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Markham, 2002

A new species of *Leidya* and the first record of *Lobocepon*

A NEW SPECIES OF *LEIDYA* CORNALIA AND PANCERI, 1861, AND THE FIRST RECORD OF THE GENUS *LOBOCEPON* NOBILI, 1905, BOTH FROM THE EASTERN PACIFIC OCEAN, WITH A REVIEW OF THE PARASITES OF GRAPSID CRABS WORLDWIDE (ISOPODA, BOPYRIDAE, IONINAE)

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ABSTRACT

Leidya infelix, new species, is described as a parasite of the grapsid crab *Pachygrapsus crassipes* Randall from the west coast of Baja California, Mexico. Another male belonging to the genus *Leidya* from the same host and nearly the same locality may belong to the same species, but that is not certain. A lone immature female bopyrid assignable to the genus *Lobocepon* is recorded as a parasite of *Grapsus grapsus* (L.) from the Pacific coast of Nicaragua; although probably a representative of a new species, it was not suitable for description. Included are reviews of the genera *Leidya* Cornalia and Panceri, 1861, and *Lobocepon* Nobili, 1905, and a tabulation of all species of bopyrid isopods reported to infest grapsid crabs worldwide.

I. INTRODUCTION

The first species of bopyrid isopod described as a parasite of a brachyuran crab, and the first recorded from either coast of the Americas, was recorded as a parasite of the fiddler crab *Gelasimus pugilator* (Bosc) [now *Uca pugilator* (Bosc)] at Atlantic City, New Jersey, USA. Leidy (1855) described the parasite as *Cepon distortus*, considering it congeneric with *Kepon*

typus Duvernoy (1841) from an unknown host on the Indian Ocean island of Mauritius but using an emended spelling of that name. Shortly afterward, Cornalia and Panceri (1861) created the new genus *Leidya* and re-assigned Leidy's species to it as the type-species, *Leidya distorta*, but did not examine any further material or add to the original description, which was seriously deficient in some crucial details. Despite the common occurrence of *Uca pugilator* along the carcinologically well-studied Atlantic coast of the United States, for over a century there were no further published records of *Leidya distorta*. The inadequate description and drawings presented by Leidy (1855) were repeated without further information by Bonnier (1900), Richardson (1905), Fowler (1912), Hay and Shore (1918), Miner (1950) and as recently as Schultz (1969).

Meanwhile, Pearse (1951), in a description little better than that of Leidy (1855), described the species *Leidya bimini* as a parasite of the grapsid crab *Pachygrapsus transversus* (Gibbes). Unfortunately, he failed to consider previous published citations of infestation of this widespread species. The first of these was by Müller (1871), who reported a "*Bopyrus*" infesting it in Brazil; Giard and Bonnier (1887), with no description, gave this parasite the name *Grapsicepon fritzii*, which was thus a nomen nudum. The next mention of

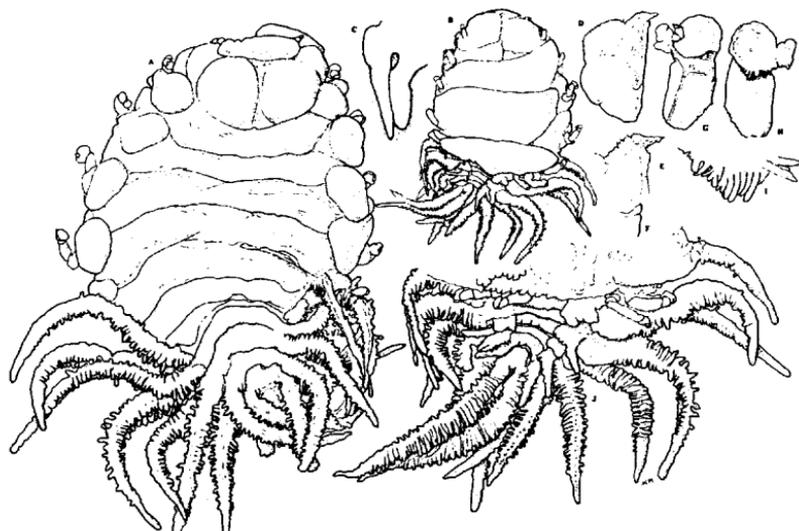


Figure 1. *Leidyia infelix*, n. sp., holotype female. A. Dorsal view. B. Ventral view. C. Right side of barbula. D. Right maxilliped. E. Pulp of same. F. Plectron of same. G. Right oostegite 1, external view. H. Same, internal view. I. Same, detail of internal ridge. J. Pleon in ventral view. Scale: 2.1 mm for B, G, H; 1.0 mm for A, D, J; 0.5 mm for C, E, F, I.

infestation of *Pachygrapsus transversus* was that of Verrill (1908) in Bermuda. Afterwards, Bourdon (1968) reported it in Bermuda, Brazil, Jamaica and the Bahamas: both of the latter authors called its parasite *Leidyia distorta*. Only when Bourdon and Bowman (1970) thoroughly redescribed the parasites of several species of *Uca* and of *Pachygrapsus transversus* in the western Atlantic did it become clear that there are two valid and distinguishable species of *Leidyia* there, *L. distorta* infesting *Uca* spp. and *L. bimini* from *Pachygrapsus* and some other grapsid crabs.

Elsewhere, mentions of the genus *Leidyia* have been almost as confusing. Pearse (1930) described *L. sesarmae* as a parasite of *Sesarma dehaani* (Milne Edwards) [now called *Chiromanes dehaani*] and *L. ucae* infesting *Uca forcipata* (Adams and White), both from Fujien, China. Unfortunately, both descriptions were severely deficient, the types have not been examined since, and no one has reported collecting either species again. In the eastern Pacific, a parasite of *Pachygrapsus crassipes* Randall has been recorded from the coasts of California and adjacent Mexico on three

different occasions (Baker 1912, Hilton 1917, Hoard 1937); it was never described but at least twice tentatively considered to belong to the genus *Grapsicepon*, while the possibility existed that it was yet another species of *Leidyia*. It is noteworthy that *Pachygrapsus transversus*, the host of *L. bimini* in the western Atlantic, also occurs along the west coast of Mexico, though it seems not to be known to harbor any bopyrid parasites there.

Recently, material of infested *Pachygrapsus crassipes* from western Mexico has become available for examination, and its parasite has proved to belong to an undescribed species of *Leidyia*. At the same time, a parasite infesting *Grapsus grapsus* (L.) on the Pacific coast of Nicaragua, which had long been present but overlooked in the collection of the Smithsonian Institution, became available for study and proved to belong to the genus *Lobocepon*. The first of these species is herein described, while the latter, only an immature female, is inadequate for description. These findings provided opportunity for reconsideration of the genera *Leidyia* and *Lobocepon* and remarks on world-wide records of bopyrid parasites infesting grapsid crabs.

II. RESULTS

Genus *Leidyia* Cornalia and Panceri, 1861

Type-species, by original designation, *Cepon distortus* Leidy, 1855

Leidyia infelix, new species

Figs. 1-2

"[P]arasitic isopod."—Baker, 1912: 102 [Laguna Beach, California; infesting *Pachygrapsus crassipes* Randall].—Schmitt, 1921: 271. *Grapsicephon* [sic].—Hilton, 1917: 25-26 [Same locality and host; study of nervous system anatomy].

"[U]nidentified parasite similar to *Leidyia* or *Grapsiceon*."—Hoard, 1937: 105-106 [Seal Beach, Laguna Beach and La Jolla, California; same host; brief description]. "Unidentified genus."—Markham, 1992: 3.

Material examined

Infesting *Pachygrapsus crassipes* Randall. San Quintín, Baja California, México, 30°28'N, 115°58'W, intertidal, 23 May 1999, C. Schmidt, collector, Sta. PC83: 1♀, holotype, USNM 230506; 1♂, allotype, USNM 230507.

Description of holotype female, fig. 1, fig. 2A, B. Length 7.9 mm, maximal width 5.6 mm, head length

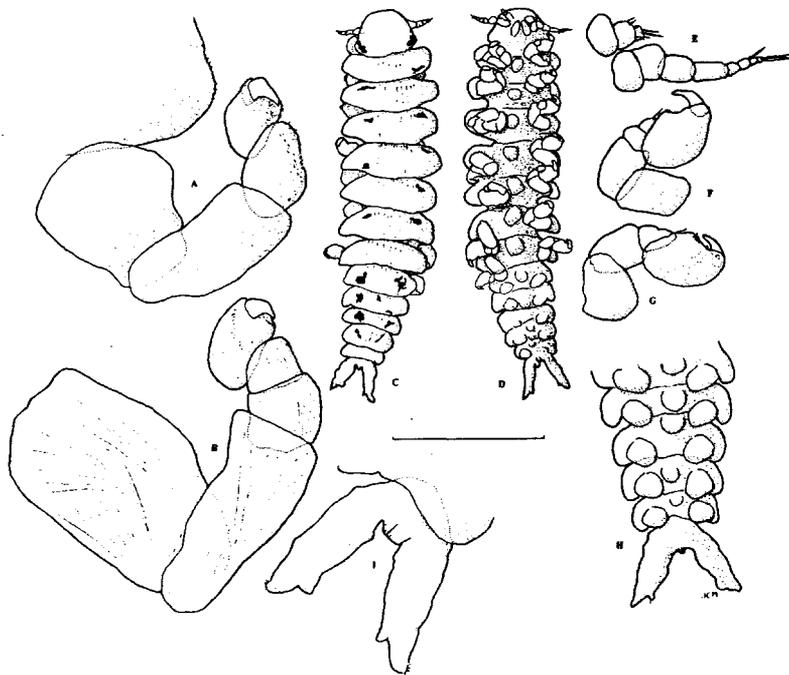


Figure 2. *Leidyia infelix*, n. sp. A, B. Holotype female. C-I. Allotype male. A. Right pereopod 1. B. Right pereopod 7. C. Dorsal view. D. Ventral view. E. Left antennae. F. Left pereopod 1. G. Left pereopod 7. H. Pleon in ventral view. I. End of pleon in ventral view. Scale: 0.4 mm for A-D; 0.2 mm for H; 0.1 mm for E-G, I.

1.8 mm, pleon length 2.2 mm. Body distortion 25°. Body, exclusive of pleopods, broadly suboval, all body regions and segments distinct (Figs. 1A, B).

Head completely embedded in pereon, its dorsal surface divided into 2 large suboval lobes; prominent frontal lamina extending across middle half of head only. Barbula (Fig. 1C) with 2 long slender flaps on each side. Maxilliped (Fig. 1D) incompletely segmented, fringed with setae anterolaterally, bluntly pointed posteriorly; produced into large medially-directed nonarticulating palp placed anteromedially (Fig. 1E); plectron (Fig. 1F) small, rounded, not extended medially.

Pereon broadest across pereomere 4, both lateral margins almost completely covered by globose coxal plates; no midventral projections. Oostegites completely enclosing brood pouch. Oostegite 1 (Fig. 1G-I) about 2½ times as long as wide, its sides nearly parallel, bluntly rounded anteriorly and slightly pointed posteriorly; both segments of same width, anterior one less than half as long as posterior one; internal ridge (Fig. 1I) of many small lanceolate projections. Oostegites 3-5 extending

clear across brood pouch, last pair covering anterior part of pleon. Pereopods (Fig. 2A, B) all extending laterally, slightly larger posteriorly, especially in bases and ischia; carpi and meri of anterior pereopods fused, others separate.

Pleon (Fig. 1A, B, I) of 6 distinct pleomeres, its sides enclosed by long lanceolate lateral plates and exopodites all of about same size and extending far out and with similar deeply digitate margins; 5 pairs of smaller foliate endopodites covering half of ventral surface of pleon, narrower but longer posteriorly, their margins crenulate. Uniramous uropods similar in structure to lateral plates and exopodites but somewhat larger, extending far posteriorly. Anal cone minute, filling margin between uropods.

Description of allotype male, Fig. 2C-I. Length 1.04 mm, maximal width 0.26 mm, head length 0.12 mm, pleon length 0.34 mm. Sides of pereon nearly parallel, head and pleon both narrower (Fig. 2C, D). Head subtrapezoidal, truncate and narrowest anteriorly, broadest just in front of posterior margin. Large

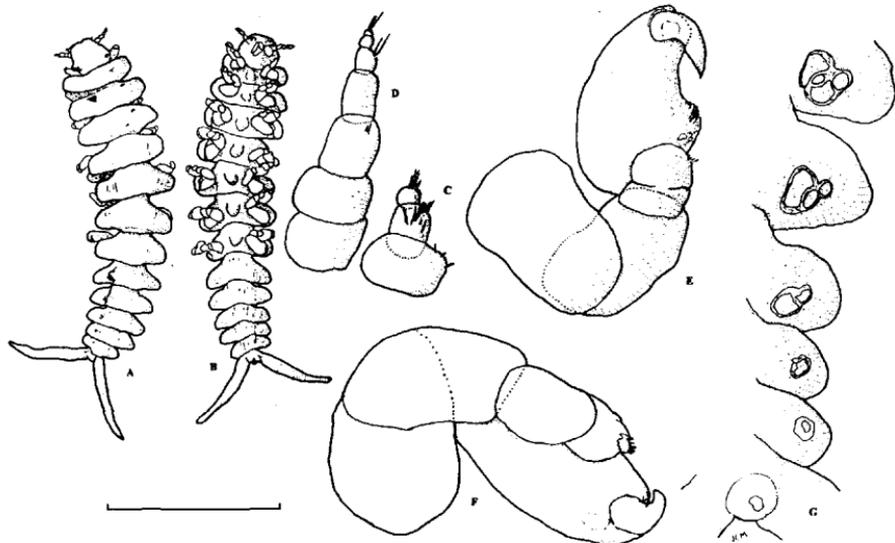


Figure 3. *Leidyia* sp., male. A. Dorsal view. B. Ventral view. C. Right antenna 1. D. Right antenna 2. E. Right pereopod 1. F. Left pereopod 7. G. Left side of pleon in ventral view. Scale: 1.15 mm for A, B; 0.20 mm for G; 0.10 mm for C-F.

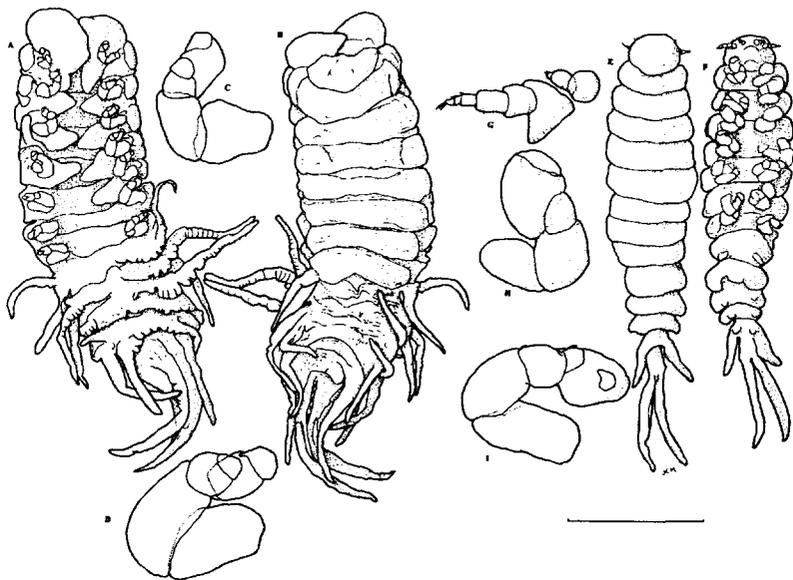


Figure 4. *Leidyia ucae* Pearse, 1930. A-D. Holotype female. E-I. Allotype male. A. Ventral view. B. Dorsal view. C. Left pereopod 1. D. Left pereopod 7. E. Dorsal view. F. Ventral view. G. Right antennae. H. Right pereopod 1. I. Left pereopod 6. Scale: 2.3 mm for A, B; 1.0 mm for E, F; 0.4 mm for C, D; 0.2 mm for G-I.

irregularly shaped dark eyespots near posterolateral corners of head. Antennae (Fig. 2E) well-developed, both terminally setose, first of 3 articles, second of 8 articles and extending far laterally from side of head; sparse setae also on middle article of antenna 1 and on antepenultimate article of antenna 2.

Pereon with pereomerites distinctly separated by anterolateral notches, all of nearly same length and width. Dark dorsal splotches near sides of most pereomerites. Prominent conical midventral tubercle on each pereomerite. Pereopods (Fig. 2F, G) all equally developed, some extending slightly beyond body margin, all articles distinct in anterior pereopods, meri and carpi fused in posterior ones.

Pleon long, tapering gradually posteriorly, of 6 distinct pleomerites. Irregularly shaped dark dorsal splotches near sides of most pleomerites. Five pairs of flaplike uniramous pleopods and 5 extended conical

midventral pleonal projections (Fig. 2H). Final pleomere (Fig. 2I) produced into extended divergent uropods, each with posteromedial process and tuft of tiny setae on posterolateral margin.

Etymology

The specific name *infelix*, "ill-fated" or "unfortunate," has been selected to denote the long inability of this species to be described, despite its having been collected originally almost 90 years ago.

Remarks

Because the two species of *Leidyia* reported from China are either poorly known or described from immature specimens only, the comparisons here deal with the two western Atlantic species, as redescribed by Bourdon and Bowman (1970). The new species, *L. infelix*, is assigned to the genus *Leidyia* by the following criteria. The

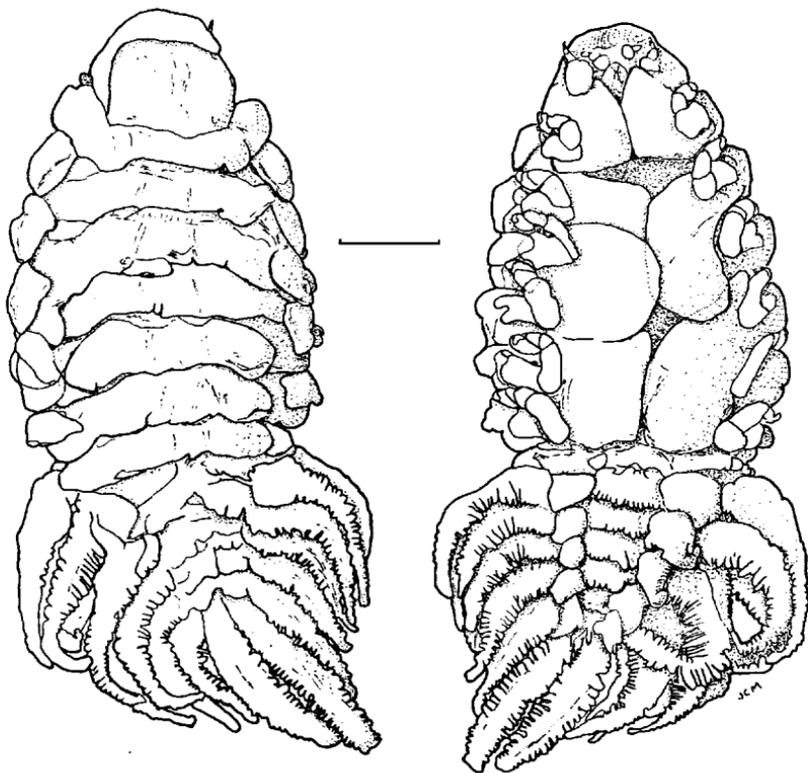


Figure 5. *Lobocepon* sp., immature female, in dorsal and ventral views. Scale: 1.0 mm.

female has only moderate body distortion; a conspicuous frontal lamina; a dorsally bilobate head; a prominent nonarticulating maxilliped palp; two long slender projections on each side of the barbula; well-developed coxal plates; 5 pairs of similar long, slender lanceolate lateral plates and pleopodal exopodites and larger but similar uniramous uropods, all with digitate margins; and 5 pairs of reduced pleopodal endopodites. It lacks the middorsal pereonal bosses of *L. distorta* and *L. bimirii*; its first oostegite, similar to that of *L. distorta*, is much more elaborate than that of *L. bimirii*; its pereopods are relatively larger and

their dactyli better developed than those of either species; and its pleonal appendages are proportionately considerably longer and its endopodites more ornamented than those of either species. The male of *L. infelix* has the long slender body, narrow head, deeply separated body segments, midventral pereonal and pleopodal tubercles and extended divergent pleopods typical of *Leidya*. Its antennae and pereopods are proportionately larger than those of either other species, and its pleopods are tuberculiform and extended rather than sessile, while its uropods are much shorter.

A new species of Leidyia and the first record of Lobocepon

Table 1. Bopyrid parasites of species of family Grapsidae.

Host species	Parasite species	Locality	Reference
<i>Amases ricordi</i> (H. Milne Edwards)	<i>Leidyia bimini</i> Pearse, 1951	S. Florida, USA	Markham, 1972
<i>Chiromantes dehaanti</i> (H. Milne Edwards)	<i>L. sesarmae</i> Pearse, 1930	Fuzhou, China	Pearse, 1930
	<i>Megacepon choprai</i> George, 1946	Okayama, Japan	Shiino, 1958
<i>Cyclograpsus integer</i> (H. Milne Edwards)	<i>Leidyia bimini</i> (?)	Jamaica	Hartnoll, 1965
<i>Episesarma mederi</i> (H. Milne Edwards)	<i>Megacepon choprai</i>	Samut Sakhon, Thailand	Markham, 1982
<i>Goetice depressus</i> (de Haan)	<i>Allokepon goetici</i> (Shiino, 1934)	Seto, Mie & Ryukyus, Japan	Shiino, 1934, 1939, 1958
		Hong Kong	Markham, 1982
<i>Grapsus albolineatus</i> Lamarck	<i>Kepon typus</i> Duvernoy, 1841	Mauritius	
<i>G. grapsus</i> (Linnaeus)	<i>Lobocepon</i> sp.	W. Nicaragua	This paper
<i>G. tenuicrustatus</i> (Herbst)	<i>L. grapsi</i> Nobili, 1905	New Guinea	Nobili, 1905
		Taiwan	Shiino, 1936
<i>Metaplex distincta</i> H. Milne Edwards	<i>Kepon orientalis</i> Markham, 1985	Phuket, Thailand	Markham, 1985
<i>M. elegans</i> de Man	<i>K. orientalis</i>	Phuket, Thailand	Markham, 1985
<i>Metapograpsus messor</i> Forskäll	<i>Grapsicepon messoris</i> (Kossmann, 1877)	Red Sea	Kossmann, 1877
<i>M. oceanicus</i> Jacquinot & Lucas	<i>Megacepon</i> (?) sp.	Sumbawa, Indonesia	Bourdon & Stock, 1979
<i>Muradium tetragonum</i> (Fabricius)	<i>Megacepon choprai</i>	Madras, India	George, 1946
<i>Pachygrapsus crassipes</i> Randall	<i>Leidyia infelix</i> , n. sp.	Calif., USA; B. Calif, Mex	This paper
<i>P. transversus</i> (Gibbes)	<i>L. bimini</i>	Bermuda; Bahamas;	Bourdon & Bowman, 1970
		Florida; Caribbean;	
		Panama; Brazil	
<i>Perisesarma maipoensis</i> (Soh)	<i>Megacepon choprai</i>	Hong Kong	Markham, 1990
<i>Planes minutus</i> (Linnaeus)	<i>Grapsicepon edwardsi</i> Bonnier, 1900	Sargasso Sea	Markham, 1988
<i>Varuna litterata</i> (Fabricius)	<i>Megacepon</i> (?) <i>pleopodatus</i> Bourdon, 1981	Sumba, Indonesia	Bourdon, 1981

Leidyia sp.
Fig. 3

Remarks

Because there was no female present in this collection, I cannot assign this specimen to species, even though it came from the same host and nearly the same locality as *L. infelix*, n. sp. As Bourdon and Bowman (1970) demonstrated in their study of *L. distorta*, there is much variation within at least that species, so it is possible that the present specimen is

Material examined

Infesting *Pachygrapsus crassipes* Randall. Intertidal, Estero de Ensenada, Baja California, México, 31°53'N, 116°35'W, intertidal, 2 December 1998, M. Torchin, coll.: 1C, USNM 000000.

actually assignable to *L. infelix*. The absence of an accompanying female here and the necessity to base the description above on only the allotype male make it impossible to be certain.

It is noteworthy that all of the characters by which the male of *L. infelix* differs from those of the western Atlantic species are absent from this male. As in the males of both Atlantic species, its pleopods are reduced to scroll-like scars, and its uropods are greatly extended. According to Bourdon and Bowman (1970), the only character by which the Atlantic species' males differ from each other is that the male of *L. bimini* has midventral tubercles on pleomeres 1-5, while in *L. distorta* they occur on only pleomeres 1-2. The present male differs from both of those species only in having no such tubercles on any pleomere, in contrast with all three species.

Leidy ucae Pearse, 1930

Fig. 4.

Leidy ucae Pearse, 1930: 12-13; pl. I, figs. 2, 4-7; pl. II, figs. 11, 12 [Type-locality Mui Hua, Foochow [=Fuzhou], Fukien [=Fujian Province], China, infesting *Uca forcipata* (Adams & White)].—Markham, 1980: 629.—Bourdon, 1981: 106.—Markham, 1982: 361, 365.

Material examined

Infesting *Uca forcipata* (Adams & White), Mui Hua, Fuzhou, Fujian Province, China, 10 April 1930, A. S. Pearse, coll.: 1 ♀, holotype, 1 ♂, allotype, USNM 66737.

Remarks

Reexamination and reillustration of the type-specimens of *L. ucae*, still the only material of this species known, confirm that the holotype is a very immature female, even though the allotype male appears essentially mature. The characters of the female are easier to assess than from the original description, but its immaturity means that it is not possible to make meaningful comparisons with other species.

Genus *Lobocepon* Nobili, 1905

Type-species, by monotypy, *Lobocepon grapsi*,

Nobili, 1905

Lobocepon sp.

Fig. 5

Material examined

Infesting *Grapsus grapsus* (Linnaeus). Masachapa (Pacific coast), Nicaragua, 11°47'N, 86°31'W, intertidal, 4 December 1955, W. Lemons, collector. 1E, immature, USNM 000000.

Remarks

Because the single female is clearly immature and unaccompanied by a male, it is unsuitable for description. Further, its assignment to the genus *Lobocepon* is somewhat doubtful, though it appears the most likely placement for this species. The only prior records of a species of *Lobocepon* are of the type-species, *L. grapsi*, reported as a parasite of *Grapsus grapsus* (evidently a reference which should have been to *Grapsus tenuicrustatus* (Herbst, 1783), because it is far outside the known range of the species now recognized as *G. grapsus*) at Tami Island, New Guinea (Nobili, 1905) and Kotosho, Taiwan (Shiino, 1936). Both Nobili (1905) and Shiino (1936) presented good descriptions of *L. grapsi*, on the basis of which I consider the present material probably to be congeneric with it. Like the female of *L. grapsi*, the present female has a well-developed frontal lamina; a faintly bilobate head; distinctly separated pereomeres and pleomeres; five pairs of biramous pleomeres, their endopodites clumped together and extended laterally, with finely serrate margins, their endopodites suboval, small, dorsomedially placed and with smooth margins; and its uniramous uropods filling the posterior gap between the exopodites and similar to them in shape and ornamentation but slightly broader than any pleopodal exopodites. The most conspicuous differences are the much broader body and the presence of large prominent tuberculate coxal plates on the first 4 pereomeres of *L. grapsi*, but these characters probably become manifest only with maturity, so it is not unexpected for the present female to lack them.

Even though its name has been cited previously as a host of bopyrid isopod, this is probably the first actual report of bopyrid infestation of *Grapsus grapsus* (Linnaeus), as presently recognized. See the discussion above about the use of the name for *Grapsus tenuicrustatus* (Herbst, 1783). Another citation of a species of *Grapsus* is probably also erroneous. Giard (1906) reported that *G. strigosus* Herbst was the long-unknown host of *Kepon typus* in Mauritius, but that reference should probably have been to *Grapsus albolineatus* Lamarck, 1818.

III. ADDENDUM

Summary of parasites of Grapsidae

This discussion of parasites of grapsid crabs of the eastern Pacific Ocean has provided a suitable opportunity to summarize published records of bopyrid parasites of crabs in the Family Grapsidae worldwide. Because some of the host species were originally recorded under names now considered incorrect or subsequently reassigned to more recently established genera, it is also timely to update those names. The parasites are summarized by host in Table 1. To date, 18 host species in 13 genera are known. Their parasites belong to 11 species in 6 genera all in the subfamily Ioninae. Most parasite species are reported from single host species, but *Leidyia bimini* infests 2 and probably 3 species in as many genera, and *Megacepon choprai* infests 4 host species, all in different genera.

ACKNOWLEDGEMENTS

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