

## ***Elthusia arnoglossi* sp. nov. (Crustacea: Isopoda: Cymothoidae), a branchial parasite of flatfishes (Bothidae) from the Chesterfield Islands, New Caledonia**

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### **Abstract**

The cymothoid isopod *Elthusia arnoglossi* sp. nov., a branchial parasite of *Arnoglossus* sp. (Teleostei, Bothidae) from the Chesterfield Islands, New Caledonia (southwestern Pacific), is described and figured. The new species is characterised by the asymmetric body of the female, always twisted to the right side, antenna composed of 18 articles in both sexes, all female pereopods with a distinctly dilated merus and uropods almost reaching posterior margin of pleotelson in both sexes; males have the body with pereonites 1–3 distinctly wider than pereonites 4–5 and a well developed appendix masculina. Within the genus the species is similar only to *E. samariscii* (Shiino, 1951), a parasite of *Samaris cristatus* (Teleostei, Samaridae) from the Indo-Pacific. *E. arnoglossi* is the first *Elthusia* reported on fish from the genus *Arnoglossus*.

**Key words:** *Elthusia*, Isopoda, Cymothoidae, Bothidae, Chesterfield Islands, New Caledonia, parasites

### **Résumé**

*Elthusia arnoglossi* sp. nov. (Crustacea: Isopoda: Cymothoidae), parasite branchial de poisson plat (Bothidae) des Îles Chesterfield, Nouvelle-Calédonie. L'isopode Cymothoidae *Elthusia arnoglossi* sp. nov., parasite branchial de *Arnoglossus* sp. (Teleostei, Bothidae) des Îles Chesterfield, Nouvelle-Calédonie (Pacifique sud-ouest), est décrit et figuré. La nouvelle espèce est caractérisée par le corps asymétrique de la femelle, toujours tordu du côté droit, des antennes composées de 18 articles dans les deux sexes, tous les péreïopodes de la femelle avec un mérus nettement dilaté et des uropodes qui atteignent presque le bord postérieur du pléotelson dans les deux sexes. Les mâles ont des péreïonites 1–3 nettement plus larges que les péreïonites 4–5 et un appendix masculina bien

développé. À l'intérieur du genre l'espèce est proche seulement de *E. samariscii* (Shiino, 1951), parasite de *Samaris cristatus* (Teleostei, Samaridae) de l'Indo-Pacifique. *E. arnoglossi* est le premier *Elthusa* trouvé chez un poisson du genre *Arnoglossus*.

## Introduction

*Elthusa* Schioedte & Meinert, 1884 has most recently been redefined and revised by Bruce (1990), and now contains at least 27 nominal species. Most species are known from the Pacific or from the Indo-Pacific area (Kensley *et al.* 2006). Only four species have been reported from the Atlantic and apparently there are no records from the Mediterranean; several of these species still remain incompletely described and identified, and for many of them hosts are still unknown (Trilles 1994).

Marine isopods are among the most poorly studied of Crustacea groups in many regions of the world, particularly in tropical regions. Unsurprisingly, the cymothoid fauna of New Caledonia which includes the Chesterfield Islands is still largely unstudied. During the EBISCO cruise (October 2005) arranged by IRD (Institut de Recherche pour le Développement, France) in the Chesterfield Islands, several specimens of a new species of *Elthusa* were collected from flatfishes of the genus *Arnoglossus* Bleeker, 1862 (Teleostei, Bothidae).

In this article, we describe all stages (ovigerous and non-ovigerous female, male and manca larvae 1) of the new species.

## Materials and methods

Host fishes were collected by trawls on RV *Alis*; hosts infected with cymothoids were selected and immediately fixed in 70% ethanol. Isopods were removed later from the gill chamber of host fish, measured for total length (TL) and maximum width, and preserved in 70% ethanol. All measurements are in millimetres. Mouthparts and appendages were carefully dissected and figures were drawn using a camera lucida.

All specimens are deposited in the collection of the Muséum national d'Histoire naturelle, Paris (MNHN) as well as the infected fishes. Identification of the hosts was performed by Dr. M. Desoutter (MNHN). Other fish taxonomy is according to Froese & Pauly (2006).

## Family Cymothoidae Leach, 1814

### Genus *Elthusa* Schioedte & Meinert, 1884

*Elthusa* Schioedte & Meinert, 1884: 337; Bruce, 1990: 254

*Type species*

*Livoneca emarginata* Bleeker, 1857, by monotypy (Schioedte & Meinert 1884). One of Bleeker's type specimens reported and figured by Schioedte & Meinert from the Rijksmuseum von Natuurlijke Historie, Leiden, is apparently lost and not available (Trilles 1979). One female syntype is held in this museum (Bruce 1990) and one representative specimen (an ovigerous female probably observed by Schioedte & Meinert (1884) from Ambon under the gill-cover of an upeneid fish) is held in the MNHN, Paris, under registration number 241 (Trilles 1976).

*Species now included in the genus Elthusia*

**From the Pacific:** *Elthusia californica* (Schioedte & Meinert, 1884), *E. caudata* (Schioedte & Meinert, 1884), *E. foveolata* (Hansen, 1897), *E. frontalis* (Richardson, 1910), *E. intermedia* (Nierstrasz, 1931), *E. menziesi* (Brusca, 1981), *E. myripristae* Bruce, 1990, *E. neocyttia* (Avdeev, 1975), *E. ochotensis* (Kussakin, 1979), *E. philippinensis* (Richardson, 1910), *E. parabothi* Trilles & Justine, 2004, *E. puhi* (Bowman, 1960), *E. sacciger* (Richardson, 1909), *E. samoensis* (Schioedte & Meinert, 1884), *E. sigani* Bruce, 1990, *E. splendida* (Sadowsky & Moreira, 1981), *E. turgidula* (Hale, 1926); also the new species described in this work *Elthusia arnoglossi* sp. nov.

**From the Indo-Pacific:** *Elthusia nanoides* (Stebbing, 1905), *E. propinqua* (Richardson, 1904), *E. raynaudii* (Milne-Edwards, 1840), *E. samariscii* (Shiino, 1951), *E. vulgaris* (Stimpson, 1857).

**From the Atlantic:** *Elthusia alvaradoensis* Rocha-Ramirez *et al.*, 2005, *E. atlantiroi* (Kononenko, 1988), *E. methepia* (Schioedte & Meinert, 1884) and *E. tropicalis* (Menzies & Kruczynski, 1983).

***Elthusia arnoglossi* sp. nov.**

(Figs 1–4)

*Material examined*

**Holotype.** ♀ (ovig, 11.0 mm), MNHN–Is 5893. Chesterfield Islands, Banc Nova Nord, EBISCO cruise, RV *Alis*, station CP 2539, 10 October 2005, 22°20'S, 159°24' E, depth 315–320 m.

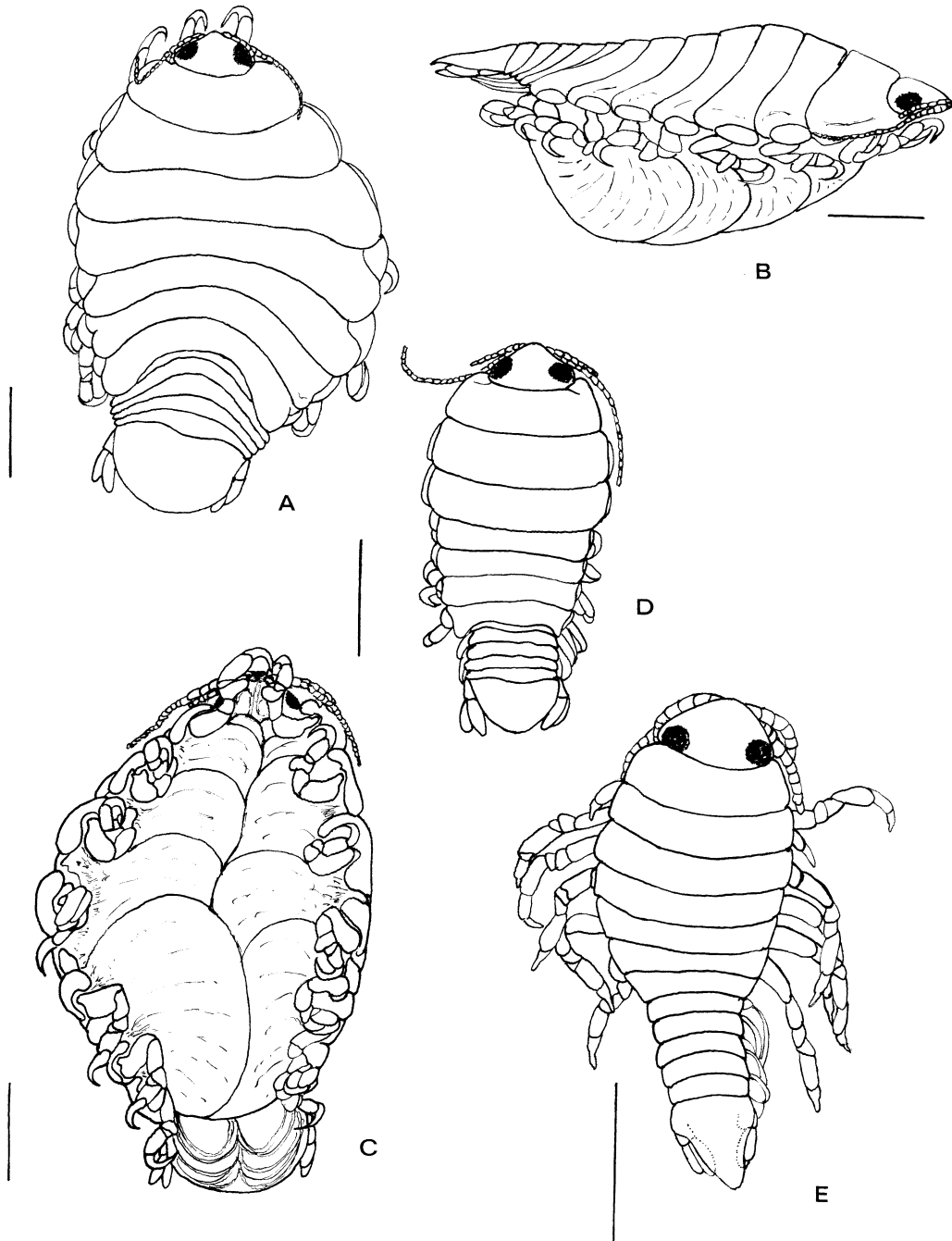
**Paratypes.** Allotype, ♂ (7.0 mm), MNHN–Is 5894; 23 ♀ (16 ovig, TL 9.0–13.0 mm; 7 non-ovig, TL 10.5–13.0 mm); 2 intermediate stages (8.5–9.0 mm); 4 ♂ (6.5, 7.0, 7.5 and 8.5 mm), MNHN–Is 5895, 5896, 5897, 5898. Parasite collection number JNC1639.

*Type-host*

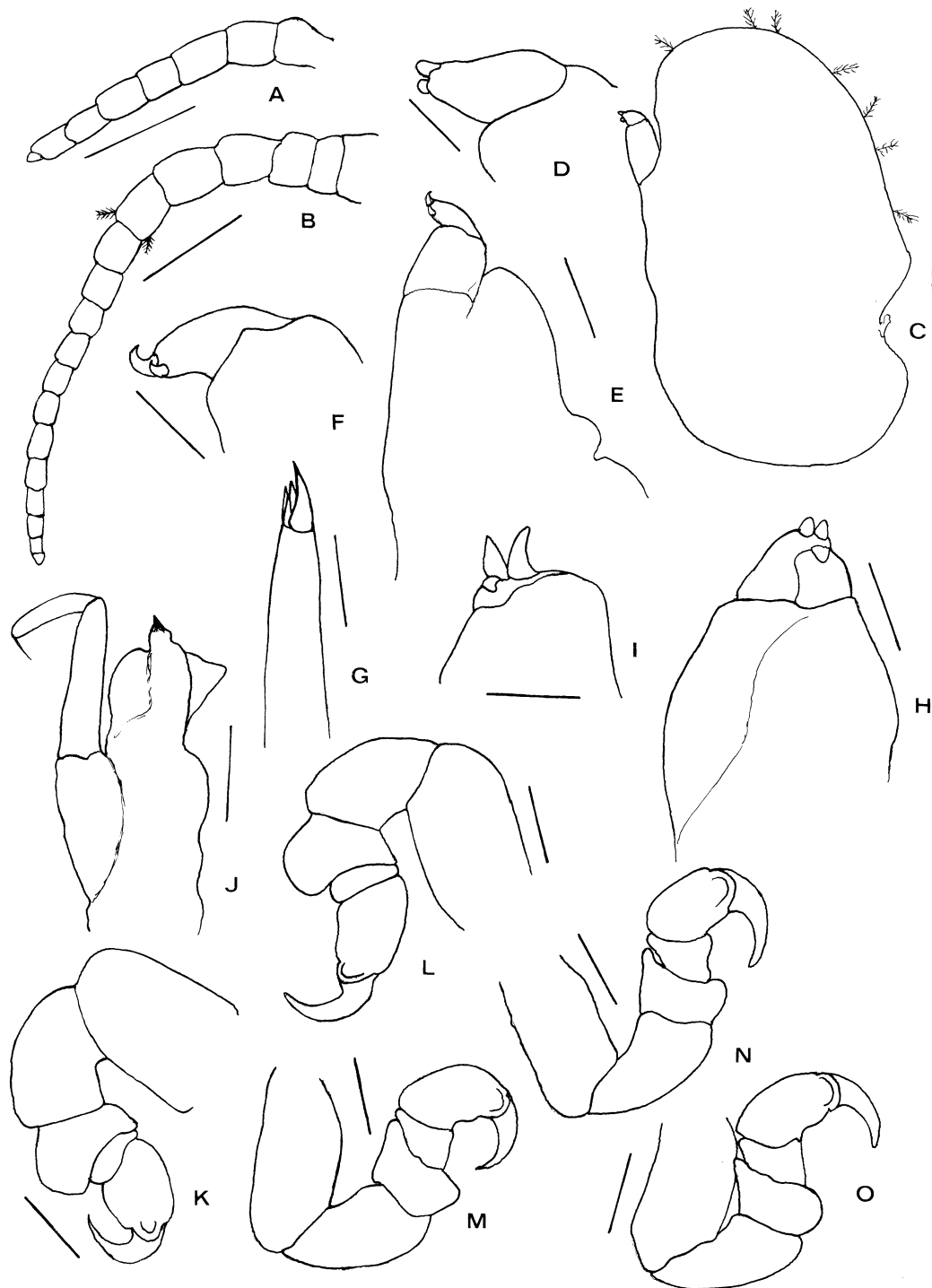
*Arnoglossus* sp. The fish specimens could not be identified at the species level and are either *Arnoglossus polyspilus* (Günther, 1880) or *A. japonicus* Hubbs, 1915 (Pleuronectiformes, Bothidae). They are deposited in the collections of the MNHN under number 2006–0759.

*Site of attachment*

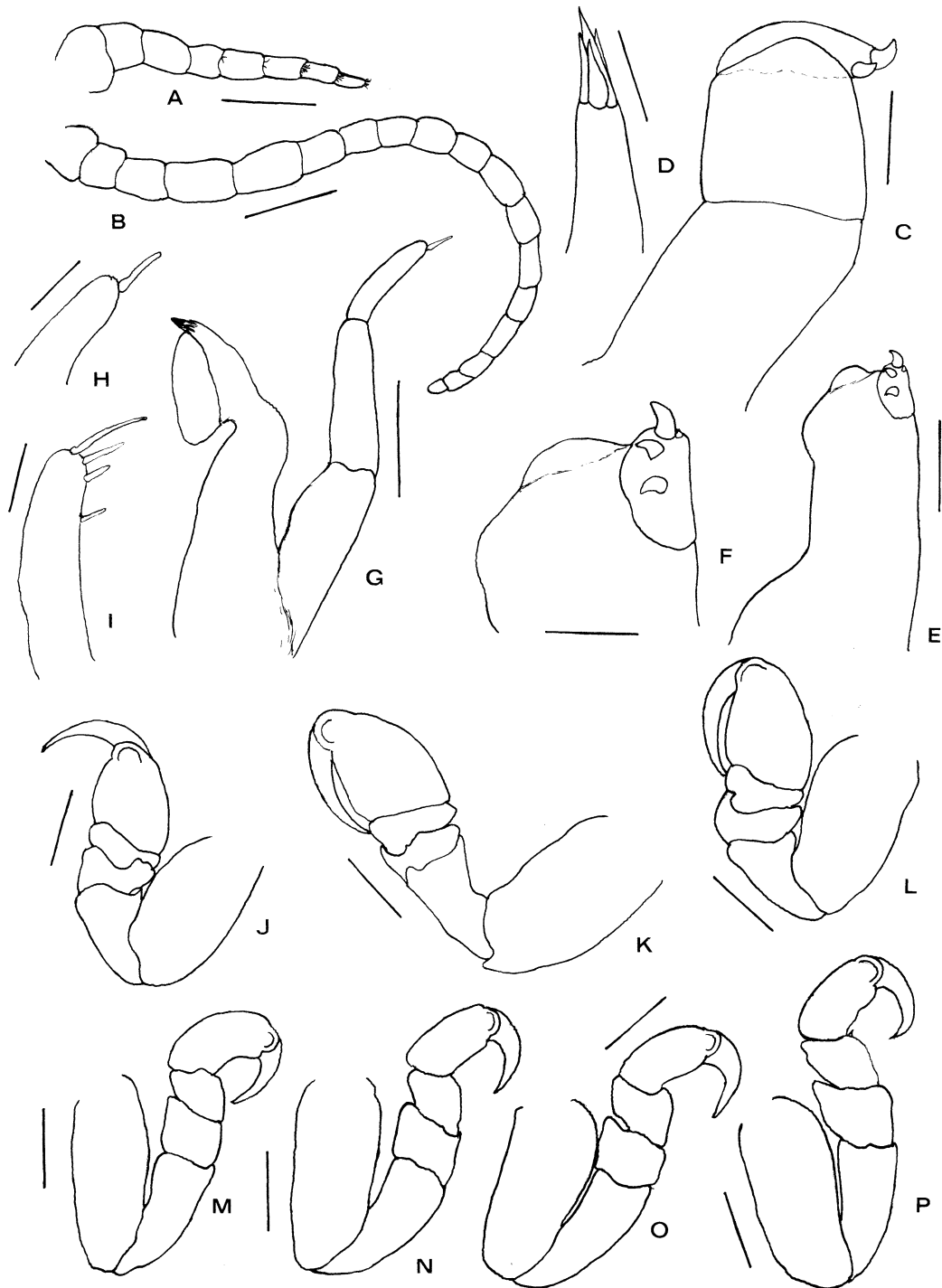
The female occurs only in the lower gill chamber, attached to the branchial arches, with the head facing the buccal cavity; the male usually settles beneath the female.



**FIGURE 1.** *Elthusa arnoglossi* sp. nov. A–C, holotype, ♀, ovigerous. A, dorsal view; B, lateral view; C, ventral view; D, allotype, ♂. E, manca larva 1. Scale bars: 2 mm (A–D); 0.5 mm (E).



**FIGURE 2.** *Elthusa arnoglossi* sp. nov., paratype ♀, ovigerous. A, antennule; B, antenna; C, maxilliped; D, maxilliped apex; G, maxillule; H, maxilla; J, mandible; K–L, pereopods 1–2; M–O, pereopods 5–7; paratype ♀, non-ovigerous. E, maxilliped; F, maxilliped, apex; I, maxilla. Scale bars: 0.5 mm (A, B, C, K, L, M, N, O); 0.2 mm (E); 0.1 mm (F, G, H, I, J); 0.05mm (D).



**FIGURE 3.** *Elthusa arnoglossi* sp. nov., paratype ♂. A, antennule; B, antenna; C, maxilliped; D, maxillule, apex; E, maxilla; F, maxilla, apex; G, mandible; H–I, mandible palp, apex; J–P, pereopods 1–7. Scale bars: 0.5 mm (A, B, J, K, L, M, N, O, P); 0.2 mm (G); 0.1 mm (C, E); 0.05 mm (D, F, H, I).



**FIGURE 4.** *Elthusia arnoglossi* sp. nov., paratype ♀, ovigerous. A–E, pleopods 1–5; F, uropod; paratype ♂: G–K, pleopods 1–5; L, uropod. Scale bar: 0.5 mm (A–L).

*Etymology*

The species name is derived from that of the host genus, *Arnoglossus*.

*Description of ovigerous and non-ovigerous females* (Figs 1A–C, 2A–O, 4A–F)

*Body* about 1.5 times as long as wide, widest at pereonite 4, asymmetrical, deeply twisted to the right side. *Pereon* slightly vaulted at the level of pereonites 2–4.

*Cephalon* about 1.6 times as wide as long, roughly triangular, anterior margin acute in dorsal view, with minute rostral point, posterior margin broadly rounded, not enclosed in the pereonite 1. Eyes about 0.5 times width of cephalon, ovate, black. Coxal plates of pereonites 2–7 more or less visible in dorsal view.

*Pereon* broad, about 1.15 as wide as long, always twisted to the right side. Pereonite 1 longest, 2–4 progressively decreasing in length, 5–7 shortest and subequal in length. Posterior margin of pereonite 7 deeply curved. Pereonites 3–4 are expanded on the right side compared to the left.

*Pleon* about 1.8 as wide as long; all pleonites visible; pleonite 1 shorter and narrower than others, partially covered by pereonite 7; pleonites 2–5 progressively narrower towards posterior, 2–4 subequal in length, 5 longest with posterior margin widely bisinuate. Pleotelson hemispherical, about 1.6 times as wide as long, posterior margin rounded.

*Brood pouch* (filled with eggs, embryos or manca larvae) of the ovigerous female is prominent in lateral view and made up of five pairs of alternatively overlapping oostegites arising from sternites 1–5, anterior pair partly overlapping mouth parts.

*Antennule* much shorter than antenna, with 8 articles, reaching posterior of cephalon, basal articles nearly in contact; *Antenna* with bases wide apart, composed of 18 articles, extending to or beyond posterior margin of pereonite 1, proximal article 6 sometimes with 2 plumose setae respectively on the anterodistal and posterodistal angles. *Mandible* incisor acute but reduced, molar prominent; palp slender, article 1 widest and article 2 longest, sometimes with only a single setae on distolateral margin of article 3. *Maxillule* with 1 large and 3 small spines. *Maxilla* with 3 blunt spines on lateral lobe in ovigerous female (Fig. 2H), 2 of which longer, recurved and acute in non-ovigerous female (Fig. 2I). *Maxilliped* with oostegial lobe bearing some plumose setae and distal article of palp with 2 blunted spines in ovigerous female (Fig. 2C–D), recurved and acute in non-ovigerous (Fig. 2E–F).

*Pereopods* almost similar with distinctly dilated merus, humped, decreasing slightly in size from pereopod 1 to 7, dactyli short and basis without carina. Propodus of all pereopods short, about as long as combined lengths of merus and carpus; ischium of pereopods 1–3 about 0.6–0.7 length of basis; ischium and basis of pereopods 4–7 nearly subequal.

*Pleopods* with all rami lamellar, decreasing progressively in size, exopod slightly larger than endopod; all pleopods without coupling hooks on peduncle medial margin and folding or accessory lobes on endopod.

Uropods short, almost reaching posterior margin of pleotelson, biramous, rami unequal, exopod shorter than endopod, apices blunted pointed.



*Description of male* (Figs 1D, 3A–P, 4G–L)

Smaller than the female. *Body* roughly bilaterally symmetrical, about 2.1 as long as wide, widest at pereonite 3.

*Cephalon* subtriangular about 1.7 as wide as long, slightly immersed in pereonite 1, anterior margin in blunted point. Eyes visible, about 0.6 times width of cephalon.

*Pereonites* 1–3 distinctly longer and wider than 4–7 subequal in length but decreasing progressively in width. Coxae of pereonite 2–7 more or less visible in dorsal view.

*Pleon* about 1.6 as wide as long and about 0.45 width of pereon, lateral margins sub-parallel. All pleonites visible, pleonite 1 shorter than others, 2–4 subequal in length, fifth slightly longest with posterior margin widely bisinuate. Pleotelson about 0.5 times as long as wide, subtriangular to posteriorly round.

*Antennule* and *antenna* similar to female, but antennule with some very little setae on distal margin of articles 1–5 and antenna extending to the pereonite 3. Mouthparts similar to female but mandible palp article 3 sometimes with more setae.

All *pereopods* sub-similar, without dilated merus, but dactyli 1–3 relatively longest.

*Pleopod* 2 with appendix masculina, approximately 0.7 as long as endopod.

*Uropod* rami subequal, bluntly rounded, exopod larger than endopod, extending to posterior of pleotelson.

*Manca larvae* 1 (Fig. 1E)

The specimen reproduced in Figure 1E is at the intramarsupial stage 1 (*manca larvae* 1 or *pulli* 1) with 7 pereonites but only 6 pereopods and characterized by: enlarged cephalon, sub-triangular; ovate pereon and narrowed pleon with sub-parallel margins; acute pleotelson with posterior margin rounded; uropods short, both rami broadly rounded, not reaching posterior margin of pleotelson.

*Colour*

Female and male yellowish.

*Size range*

Ovig ♀: 9.0–13 mm in body length; non-ovig ♀: 10.5–13.0 mm; intermediate stage: 8.5–9.0 mm; ♂: 6.5–8.5 mm.

*Remarks*

The genus *Elthusa* Schioedte & Meinert, 1884, briefly defined in Latin by the Danish authors, was recently clearly redefined by Bruce (1990) who at that time recognized 25 species, including several incompletely described and characterized. Twenty eight species are now recognized, most species (24) being known from the Pacific or Indo-Pacific area. Only 4 species are reported from the Atlantic Ocean.

Host identity remains unknown for several species of *Elthusa* but five species are

known to parasitize pleuronectiform fishes, either specifically [*E. parabothi* from Bothidae (Trilles & Justine 2004), *E. samariscii* from Samaridae (Shiino 1951; Biju Kumar & Bruce 1997), *E. methepia* from Achiridae (Schioedte & Meinert 1884)] or occasionally [*E. raynaudii* from Pleuronectidae (Chilton 1911), *E. vulgaris* from Paralichthyidae (Ho 1975; Brusca 1978)]. *E. parabothi* was previously reported from *Parabothus kiensis* (Tanaka, 1918). So, *E. arnoglossi* is the second species of *Elthusia* described from the host family Bothidae. However, this species is the first cymothoid collected on gills of flatfishes of the genus *Arnoglossus*.

*Elthusia arnoglossi* can be easily distinguished from most of the species of the genus that have a bilaterally symmetrical body (*E. alvaradoensis*, *E. atlantniroi*, *E. caudata*, *E. menziesi*, *E. neocyta*, *E. ochotensis*, *E. puhi*, *E. raynaudii*, *E. sacciger*, *E. samoensis*, *E. splendida*, *E. tropicalis*, *E. turgidula*, *E. vulgaris*) or only weakly asymmetrical (*E. californica*, *E. foveolata*, *E. frontalis*, *E. intermedia*, *E. methepia*, *E. myripristae*, *E. philippinensis* and *E. parabothi*). Four species (*E. nanoides*, *E. propinqua*, *E. samariscii* and *E. sigani*) are distinctly asymmetrical. From them, only one species, *E. samariscii*, first described by Shiino (1951) and recently redescribed by Biju Kumar & Bruce (1997) show some similarity to *E. arnoglossi*. However, *E. arnoglossi* can be separated from this species by: female body more asymmetrical, dissimilar in shape and always deeply twisted only to the right side while *E. samariscii* is slightly twisted to one side or another (dextral or sinistral); antenna composed of 18 articles (only 12 for *E. samariscii*) extending to or beyond margin of pereonite 1 (instead of posterior margin of cephalon); all pereopods with a distinctly dilated merus lacking in *E. samariscii*; uropods longer and almost reaching posterior margin of pleotelson (instead barely reaching beyond anterior quarter of pleotelson); male body with pereonite 1–3 relatively wider and longer beside others (character not related to the isopods moulting process); antenna with 18 articles instead of 12; pleopod 2 with appendix masculina distinctly longer and uropods reaching posterior margin of pleotelson

### Acknowledgements

We thank Bertrand Richer de Forges (IRD, Nouméa) who collected the fish, the members of the EBISCO cruise on RV *Alis*, Dr. Martine Desoutter, who kindly identified the hosts and Dr. Danielle Defaye (MNHN, Paris) for their help. Also, we wish to thank anonymous reviewers and Dr. Jörundur Svavarsson (University of Iceland) for helpful and constructive comments on the manuscript.

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