



A probable non-annelid origin of pods attached to *Amaeana ellobophora* (Annelida: Polycirridae)

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There is an alternative explanation to the proposal by Nogueira *et al.* (2015) that the polycirrid *Amaeana ellobophora* Nogueira, Carrerette & Hutchings, 2015 is a species which broods eggs in attached cocoons. We suggest that the pods observed fixed to the anterior of one worm are instead highly modified parasitic copepods (Arthropoda: Crustacea: Copepoda: Poecilostomatoida), and thus do not provide any information on the reproductive mode of *Amaeana* Hartman species.

When *Amaeana ellobophora* from Moreton Island, Queensland was newly described by Nogueira *et al.* (2015), the species name, which alludes to pod-bearing, was in reference to "egg cocoons" attached to the prostomium of one paratype. The authors stated that it seems likely that *Amaeana* species "brood their embryos", that an attached cocoon (pod) was "a character which has not been found in any other species examined to date", and that "such [a] brooding method has never been observed in any other species of Terebelliformia" (Nogueira *et al.* 2015: 4, 33).

The brooding of larvae (inside the tube or burrow) in simple gelatinous egg masses or enclosed by fragile capsules secreted by the worms would not be unusual reproductive modes in Terebellidae and relatives (e.g., Thorson 1946; Blake 1991; Wilson 1991), whereas here the pods clearly had a substantial outer "skin", and were attached narrowly at one end to the anterior of the worm itself rather than deposited along the tube/burrow wall. These were the factors that prompted Nogueira *et al.* (2015) to state that the brooding method was novel.

However, there are past reports of uncommon reproductive modes for annelid species that have become embedded in review literature, but have not been confirmed or observed subsequently. For example, the viviparity of the ampharetid *Alkmaria romijni* Horst enigmatically asserted by Wesenberg-Lund (1934), was not confirmed elsewhere (Cazaux 1982), and still lacks subsequent verification (Rouse & Pleijel 2001: 241), but nevertheless has been treated as factual in reviews (e.g., Ostrovsky *et al.* 2015). It is therefore important that new reports of unusual reproductive modes be based on a sound interpretation of the data.

A figure of an apparent cocoon-bearing *Amaeana* was first published in Hutchings & Glasby (1986: 322 Fig.1). They described "a peculiar reproductive structure" present in "a few" *Amaeana trilobata* (Sars) specimens from Queensland (Australian Museum lots AM W.10341 and AM W.7047), in which "two long, cylindrical and transparent egg tubes were attached distally to a larger, thicker walled sac which was in turn attached by a narrow neck to the tentacular membrane. A duct connected this structure with the coelom." They further commented that the "significance of this reproductive adaptation is unclear." The figured specimen (AM W.10341) was collected from Calliope River, Gladstone. However, it was long ago pointed out to one of us (GBR) that the structure appeared to be an attached parasitic copepod. This identification as a copepod was acknowledged as being correct by the original authors in an unrelated article (Hutchings & Glasby 1988: 53), in which they stated that the *Amaeana* copepod had been "wrongly interpreted as an egg sac" in 1986, and is supported by the opinion of an expert copepodologist (G. Boxshall, personal communication, August 2015).

Sac-like copepods are known to parasitize Terebelliformia annelids, including polycirrids, and may have external structures very similar to those reported by Nogueira *et al.* (2015) (e.g., Caullery 1915: 247 Fig. 2; Wesenberg-Lund 1951: 117 Fig. 11). These parasites gain sustenance by maintaining a permanent attachment duct into their host's interior. The anatomy of *Xenocoeloma alleni* (Brumpt), which is one such parasite of a *Polycirrus*, has been studied in detail (Bocquet *et al.* 1970). Additionally, a recent review of annelidicolous copepods lists a number of instances of copepod infestations of *Polycirrus* species, predominately by xenocoelomatids (Conradi *et al.* 2015: 21). Occurrence rates of sac-