is deeply embedded in the pereon, the maxillipede lack palps, the coxal plates are very reduced, the pereopods have tiny dactyli and anteriorly enlarged bases, the pleomeres are fused dorsally and laterally into continuous margins, and the four pleopods are in the form of small lamellae reduced in size posteriorly. All of these are characteristics of *Bopyrione*. Thus we are reassigning *Bopyroides woodmasoni* to the new genus *Bopyrione*. Its female differs from the type-species, *B. synalphei*, at least in having some dorso-lateral pereonal bosses and undulate indentations separating the pereomeres and in having the posterolateral point of the first oostegite curved medially rather than extending laterally. It is of interest to note that Nierstrasz & Brender à Brandis (1929), without reexamining the type, considered the generic status of *B. woodmasoni* and concluded that it should be retained in *Bopyroides*, even though Chopra (1923) had originally referred it to *Bopyroides* only "with grave doubts".

Bopyrione is also closely similar to *Bopyrina* Kossmann, which is being narrowly redefined by Markham (in prep.) so as to include only the European species *B. ocellata* (Czerniavsky) and the eastern American species *B. abbreviata* Richardson. Thus females of *Bopyrina* have relatively broader heads bearing only one pair of dorsolateral projections, first oostegites extended into rounded central projections rather than pointed lateral ones, and the pleomeres indicated on one side. The males of *Bopyrina* are proportionately much longer and lack midventral pereonal tubercles. It is noteworthy that females of *Bopyrione synalphei* and *Bopyrina ocellata* seem to be the only ones in the subfamily Bopyrinae in which the number of pleopods is variable.

In diagnosing the subfamily Bopyrinae, Codreanu (1967) stated that the oostegites do not cover the females' brood pouches at all. *Bopyrione* females contradict this but are otherwise clearly assignable to this subfamily, so a slight amendment of the subfamilial diagnosis to "oostegites usually not at all covering brood pouches", is proposed.

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