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A New Shrimp Host for *Parabopyrella lata* (Nierstrasz and Brender à Brandis, 1929) (Crustacea: Isopoda: Bopyridae) from the Florida Gulf Coast: A Novel Host–Parasite Relationship or a Case of Mistaken Identity?

CHRISTOPHER B. BOYKO

Identification of a bopyrid isopod found on a specimen of *Lysmata wurdemanni* (Gibbes) showed that it was not conspecific with the only known bopyrid parasite found on that host, *Parabopyrella mortensi* (Nierstrasz and Brender à Brandis, 1929). Instead, it is identifiable with a congeneric species, *Parabopyrella lata* (Nierstrasz and Brender à Brandis, 1929), formerly known only from alpheid shrimp hosts. A brief discussion of the implications of this finding on the question of level of host specificity is given, and evidence suggesting an accidental occurrence of the parasite on the host, rather than a successful host switch.

Bopyrid isopods have complex life cycles with three distinct larval stages: females brood *epicaridean* larvae that locate, transform, and feed on copepods as *microniscus* larvae, and transform yet again into *cryptoniscus* larvae that seek out the definitive decapod host where the final metamorphosis occurs to the adult form. Adult bopyrid isopods of the subfamily Bopyrinae are obligate ectoparasites found in the branchial chamber of caridean shrimps, with the females feeding directly on the hosts and the smaller, less-modified males living in association with females. Although little is known about the host–parasite specificity of *microniscus* larvae, the degree of specificity of host–parasite relationships between the adults of bopyrid species and their hosts is known to be quite variable. The level of variability appears to differ between the nine bopyrid subfamilies, so the discussion here is restricted to the shrimp-infesting Bopyrinae, where it ranges from species of parasites that are found only on one species of host [e.g., *Probopyrinella latreuticola* (Gissler, 1882) on *Latreutes fucorum* (Fabricius) (Hippolytidae)], to species on a few species in one genus of host [e.g., *Synsynella deformans* Hay, 1917 on *Synalpheus longicarpus* (Herrick), *Synalpheus brooksi* Coutiere, and *Synalpheus pectiniger* Coutiere (Alpheidae)]. Even the most widespread and least host-specific bopyrines are usually found on host species of only one or two families of shrimp, although not ones that are necessarily very closely related [e.g., *Bopyroides hippolytes* (Kröyer, 1838) on numerous species of Hippolytidae and Pandalidae (see Markham, 1985; Boyko, 2004)]. Usually, the more times a bopyrine species is found, the greater the detail of the level of host specificity becomes appar-

ent (i.e., the bopyrine can be seen to be species specific, genus specific, or otherwise).

Recently, I examined a parasitized *Lysmata wurdemanni* (Gibbes) [Hippolytidae] from the Gulf Coast of Florida and now in the collections of the Yale Peabody Museum (YPM). I expected the parasite to be identifiable as the relatively common and only known bopyrine found on *Lysmata wurdemanni*: *Parabopyrella mortensi* (Nierstrasz and Brender à Brandis, 1929). It has been estimated that 50% of *L. wurdemanni* caught by commercial fishermen in Biscayne Bay, FL, possess conspicuous swellings on their carapaces, presumably caused by *P. mortensi* as all examined specimens from *Lysmata* hosts have proved to be that species (VanArman and Smith, 1970; Markham, 1985). In addition, *P. mortensi* is found on a congeneric host, *Lysmata rathbunae* Chace (Markham, 1985). I was therefore surprised to discover that this female specimen (no male was present) did not show the diagnostic characters of *P. mortensi*. Further study was therefore required to determine if this was a new species of bopyrine from *Lysmata*.

MATERIALS AND METHODS

The following material was examined: one female bopyrid, 9.6 mm × 8.3 mm (YPM 35864), ex left branchial chamber of female *Lysmata wurdemanni* (Gibbes), 14.7 mm carapace length (incl. rostrum) (YPM 35863), Florida, Lee County, Pine Island Sound, Palmetto Key (also known as Cabbage Key), north shore of key, eel grass, coll. M. B. Bishop, 18–20 Jan. 1939. Camera lucida sketches made of specimens were scanned into a Macintosh[®] computer. Images were then prepared using the

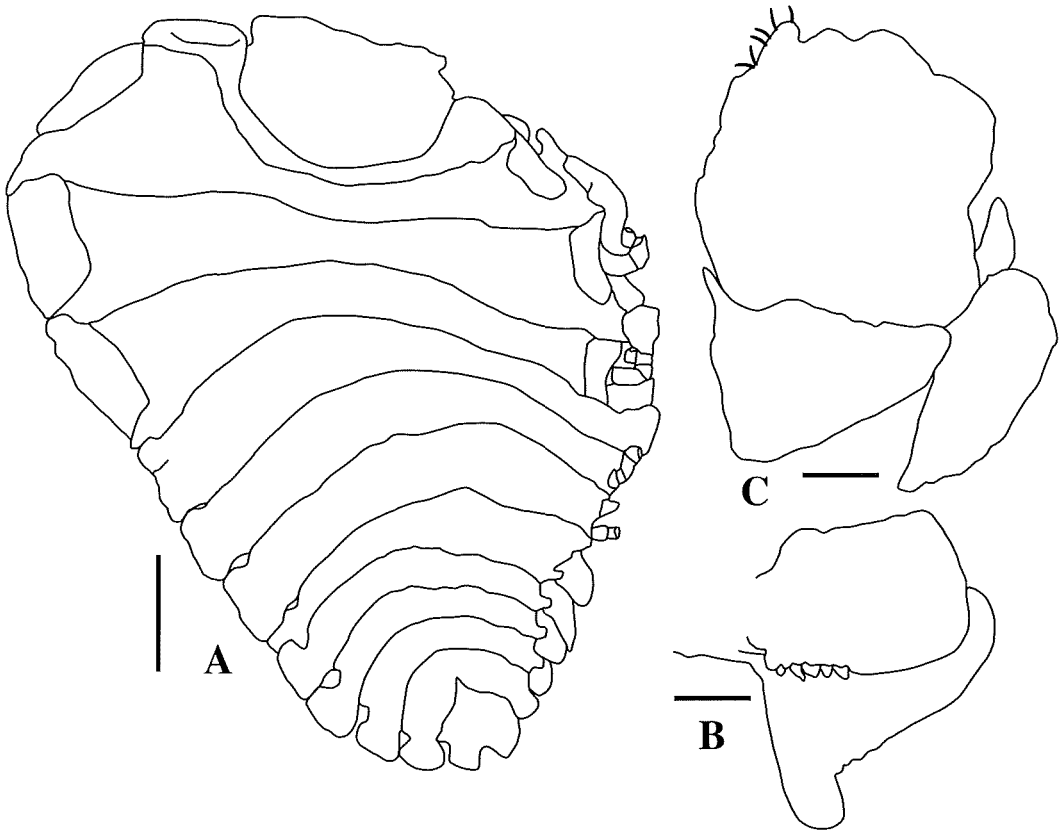


Fig. 1. *Parabopyrella lata* (Nierstrasz and Brender à Brandis, 1929), female, 9.6 mm, ex *Lysmata wurdemanni* (Gibbes). (A) Dorsal view. (B) Left oostegite I, internal view. (C) Left maxilliped, external view. Scales = 2.0 mm (A), 1.0 (B), 0.5 mm (C).

programs Adobe Photoshop[®] and Adobe Illustrator[®].

TAXONOMIC RESULTS AND DISCUSSION

Examination of the female bopyrid showed that, although clearly a member of the genus *Parabopyrella* Markham, 1985, it differed considerably from the only known bopyrine parasite of *Lysmata* spp.: *P. mortensi*. In fact, all the diagnostic characters indicate that it belongs to *Parabopyrella lata* (Nierstrasz and Brender à Brandis, 1929), previously known only as a parasite of *Alpheus normanni* Kingsley (also possibly from another species or multiple species of *Alpheus*) from southeast Florida, the Virgin Islands, and southern Brazil (Markham, 1985). There is a record of *P. lata* from a *Upogebia* (Lemos de Castro, 1965) in Brazil but Markham (1985) rightly considers this record as suspect because bopyrid species, no matter their level of host specificity, are not known to cross over infraordinal host divisions.

Important differences between females of *P. mortensi* and *P. lata* include the following: 1) the shape of the anterior body in dorsal view (much broader in *P. lata*, see Fig. 1A), 2) the development of the dorsolateral bosses and coxal plate on the first pereomere (irregular and asymmetrical in *P. lata* vs smoothly rounded and symmetrical in *P. mortensi*), 3) the shape of the pleotelson (medially indented in *P. lata* vs smoothly rounded in *P. mortensi*), 4) the shape of the posterior portion of the first oostegite [broadly rounded and weakly curved in *P. lata* (see Fig. 1B) vs narrowly pointed and distinctly curved in *P. mortensi*], and 5) maxilliped spur shape and palp setation [elongate spur with few palp setae on *P. lata* (see Fig. 1C) vs short spur with numerous palp setae in *P. mortensi*]. Based on all of these characters, the female from *L. wurdemanni* is clearly identifiable with *P. lata*.

Identification of this parasite as *P. lata* raises the question of host specificity for *Parabopyrella* species. Almost all of the 26 species and one

subspecies of *Parabopyrella* are known to parasitize only a single species (rarely two or three species within a genus) of hippolytid or alpheid host (Bourdon, 1980; Markham, 1985, 1990). The only clear exception is *Parabopyrella pacifica* (Shiino, 1933), which is recorded as occurring on one species each in *Synalpheus* and *Betaeus* (both Alpheidae). The only previous record for intergeneric parasitization is for *Parabopyrella choprai* (Nierstrasz and Brender à Brandis, 1929) that was recorded from both an *Alpheus* and a "*Hippolyasmata vittata* Stimps. oder *Synalpheus* spec.," which would also be an instance of interfamilial parasitization if it could be verified. However, there is obvious doubt about the second host for *P. choprai*, probably because of loss of the host and subsequent guessing as to its identity. Another species of bopyrid, *Parabopyrella nierstraszi* (Chopra, 1930), is definitely known to parasitize *Lysmata vittata* (Stimpson), and it seems probable that *P. choprai* is actually only found on hosts in two genera of alpheids and not on hippolytids. In fact, almost all the species of *Parabopyrella* are known only from alpheid hosts, with only four species [*Parabopyrella thomasi* (Nierstrasz and Brender à Brandis, 1929), *P. mortensi*, *P. nierstraszi*, and *Parabopyrella saronae* (Bourdon and Bruce, 1979)] being known from hippolytid shrimp (the host of *Parabopyrella perplexa* Markham, 1990, is unknown).

As can be seen from the above discussion, there is no clear precedent for recognizing hosts in two different families for any *Parabopyrella* species. Thus it appears that *Lysmata* is an accidental or incidental host of *P. lata* (sensu Roberts & Janovy, 2005: 4), as evidenced by the fact that *P. lata* has been recorded several times and always on *Alpheus* spp. (excepting the spurious record from a *Upogebia*). Additionally, *P. mortensi* has been reported numerous times from *Lysmata* spp., and the occurrence of *P. lata* on the same host species of shrimp as *P. mortensi* would result in competition between these two closely related species (the ranges of both overlap considerably). The barren reproductive condition of the female *P. lata* from *Lysmata* (also lacking a male) suggests that the female had not mated which may be explained by the host-seeking cryptoniscid stage making an incorrect choice of host. Such a scenario would explain the mature female, although of a large size, lacking both an accompanying male and/or eggs or epicaridean larvae. Based on previous records of host-parasite associations and the reproductive status of the female bopyrid, I conclude that this occurrence of a *P. lata* female on a *Lysmata wurdemanni*

host was the result of an unfortunate choice by the cryptoniscid larva and one unlikely to have led to a successful host switch for *Parabopyrella lata*. In fact, it is likely that most incorrect host choices by cryptoniscid larvae fail to result in successful host switches, but in those rare cases when they do they open up a new host niche which can be rapidly exploited, as seems to be the case in the trans-Pacific migration and subsequent population explosion of *Orthione griffenis* Markham, 2004 (Pseudioninae) on the thalassinoid *Upogebia pugettensis* (Dana) in the Pacific Northwest of the United States (Floyd, 2005). Because of the rarity of such host switches, it therefore unlikely that an increase in prevalence of *P. lata* on *L. wurdemanni* will be found, but only diligent examination of additional host specimens will provide data to support or refute this hypothesis.

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NOTE ADDED IN PROOF

Reexamination of the host shrimp was made in light of the recent revision of the genus *Lysmata* in the western Atlantic by Rhyne and Lin (2006) and it is clearly a specimen of *L. boggei* Rhyne and Lin, 2006, rather than a *L. wurdemanni*. This reidentification does not alter the conclusion of improper host choice by the parasite on a non-alpheid host. According to Rhyne and Lin (2006), it appears that references to *L. wurdemanni* by Van Arman and Smith (1970) and Markham (1985) in the eastern Gulf of Mexico refer to *L. boggei*, and that all Markham's (1985) references to *L. rathbunae* refer to *L. pedersoni* Rhyne and Lin, 2006. *Lysmata wurdemanni* is not, therefore, currently known as a host for *Parabopyrella mortensi*.