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TWO NEW SPECIES OF ISOPODA BOPYRIDAE (CRUSTACEA) INFESTING THALASSINIDEANS IN THE WESTERN PACIFIC

John C. Markham

ABSTRACT.-Two species of Isopoda Bopyridae of the subfamily Ioninae are described as new. Both infest species of thalassinidean decapods not previously recorded as bopyrid hosts; they are from localities whose bopyrid faunas are very poorly known. *Ione taiwanensis*, new species, infests the callianideid *Callianidea typa* H. Milne Edwards in Taiwan. It is the first species of *Ione* from the western Pacific, and its host is the first callianideid reported to bear a bopyrid parasite. *Castrione digiticaudata*, new species, infests the axiid *Marcusiaxus wamsoi* Poore & de Saint Laurent in Irian Jaya, New Guinea; this is the first Pacific record of *Castrione*. On the basis of new information, *Castrione* is transferred from the subfamily Pseudioninae to the subfamily Ioninae.

INTRODUCTION

The family Bopyridae is the largest and least modified of the isopodan suborder Epicaridea. Its species, as adults, are obligate ectoparasites of decapod crustaceans, with members of a single subfamily typically largely or entirely restricted to a single decapod infraorder. Branchially occurring parasites of thalassinideans, however, are members of the subfamilies Pseudioninae (typically found as parasites of anomurans) and Ioninae (otherwise known as parasites of brachyurans) and seem to represent an evolutionary linkage between these two subfamilies called the Thalassinidean Transition (Markham, 1985). Both of the new species described herein are placed in the Ioninae, in genera previously known to contain parasites of thalassinideans elsewhere in the world.

John C. Markham - Arch Cape Marine Laboratory, Arch Cape, Oregon 97102-0105, U.S.A.

SYSTEMATICS

FAMILY BOPYRIDAE RAFINESQUE, 1815
SUBFAMILY IONINAE DANA, 1852, EMEND. R. CODREANU, 1967

Genus *Ione* Latreille, 1818
Ione taiwanensis, new species
(Fig. 1)

Material examined.- Holotype - female, Muséum National d'Histoire Naturelle, Paris, MNHN-Ep 836. Infesting *Callianidea typa* H. Milne Edwards (det. M. de Saint Laurent): Taipei County, northern Taiwan, collected by hand intertidally, under coral sand, coll. Tin Yam Chan, Apr.1992.

Description.- Female: Length 6.8 mm, maximal width 3.6 mm, head length 1.1 mm, head width 1.8 mm, pleon length 2.7 mm; distortion 12°. Outline suboval. All body regions and segments distinct (Fig. 1A, B). Head subtrapezoidal, narrowest at posterior margin. Frontal lamina extending completely across anterior margin, reaching only slightly back on dorsal surface but elaborated into large laterally- directed flaps ventrally. Antennae (Fig. 1C) prominent; first antennae of 3 articles; second antennae of 6 articles, extending conspicuously beyond anterolateral body margins. Barbula (Fig. 1D) with 3 long slender unornamented processes on each side. Maxilliped (Fig. 1E) suboval, with irregular margin; anterior article about twice as long as posterior, lacking palp; plectron poorly developed.

Pereomeres deeply separated laterally, first one partly enclosing head. Slightly raised broad middorsal ridge along all pereomeres, with peculiar projection (a possible artifact) on top of pereomere 3. Large petiolate lanceolate tergal plates on both sides of each pereomere, those on pereomeres 1 and 2 extended laterally, others posteriorly. Oostegites not enclosing brood pouch; those of first pair (Fig. 1F, G) suboval, their internal ridges lacking ornamentation, posterolateral projections absent and posterior margins setose. Pereopods (Fig. 1B) large, especially posteriorly; pereopods not projecting beyond lateral body margins, and with all articles distinct; pereopods 1-3 tightly clumped in arc on ventral surface, 4-7 arrayed along sides of body; pereopod 1 (Fig. 1H) with blunt dactylus, distally angled propodus, only slightly setose carpus; pereopod 7 (Fig. 1I) with sharply pointed dactylus, distally broad, angled and grooved propodus, setose carpus, greatly reduced merus and long slender ischium and basis.

Pleon (Fig. 1J, K) extending prominently out from pereon, of 6 distinct pleomeres. Five pairs of uniramous lateral plates, each divided into variable number of branchlets. Pleopods 1 and 5 uniramous, pleopods 2-4 biramous; all endopodites elongate-lanceolate and extended far laterally, endopodites knob-like to falcate and dorsally placed. Uropods uniramous, swollen and clublike, thicker but shorter than most pleopodal exopodites and sharply bent distally.

Male unknown.

Remarks.- Characters exhibited by the female of *Ione taiwanensis* that place it in the genus *Ione* Latreille, 1817, are the nearly straight narrow body, the laterally extended frontal lamina, the barbula of three long slender projections on each side, the "shoulder-like" tergal plates of the first two pereomeres, long slender pereopods with lateral rather than proximal connections of propodi to carpi, the multidivided lateral plates and the large clublike uropods. The genus *Ione*, the third oldest of the Bopyridae, contains 7 species from the Atlantic, Pacific

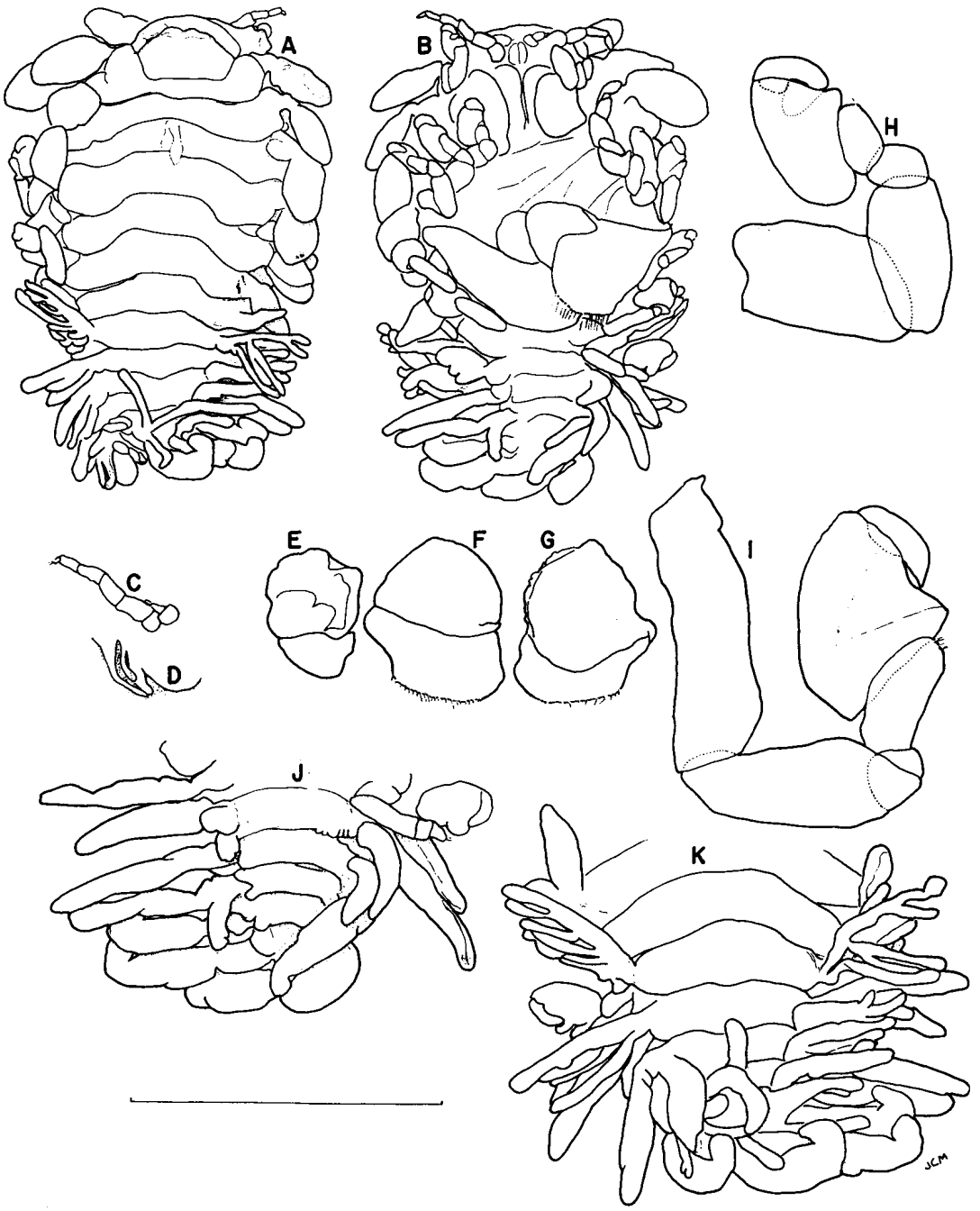

Fig. 1. *Ione taiwanensis*, new species, holotype female. (A) Dorsal view. (B) Ventral view. (C) Right antennae. (D) Right side of barbula. (E) Right maxilliped. (F) Right oostegite 1, external view. (G) Same, internal view. (H) Right pereopod 1. (I) Right pereopod 7. (J) Pleon, ventral view. (K) Pleon, dorsal view. Scale: 5.0mm for A, B; 3.3 mm for C-I; 2.5 mm for J, K.

and Indian Oceans. Five species infest species of *Callianassa*, one came from an *Albunea*, and the host of the other is unknown. This is the first record of infestation of any species in the family Callianideidae and thus a new record for the genus *Ione*.

The female of *I. taiwanensis* differs from that of *I. thoracica* (Montagu), a parasite of *Callianassa* spp. and other thalassinidean hosts from England to the Mediterranean (as redescribed by Bourdon, 1968), by lacking a maxilliped palp, and having shorter and broader extended anterior tergal plates, noncarinate pereopodal bases, fewer subdivisions of the lateral plates and thicker, shorter uropods. It differs from *I. cornuta* Bate, a parasite of *Neotrypaea* spp. along the west coast of North America and Japan (as redescribed by Shiino, 1939), by being more distorted, having longer anterior tergal plates, having less subdivided lateral plates, less developed pleopodal endopodites and broader uropods. The female of *I. ovata* Shiino 1964, as described by Shiino (1964) which infests *Neotrypaeauncinata* (H. Milne Edwards) in Chile, contrasts mainly in having minutely subdivided pleonal lateral plates. *I. thompsoni* Richardson 1904, as described by Richardson (1904, 1905), infesting *Gilvossius setimanus* (DeKay) in the northeastern United States, differs in that its female has tuberculate pleopods and foliose lateral plates. The female of *I. vicina* Bonnier, 1900, according to Bonnier (1900), a parasite of *Trypaea truncata* (Giard & Bonnier) in the Mediterranean, differs in having setose oostegites and multidivided lateral plates. In the case of *I. tubulata* Bourdon (1976), from an unknown host in the western Indian Ocean, the female has much more extended and pointed coxal plates and foliate lateral plates. And finally, the female of *I. indecora* Markham, 1988, described by Markham (1988) and known from *Albunea paretii* Guérin in Jamaica, has a much more irregularly shaped head, rather reduced coxal plates and very slender lateral plates.

Etymology.- Name *taiwanensis* in reference to the type-locality, the island of Taiwan.

Genus *Castrione* Brasil Lima, 1980
Castrione digiticaudata, new species
(Fig. 2)

Material examined.- Holotype - female; 1 male, allotype, Nationaal Naturhistorisch Museum, Leiden, Netherlands (NNM) I 7136. Infesting *Marcusiaxus wamsoi* Poore & de Saint Laurent (det. G. C. D. Poore), holotype. :Natural Science Foundation Station 490, in Wamsoi Lagoon, 1.5 km east of Dauwi Island, Kepulauan (Archipelago) Padaido, northern Irian Jaya, Indonesia, 01°16'S, 136°47'E, 54-90m, coll. Ostheimer, Orr, Powell, 4 Feb.1956.

Description.- Female (Fig. 2A-K): Length 7.1 mm, maximal width 5.9 mm, head length 1.2 mm, head width 2.0 mm, pleon length 1.9 mm; distortion 7°. Outline suboval. All body regions and segments distinct (Fig. 2A, B). No pigmentation.

Head subrhomboid, rounded slightly along anterior and posterior margins, embedded in pereon so front margin continuous with pereon. Frontal lamina short but extending slightly beyond sides of head. No eyes. First antennae (fig. 2C) short, of three articles; second antennae long and prominently extending beyond front of body, of up to 8 articles. Barbula (fig. 2D) of 2 processes on each side, outer one much broader and somewhat longer. Maxilliped (fig. 2E) with subrectangular anterior article, triangular posterior one; anterior margin minutely setose; nonsegmented palp (fig. 2E) small, slightly setose, articulating with front margin, inserted slightly lateral from anteromedial corner of maxilliped; plectron prominent and slightly extended but not sharply pointed.

Pereon evenly rounded, longer than broad. Coxal plates and tergal projections on both sides of pereomeres 1-4. Oostegites almost completely enclosing brood pouch; oostegite 1 (fig. 2G, H) suboval, each article about equally long, posterior one not produced into sharp posterolateral point but slightly extended in that region, both anterior and posterior margins fringed with minute setae, internal ridge entire except for 3 irregularly shaped unextended teeth; some of other oostegites bearing prominent setae along posterior margins. Pereopods (fig. 2I-K) along sides of pereon and most visible in dorsal view; all with all articles distinct, progressively longer posteriorly.

Pleon tapering rapidly posteriorly, of 6 pleomeres, all produced into long slender lateral plates with digitately divided margins. Five pairs of uniramous pleopods and uropods of structure and size like lateral plates.

Male (Fig. 2L-O): Length (exclusive of pleonal appendages) 2.3 mm, maximal width 0.8 mm, head length 0.4 mm, head length 0.5 mm, pleonal length 0.7 mm. All body regions and segments distinct. Body outline fusiform, nowhere narrowing abruptly (fig 2L, M). No pigment spots.

Head extended, suboval in outline. Antennae (fig. 2N) of 3 and 7 articles, respectively, all articles of both antennae sparsely setose distally; second antennae extending prominently beyond margins of head.

Pereon with sides nearly parallel except at ends. Pereopods (fig. 2O) reduced and tightly pressed against ventral surface, not extending laterally, all with all articles distinct, propodi proportionately large. No midventral tubercles.

Pleon narrower than pereon anteriorly and tapering posteriorly, of 6 distinct pleomeres. Five pairs of uniramous long lanceolate pleopods and similar uniramous uropods, all extending far to sides and rear of pleon.

Remarks.- This species, despite some significant differences from the type-species *Castrione longicaudata* Brasil Lima (1980) of its hitherto monotypic genus, is assigned to that genus. The female of *C. longicaudata* is markedly more distorted, its head prominently extended, and its abdominal appendages different, but it has a similarly shaped head, antennae of the same proportions and very similar maxilliped (drawn upside-down by Brasil Lima, 1980: fig. 4), first oostegite and pereopods. The males of the two species are nearly identical, both with elongate bodies and very peculiar filamentous pleopods. Both of the species are uniquely parasites of species of the family Micheleidae and of the genus *Marcusiaxus*. Additional differences between these species are the absence of a maxilliped palp in the female of *C. longicaudata* and the lack of pleonal lateral plates in that female (though the endopodites of its pleopods may be homologues of the lateral plates of the female of *C. digiticaudata*). The male of *C. longicaudata* has tiny eyes and somewhat more separated pereomeres and pleomeres. Confusingly, the generic diagnosis of Brasil Lima (1980) mentions both exopodites and endopodites of the male's pleopods, while the specific description of the male cites "pleópodes unirramados," as shown in the illustrations.

Brasil Lima (1980) assigned the genus *Castrione* to "grupo 'Pseudione'" [= subfamily Pseudioninae] while acknowledging that it also showed characters of "grupo 'Cepon'" [= subfamily Ioninae]. The lateral plates of the female of the new species, *Castrione digiticaudata*, indicate a closer affinity to the Ioninae, where I am reassigning the genus.

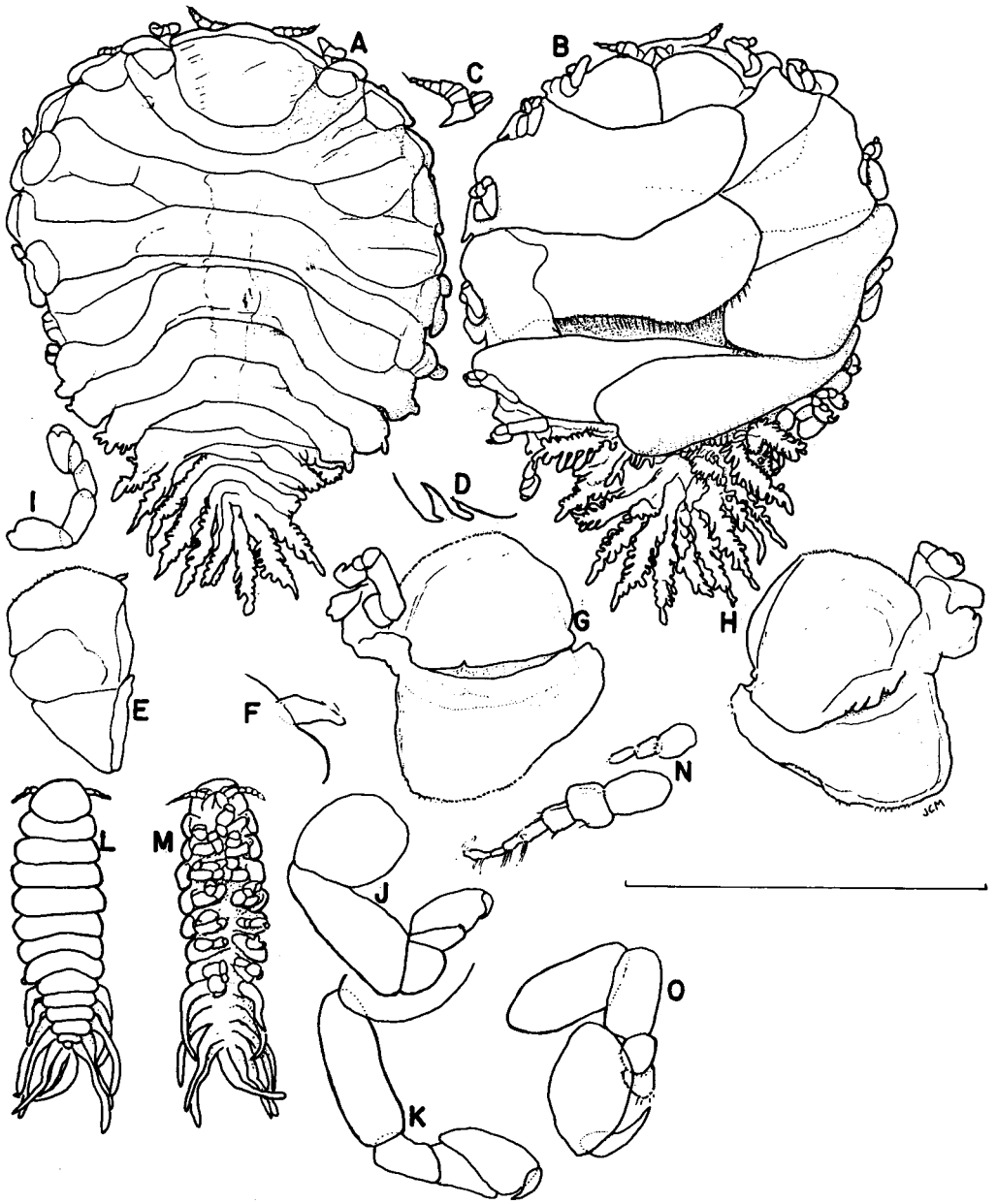

Fig. 2. *Castrione digiticaudata*, new species A-K, holotype female; L-O, allotype male. (A) Dorsal view. (B) Ventral view. (C) Right antennae. (D) Right side of barbula. (E) Right maxilliped. (F) Palp of same. (G) Right oostegite 1, external view. (H) Same, internal view. (I) Right pereopod 1. (J) Right pereopod 4. (K) right pereopod 7. (L) Dorsal view. (M) Ventral view. (N) Right antennae. (O) Right pereopod 7. Scale: 5.0 mm for A, B; 3.3 mm for C-E, G-M, O; 8.2 mm for F, N.

Still, as a member of that group of genera that I have called the Thalassinidean Transition (Markham, 1985), it shows the confusing array of characters of many genera of parasites of thalassinideans, which render them difficult to place in one of these subfamilies with complete confidence.

Etymology.- Name *digiticaudata*, "finger-like tail," selected to reflect digitate margins of female's abdominal appendages.

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