A new genus and species of bopyrid isopod (Crustacea, Isopoda, Bopyridae, Orbioninae) parasitic on *Sicyonia* (Crustacea, Decapoda, Penaeoidea) from New Caledonia

Christopher B. BOYKO
Division of Invertebrate Zoology, American Museum of Natural History,
Central Park West at 79th St., New York, NY 10024 (USA)
cboyko@amnh.org

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ABSTRACT
Asymmetrorbione drepanopleon n. gen., n. sp., a highly asymmetrical orbionine bopyrid isopod, is described from specimens of two species of *Sicyonia* H. Milne Edwards, 1830, shrimp collected by the MUSORSTOM expeditions in New Caledonia; it is the seventh genus included in the Orbioninae. This genus can be characterized by the female having coxal plates well developed on the longer side of the body, a pleon with five pleomeres plus pleotelson, pleomeres I-V having biramous pleopods and uniramous lateral plates, the short side of the body with reduced lateral plates and the long side of the body with lateral plates elongated on pleomeres I and II, all lateral plates smooth, and uniramous uropods. The male has all pleonal segments plus the pleotelson fused into a single segment and lacking midventral tubercles, pleopods, and uropods. A second species, *Orbione kempi* Chopra, 1923, is also transferred to the new genus. Comparisons are made between *Asymmetrorbione* n. gen. and *Anisorbione* Bourdon, 1981, females of which differ in having only five pleonal segments and biramous uropods, and *Orbione* Bonnier, 1900, females of which differ in their lack of pronounced asymmetry of the pleon and lateral plates and in the presence of tubercles on the lateral plates.

KEY WORDS
Crustacea,
Isopoda,
Bopyridae,
Orbione,
Anisorbione,
Asymmetrorbione n. gen.,
Sicyonia,
New Caledonia,
new genus,
new species.

RÉSUMÉ

Un nouveau genre et une nouvelle espèce de bopyre (Crustacea, Isopoda, Bopyridae, Orbioninae) parasite de Sicyonia *(Crustacea, Decapoda, Penaeoidea) de Nouvelle-Calédonie.*

Un Bopyridae Orbioninae très asymétrique, *Asymmetrorbione drepanopleon* n. gen., n. sp., est décrit à partir de spécimens provenant de deux espèces de crevettes du genre *Sicyonia* H. Milne Edwards, 1830, récoltées lors des campagnes MUSORSTOM en Nouvelle-Calédonie. C'est le septième genre de la sous-famille des Orbioninae. *Asymmetrorbione* n. gen. se caractérise, chez la femelle, par des plaques coxales bien développées sur le plus long côté du corps, un pléon avec cinq pléomères et un pléotelson, les pléomères I-V ont des pléopodes biramés et des plaques latérales uniramées, le côté court du corps avec des plaques latérales réduites et le côté long avec des plaques latérales allongées sur les pléomères I et II, toutes les plaques latérales sont lisses et les uropodes uniramés. Le mâle présente une fusion de tous les segments du pléon et du pléotelson, il ne possède pas de tubercules mi-ventraux, de pléopodes, ni d'uropodes. Une seconde espèce, *Orbione kempi* Chopra, 1923, est transférée dans le nouveau genre. Les femelles d'*Anisorbione* Bourdon, 1981 diffèrent de celles d'*Asymmetrorbione* n. gen. par la présence de seulement cinq segments pléonaux et des uropodes biramés. Les femelles d'*Orbione* Bonnier, 1900 diffèrent de celles d'*Asymmetrorbione* n. gen. par l'absence d'asymétrie prononcée du pléon et des plaques latérales et par la présence de tubercules sur les plaques latérales.

MOTS CLÉS
Crustacea,
Isopoda,
Bopyridae,
Orbione,
Anisorbione,
Asymmetrorbione n. gen.,
Sicyonia,
Nouvelle-Calédonie,
nouveau genre,
nouvelle espèce.

INTRODUCTION

All members of the bopyrid isopod subfamily Orbioninae parasitize the branchial chambers of penaeoid shrimp and six genera are currently recognized (Bourdon 1981; Trilles 1999). A single species, *Orbione kempi* Chopra, 1923, has been recorded from a host in the genus *Sicyonia* H. Milne Edwards, 1830, and this species is only known with certainty from a single male and female pair collected in the Andaman Islands (but see Remarks under *O. kempi* below). Markham (1994) reported a pair of bopyrids from another species of *Sicyonia* in New Caledonia, but because the material differed in some aspects from the description of *O. kempi*, he assigned it only to "cf. *kempi*". Reexamination of Markham's (1994) specimens, as well as additional material from two species of *Sicyonia* collected by the MUSORSTOM expeditions in New Caledonia, revealed that this material represents a species closely related to, but distinct from, *O. kempi*. Additionally, the "individual anomaly" (Markham 1994) in the shape of the lateral plate of pleomere I on the longer side of the female is, in fact, a distinctive characteristic of the New Caledonian species. Comparison of the New Caledonia specimens with the description and illustration of Chopra (1923) shows that Bourdon (1981) was correct in suggesting that *O. kempi* is not congeneric with other *Orbione* species. Accordingly, a new genus is erected herein to contain *O. kempi* and the new species from New Caledonia.

The type specimens of the new species, along with their hosts, are deposited in the Muséum national d'Histoire naturelle, Paris (MNHN). The size of the isopods is given as total length from anterior cephalon to posterior of pleotelson (exclusive of uropods); carapace length is provided as an indicator of specimen size for the hosts.

SYSTEMATICS

Order ISOPODA Latreille, 1817
Family BOPYRIDAE Rafinesque-Schmaltz, 1815
Subfamily ORBIONINAE Codreanu, 1967

Asymmetrorbione n. gen.

Orbione – Chopra 1923: 444-447 (in part). — Markham 1994: 236 (non *Orbione* Bonnier, 1900).

TYPE SPECIES. — *Asymmetrorbione drepanopleon* n. sp.

ETYMOLOGY. — The generic name is given to emphasize the posterior asymmetry of the included species, in combination with the name of the type genus for the subfamily Orbioninae.

DIAGNOSIS. — Female: one side of pereon and pleon distinctly longer than other; head broad, weakly produced with strong anterior lamina. Maxilliped with thin distally rounded spur; upper margin subovate with rounded, non-articulating palp. First oostegite proximal lobe ovate, distal lobe subtriangular, tapering and rounded, internal ridge smooth. Pereon composed of seven pereomeres, broadest across pereomere III. Coxal plates well developed on longer side, posterior two differing in shape from anterior five. Dorsolateral bosses larger on longer side. Oostegites only partly enclosing marsupium. Basis of all pereopods bearing pronounced rounded medial boss with scales on distal half. Pleon with five pleomeres plus pleotelson; pleomeres I-V with biramous pleopods and uniramous lateral plates; short side of body with reduced lateral plates; long side of body with lateral plates elongated on pleomeres I and II, shorter on III, short and rounded on IV and V; edges and surfaces of all lateral plates smooth; pleopodal exopodites and endopodites with lightly tuberculate surfaces, uropods uniramous.
Male: head subovate, distinct from first segment of pereon. Pereomeres 3-5 broadest; all pereomeres directed laterally. Pereopods all subequal. Pleon with all segments plus pleotelson fused into single segment, tapering posteriorly with rounded tip. No midventral tubercles, pleopods or uropods.

SYSTEMATIC POSITION

This new genus appears close to *Anisorbione* Bourdon, 1981 in overall morphology, especially in the pronounced asymmetry of the pleon and the lateral plates, as well as the asymmetry in the development of the coxal plates on the posterior pereonal segments. The most obvious differences between the two genera are that *Anisorbione* females have only five pleonal segments and biramous uropods while *Asymmetrorbione* n. gen. females have the primitive condition of five pleomeres plus pleotelson, but uniramous uropods. *Asymmetrorbione* n. gen. females can be separated from those of *Orbione* by the pronounced asymmetry of the pleon and lateral plates (symmetrical to slightly asymmetrical in *Orbione*), by the relative size of the uropods (much shorter in *Asymmetrorbione* n. gen.), and by the lack of tubercles on the lateral plates of *Asymmetrorbione* n. gen. *Asymmetrorbione* n. gen. can also be separated from both *Anisorbione* and *Orbione* by the extreme reduction of the coxal plates on the shorter side, which are well developed in at least the first two pereomeres of both sides in those two genera. The first oostegites of *Asymmetrorbione* n. gen. appear to be unique in the Orbioninae in that they have smooth internal ridges without any projections whatsoever (Chopra [1923] described this ridge in *A. kempi* n. comb. as having "a large lobe and two or three smaller ones" but illustrated it as smooth and almost identical to that of *A. drepanopleon* n. gen., n. sp. [Fig. 2C, D]). Males of *Asymmetrorbione* n. gen. are more anteroposteriorly compact than those of either *Orbione* or *Anisorbione*, and in this resemble males of *Parapenaeon* Richardson, 1904.

Asymmetrorbione drepanopleon n. sp.
(Figs 1-5)

Orbione cf. *kempi* – Markham 1994: 236, fig. 7 (non *Orbione kempi* Chopra, 1923).

TYPE MATERIAL. — **New Caledonia.** Norfolk Ridge, NORFOLK 1, stn DW 1652, 23°26.1'S, 167°50.3'E, 290-378 m, in left branchial chamber of ♂ *Sicyonia truncata* (Kubo, 1949) (8.3 mm), 19.VI.2001, brooding sinistral ♀ holotype 4.43 mm, ♂ allotype 2.14 mm (MNHN-Ep 898). — SMIB 2, stn DW 16, 22°51'S, 167°12'E, 390 m, in right branchial chamber of ♀ *S. truncata* (12.9 mm), 19.IX.1986, 1 brooding dextral ♀ paratype 6.45 mm, 1 ♂ paratype 2.48 mm (MNHN-Ep 904). — SMIB 3, stn DW 28, 22°47'S, 167°12'E, 394 m, in left branchial chamber of ♂ *S. truncata* (7.7 mm), 25.V.1987, 1 non-brooding sinistral ♀ paratype 3.68 mm (MNHN-Ep 900). — SMIB 4, stn DW 55, 23°21.4'S, 168°04.5'E, 260 m, in left branchial chamber of ♀ *S. curvirostris* Balss, 1913 (10.8 mm), 9.III.1989, 1 brooding sinistral ♀ paratype 4.50 mm, 1 ♂ paratype 1.95 mm (MNHN-Ep 923). — Norfolk Ridge, SMIB 4, stn DW 68, 22°55.0'S, 167°16.0'E, 440 m, in left branchial chamber of ♀ *S. truncata*

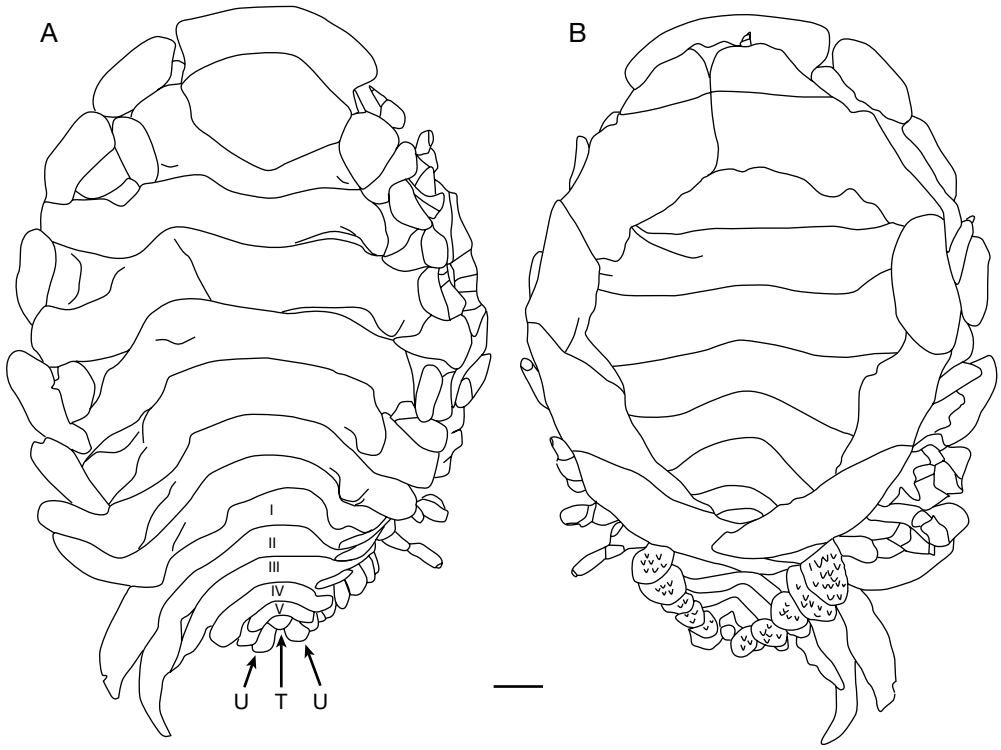

FIG. 1. — *Asymmetrorbione drepanopleon* n. gen., n. sp., ♀ holotype 4.43 mm (MNHN-Ep 898); **A**, dorsal view; **B**, ventral view. Abbreviations: **T**, pleotelson; **U**, uropod; I-V, pleon segment. Scale bar: 0.375 mm.

(12.25 mm), 10.III.1989, 1 brooding sinistral ♀ paratype 6.23 mm, 1 ♂ paratype 2.4 mm (MNHN-Ep 815). — Norfolk Ridge, SMIB 5, stn DW 97, 23°01.1'S, 168°18'E, 300 m, in left branchial chamber of ♂ *S. truncata* (7.6 mm), 14.IX.1989, 1 brooding sinistral ♀ paratype 3.98 mm, 1 ♂ paratype 1.99 mm (MNHN-Ep 903). — Sponge Bank, Mount B, SMIB 8, stn DW 146, 24°55.2'S, 168°21.7'E, 514-522 m, in right branchial chamber of ♀ *S. truncata* (11.15 mm), 27.I.1993, 1 brooding dextral ♀ paratype 4.65 mm, 1 ♂ paratype 2.14 mm (MNHN-Ep 902). — Jumeau East Bank, SMIB 8, stn DW 178, 23°45.1'S, 168°17'E, 400 m, in right branchial chamber of ♂ *S. truncata* (9.6 mm), 30.I.1993, 1 brooding dextral ♀ paratype 4.88 mm, 1 ♂ paratype 2.18 mm (MNHN-Ep 899). — BATHUS 2, stn DW 717, 22°44'S, 167°16.6'E, 350-393 m, in right branchial chamber of ♂ *S. truncata* (8.1 mm), 11.V.1993, 1 brooding dextral ♀ paratype 3.45 mm, 1 ♂ paratype 2.18 mm (MNHN-Ep 901).

ETYMOLOGY. — The specific name is given for the long, curving, sickle-shaped (Greek, *drepane*) lateral plates that are strongly developed on one side of pleomeres I-III.

DISTRIBUTION. — Known only from *Sicyonia truncata* (Kubo, 1949) and *S. curvirostris* Balss, 1913, from the vicinity of New Caledonia. Depth: between 260 and 522 m.

DESCRIPTION

Female (Figs 1; 2)

Based on holotype. Body length 4.43 mm, maximal width 3.15 mm, head length 1.05 mm, head width 1.20 mm. Pereon somewhat sinuous but essentially straight, one side distinctly longer than other. All body regions and pereomeres distinctly segmented.

Head broad, weakly produced with strong anterior lamina equal to half length of head (Fig. 1A). Eyes absent. Antenna and antennule of three articles each (Fig. 2A). Maxilliped (Fig. 2B) with thin distally rounded spur; upper margin subovate with subdistal, broad, rounded, non-articulating palp and fringe of short setae. First oostegite

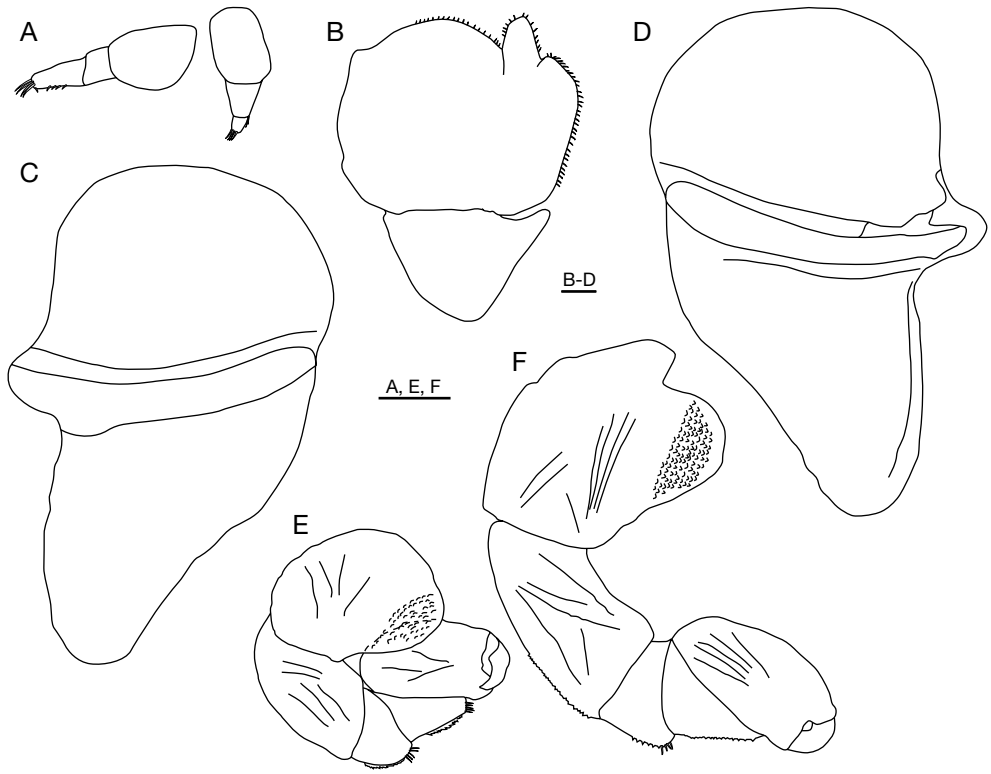

FIG. 2. — *Asymmetrorbione drepanopleon* n. gen., n. sp., ♀ holotype 4.43 mm (MNHN-Ep 898); **A**, right antenna (left) and antennule (right); **B**, left maxilliped; **C**, left oostegite 1, external; **D**, left oostegite 1, internal; **E**, left pereopod 1; **F**, left pereopod 7. Scale bars: 0.1 mm.

proximal lobe ovate, distal lobe subtriangular, distally tapering and rounded, internal ridge smooth (Fig. 2C, D).

Pereon composed of seven pereomeres, broadest across pereomere III, tapering anteriorly and posteriorly. Coxal plates well developed on longer side, clearly separated from pereomeres on I-V, indistinctly separate on VI and VII; elongate-ovate in shape on pereomeres I-III, narrowing and becoming longer on IV and V, tapering and bladelike on VI and VII. Dorsolateral bosses clearly demarcated and larger on longer side. Oostegites enclosing only approximately half of marsupium. Pereomeres II-VII with pronounced tergal projections on shorter side. Pereopods V-VII longer than I-IV (Fig. 2E, F). Outer margin of propodus, carpus, and merus with "serrate" region (acute scales along margin). Basis of all pereopods bearing pronounced rounded medial boss having scales on distal half. First pair of pereopods surrounding head region; pereopods I-V evenly spaced, VI and VII closely approximated.

Pleon with five distinct pleomeres plus pleotelson; contours of all pleomeres sinuous (Fig. 1A). Pleomeres I-V with biramous pleopods and uniramous lateral plates; short side of body with lateral plates short and thin on pleomeres I-III, becoming shorter and rounded on IV and V; long side of body with lateral plates greatly elongated and bladelike on pleomeres I and II, thinner and shorter on III, short and rounded on IV and V; edges and surfaces of all lateral plates smooth; pleopodal exopodites and endopodites ovate and subequal with lightly tuberculate surfaces, all pairs proportionally longer on long side of body; pleopods only slightly decreasing in size posteriorly; uropods uniramous, slightly larger than, but similar in shape to lateral plates of pleomere V.

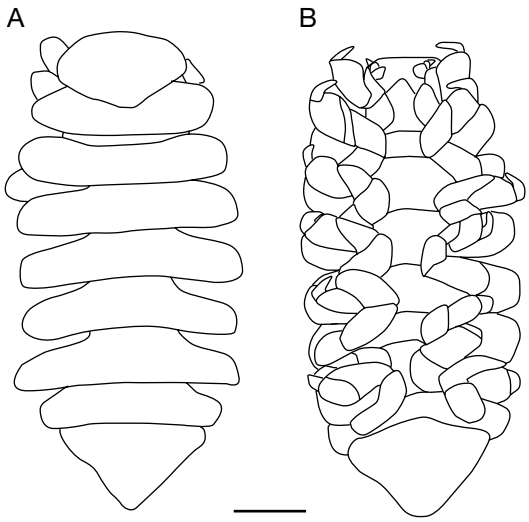

FIG. 3. — *Asymmetrorbione drepanopleon* n. gen., n. sp., ♂ allotype 2.14 mm (MNHN-Ep 898); **A**, dorsal view; **B**, ventral view. Scale bar: 0.375 mm.

Male (Figs 3; 4)

Based on allotype. Length 2.14 mm, maximal width 1.05 mm, head length 0.23 mm, head width 0.60 mm, pleon length 0.38 mm.

Head subovate, widest medially, distinct from first segment of pereon (Fig. 3A). Eyes absent. Antenna of three articles, distally setose; not extending beyond margin of cephalon; antennule of two articles; antennae and antennule with long thin setae on distal margins of segments (Fig. 4A). Pereomeres III-V broadest, tapering anteriorly and posteriorly. All pereomeres directed laterally, distolateral margins rounded. No detectable pigmentation. Pereopods (Fig. 4B, C) all subequal, all articles distinctly separated, palm of propodus with "serrate" region on surface and outer margin, outer margin and distal tip of carpus with long thin setae.

Pleon with all five segments plus pleotelson fused into single segment, tapering posteriorly with sinuous margins and rounded tip. No midventral tubercles, pleopods or uropods.

VARIATIONS

The tergal projections on the pereon of the female are variable, sometimes being very indistinct; the frontal lamina is either smooth on the anterior margin or with a few faint indentations; the degree of closure of the marsupium is variable but never approaching fully closed; the medial region of the pleomeres is distinctly bulging dorsally in some specimens (probable artifact of preservation); and the shape of the anteriormost pleopods is variable from ovate to elongate-ovate, but never as tapered as those of *A. kempi* n. comb. (Chopra 1923: text-fig. 4a). The pleotelson of the male sometimes exhibits residual suture marks from pleomere fusion (Fig. 5); the lateral shape of the pereomeres varies from rounded to bluntly angled, but not acute or subacute.

REMARKS

Asymmetrorbione drepanopleon n. gen., n. sp. can be separated from its only congener, *A. kempi* n. comb., by numerous female characters such as the width of the anterior lamina of the cephalon (half of head length in *A. drepanopleon* n. gen., n. sp., less than half head length in *A. kempi* n. comb.), presence of eyes (only in *A. kempi* n. comb.), number of articles in the antenna (three in *A. drepanopleon* n. gen., n. sp., five in *A. kempi* n. comb.), scales on the maxilliped (only in *A. kempi* n. comb.), strong angle on the outer margin of the posterior lobe of the first oostegite (only in *A. kempi* n. comb.), coxal plates of pereomeres VI and VII distinctly longer and narrower than I-V (*A. drepanopleon* n. gen., n. sp.), tergal projections on pereomeres (*A. drepanopleon* n. gen., n. sp.), pleomeres indistinctly separated (*A. kempi* n. comb.) vs well separated (*A. drepanopleon* n. gen., n. sp.), lateral plates of pleomeres I-III on long side of body elongate ovate with rounded tips (*A. kempi* n. comb.) or lamellar and blade-like with acute tips (*A. drepanopleon* n. gen., n. sp.), pleopodal exopodites and endopodites lamellar (*A. kempi* n. comb.) or ovate (*A. drepanopleon* n. gen., n. sp.), and uropods nearly two times longer than lateral plates of pleomere V (*A. kempi* n. comb.) or subequal to lateral plates of pleomere V (*A. drepanopleon* n. gen., n. sp.). The males present only minor differences, such as the presence of eyes (only in *A. kempi* n. comb.) and the number

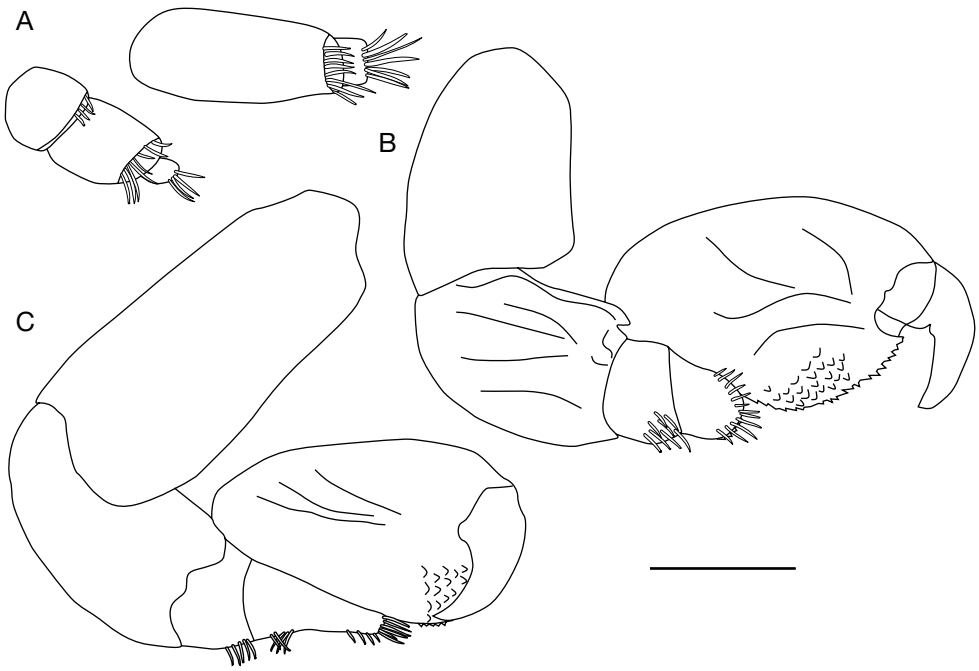

FIG. 4. — *Asymmetrorbione drepanopleon* n. gen., n. sp., ♂ allotype 2.14 mm (MNHN-Ep 898); **A**, right antenna (right) and antennule (left); **B**, right pereopod 1; **C**, right pereopod 7. Scale bar: 0.1 mm.

of articles of the antennule (two in *A. drepanopleon* n. gen., n. sp., three in *A. kempi* n. comb.). *Asymmetrorbione drepanopleon* n. gen., n. sp. is also known from two different host species and at considerably greater depths than *A. kempi* n. comb.

Asymmetrorbione kempi (Chopra, 1923) n. comb.

Orbione kempi Chopra, 1923: 416, 419, 446-451, pl. 12, figs 1-5, text-fig. 4. — Shiino 1949: 52, 55 (no new material). — Bourdon 1981: 243 (no new material).

"*Orbione*" *kempi* – Bourdon 1981: 243, table 1.

?*Orbione kempi* – Devi 1982: 28, table 1.

MATERIAL EXAMINED. — None.

DISTRIBUTION. — Known with certainty only from the pair of type specimens on *Sicyonia bispinosa* (De Haan, 1849) from Ross Channel, Port Blair, Andaman Islands. Depth: between 3.6-16.2 m. See Remarks for other possible hosts and locality.

DIAGNOSIS. — Female: anterior lamina less than half length of head. Eyes present. Antenna of five articles; antennule of three articles. Maxilliped covered with scales. Posterior lobe of first oostegite with distinct angle at midpoint of outer margin. Coxal plates elongate-ovate on pereomeres I-VI, narrowing and becoming longer with subacute tip on VII. Tergal projections apparently lacking. Pleon with five indistinctly separated pleomeres plus pleotelson. Pleomeres on short side of body with lateral plates short and blunt or rounded; long side of body with lateral plates elongated and distally ovate, becoming shorter posteriorly; pleopodal exopodites and endopodites lamellar; uropods uniramous, nearly two times longer than lateral plates of pleomere V.
Male: eyes present. Antenna of three articles; antennule of three articles.

REMARKS

Asymmetrorbione kempi n. comb. was described from a single pair of specimens from the branchial chamber of a *Sicyonia bispinosa* collected in the Andaman Islands at 2-9 fathoms (= 3.6-16.2 m) depth. Chopra (1923) indicated that the female was obtained from the left branchial chamber, but it is clearly a dextral specimen as illustrated and therefore almost certainly from the right chamber

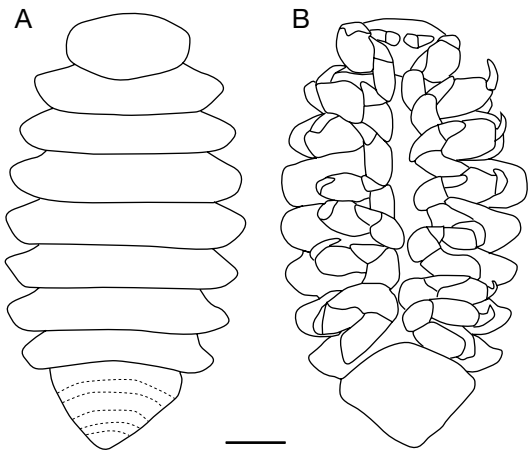

FIG. 5. — *Asymmetrorbione drepanopleon* n. gen., n. sp., ♂ paratype 2.48 mm (MNHN-Ep 904); **A**, dorsal view; **B**, ventral view. Scale bar: 0.375 mm.

(all specimens of dextral *A. drepanopleon* n. gen., n. sp. were obtained from right branchial chambers). Chopra (1923) cited the left side of his dextral female specimen as "slightly deformed" but, based on the series of *A. drepanopleon* n. gen., n. sp., this cannot be considered a deformity. Because of the lengthy description given by Chopra (1923), only a brief diagnosis is given above in order to distinguish this species from *A. drepanopleon* n. gen., n. sp. The type specimens were deposited in the Zoological Survey of India (ZSI), but because of recent unsuccessful attempts to obtain material from ZSI, it is only presumed that the specimens are still extant. Characters used to separate *A. kempi* n. comb. from *A. drepanopleon* n. gen., n. sp. are given above under the remarks for the latter species.

Devi (1982) identified two female bopyrids, one each from a *Metapenaeus brevicornis* (H. Milne Edwards, 1837) and a *M. lysianassa* (De Man, 1888) collected from Kakinada, India, at 5-70 m, as *O. kempi*, stating that "the description by Chopra (1923) fully agrees with the present specimens". However, the description given by Devi (1982) is very poor and gives only a single character ("dorsal surface of abdomen not tuberculate"), that may be useful in identifying the species as *A. kempi* n. comb. Devi (1982) also provided no illustrations of the specimens. As all of the material thus far examined comes from *Sicyonia* shrimp, it seems prudent to place Devi's (1982) records from *Metapenaeus* spp. in questionable synonymy with *A. kempi* n. comb. until that material can be examined or, more likely, new material from non-*Sicyonia* hosts is found.

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