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A NEW SPECIES OF ISOPOD, AEGA (RHAMPHION) FRANCOISAE (FLABELLIFERA, AEGIDAE), FROM THE CLOACA OF AN ASCIDIAN FROM THE GALAPAGOS ISLANDS

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Abstract.—*Aega* (*Rhamphion*) *francoisae,* a new species of Aegidae, is reported from a depth of 316 m in the Galápagos Islands. All 10 specimens of the type series were found in the cloaca of a single ascidian, *Halocynthia hispida* (Pyuridae: Stolidobranchiata). This is the first species of aegid isopod to be reported inhabiting a urochordate. The nature of the relationship is not known.

In November and December 1986 the Harbor Branch Oceanographic Institute and SeaPharm Inc. undertook a collecting expedition in the Galápagos Islands. Chief scientists for the expedition were Drs. Shirley Pomponi and Kenneth Rinehart, while Drs. Richard Brusca and Françoise Monniot undertook studies of the Crustacea and Urochordata, respectively. During this expedition, a single deep-water specimen of the stolidobranchiate ascidian *Halocynthia hispida* (Herdman, 1881) was collected by the *Johnson-Sea-Link* research submersible; the ascidian had 10 specimens of an undescribed aegid isopod in its cloacal chamber.

Members of the family Aegidae are typically predators/parasites on marine fishes and to my knowledge no aegid or any other isopod species have been reported as commensals or parasites in ascidians. In the eastern Pacific this family has been most recently treated by Brusca (1983) and Brusca & Iverson (1985). Knowledge of the Australian aegid fauna has been brought current by Bruce (1983, 1988).

Abbreviations used in this paper are: PMS = plumose marginal setae; LACM = Los Angeles County Museum of Natural History, Los Angeles, California; SDNHM = San Diego Natural History Museum, San Diego, California; USNM = National Museum of Natural History, Washington, D.C.; BMNH = British Museum (Natural History), London.

Aega (*Rhamphion*) *francoisae,* new species

Material examined.—Ten individuals, from one specimen of the solitary ascidian *Halocynthia hispida* (Herdman, 1881) (Family Pyuridae: Order Stolidobranchiata), SeaPharm no. 24-XI-86-3-9V. Ecuador, Galápagos Islands, near Fernandina Island, ca. 0.23°S, 91.32°W, 316 m depth, 24 November 1986. Holotype (SDNHM 2220), female 9.6 mm long (with oostegites). Five paratypes (SDNHM 2221) (2 females 10.7 mm, 10.3 mm both with oostegites; 2 males 9.2 mm, 9.2 mm; 1 manca 4.3 mm). One male paratype each sent to the USNM (250192) (7.4 mm), LACM (86-446.1) (7.5 mm), BMNH (1990:31) (7.8 mm) and the Australian Museum, Sydney (P40180) (8.3 mm).

Diagnosis.—Body unornamented; lateral body margins strongly convex, cephalon and pleon considerably narrower than pereonite 4. With a single frontal plate of uncertain homology (frontal lamina wanting; clypeus and labrum fused?). Antennule article 3 at least 3.5 times longer than article 2. Maxillule with 3 apical spines and 3 subapical spines. Distal article of maxillipedal palp in males with ctenate setae. Pleotelson evenly

rounded, without marginal notches. Uropodal endopod without a deep cleft or notch on lateral margin; apex of inner peduncular angle with 1 long circumplumose seta; exopod oblong with prominent, stout, apical spine; endopod subtriangular.

Description.—Body smooth and compact, slightly more than twice as long as wide; pleon narrower than pereon; pleonites progressively narrower posteriorly (Fig. 1A, B). Cephalon wider than long, subtriangular. Eyes large, well pigmented, with distinct facets, covering ⅔ of cephalon but not contiguous. Cephalon produced anteriorly into a small triangular rostrum extending ventrally to separate basal articles of antennules (Fig. 2A). Frontal plate, of uncertain homology (fused clypeus and labrum?), shield-like, elevated anteriorly on a broad pedicel, with median transverse ridge, sloping downward posteriorly, and separating antennae. Antennules extending to middle of second pereonite; basal articles 1 and 2 somewhat expanded, article 3 3.5–4 times as long as article 2; peduncular articles 2 and 3 with simple and palmate setae; 8–12 flagellar articles, each with 3–4 aesthetascs (not all figured); terminal flagellar article usually with 4 long simple setae and 1 seta bearing fine setules over most of its length (Fig. 2B). Antennae extending to posterior margin of second pereonite; with 5 peduncular articles and 9–10 flagellar articles; peduncular articles 2–5 with simple setae, article 5 also with 3 setae bearing fine setules over most of their length; simple setae on all flagellar articles (Fig. 2C).

Both right and left mandibles with a prominent incisor process; with a rounded, fleshy molar process lacking setation; palp of 3 articles subequal in length, proximal (first) article shorter than middle article; middle article with 5 plumose setae with short setules and 3 simple setae on margin; distal article with row of about 18 simple setae on margin (Fig. 3A). Maxillule with 3 stout apical and 3 subapical spines (Fig. 3B). Maxilla with 2 unequal lobes, each with 3 stout, slightly curved spines (Fig. 3C). Maxillipedal palp of 5 articles; terminal article very short, with 5 curved ctenate setae; article 4 with 5 small recurved marginal spines; article 3 with 4 marginal spines and 1 submarginal spine; article 2 with 2 distolateral spines; article 1 without spines or setae (Fig. 3D). In oostegite-bearing females, proximal maxillipedal palp articles somewhat indistinct and basis expanded into a large plate with PMS as figured (Fig. 3E).

Pereonites 4–6 considerably longer than pereonites 1–3. Pereonite 7 as long as pereonite 3. Coxal plates of pereonites 5–7 visible in dorsal aspect. Pereopods 4–7 considerably longer than 1–3 and increasing in length posteriorly (Fig. 4A–G). Pereopods 1–3 with very few setae. Pereopods 4–7 more spinose than pereopods 1–3, as figured. Pereopods 1–3 with large curved dactyl, as long as propodus, without expanded distal lobe on propodus. Penes small, on sternite 7; fused basally.

Pleon with 5 free pleonites plus pleotelson; pleonite 1 almost entirely covered by pereonite 7; pleonites 2–4 equilength. Pleotelson with 8 short spines on posterior margin and PMS as figured (Fig. 1C). Uropodal exopod oval; endopod subtriangular, without a deep cleft or notch on lateral margin; both with spines and PMS as figured; endopods slightly longer than exopods. Inner angle of peduncle strongly produced, about half length of endopod and with 1 long terminal plumose seta; outer distal angle of peduncle with one dorsal and one ventral spine (Fig. 1D).

Peduncles of pleopods not divided; pleopodal peduncles 1–4 with 3–6 basally plumose coupling spines and 3–9 PMS on inner margin; peduncle of pleopod 5 without coupling spines or PMS; peduncles of pleopods 2–5 with 1 large spine on outer margin (Fig. 5A–F); spine on pleopod 2 often missing (probably broken off). Pleopodal rami undivided; all pleopods with PMS as figured; density of PMS more-or-less equal on all exopods, but decreasing posteriorly on en-

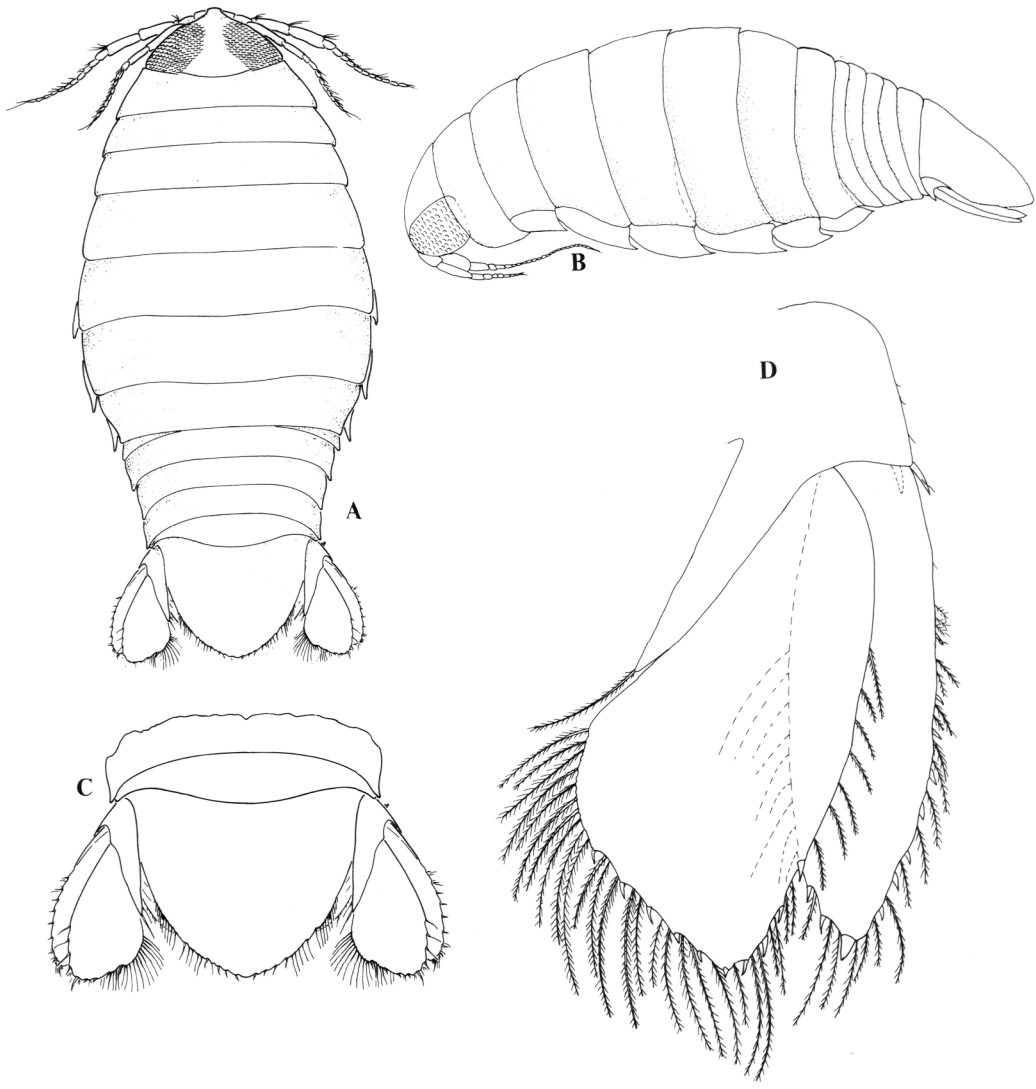

Fig. 1. *Aega francoisae* n. sp. A, dorsal view of holotype (female); B, lateral view of male paratype (9.2 mm); C, pleotelson of holotype; D, left uropod of female paratype (10.7 mm).

dopods and absent on pleopod 5 endopod; endopod of pleopod 5 with proximal lobe. Pleopods of males similar to those of females. Appendix masculina on male pleopod 2 arising basally, long and slender, tapering evenly, extending beyond apex of exopod.

Remarks.—*Aega francoisae* fits Brusca's (1983) diagnosis of the subgenus *Rhamphion*: antennular articles 1 and 2 are not inflated or dilated, the antennae extend to the posterior margin of pereonite 2, pereopods 1–3 lack distal lobes on the propodi, and the uropodal endopods are subtriangular in outline. *Aega francoisae* differs slightly from Brusca's diagnosis of *Rhamphion* in that the distal maxillipedal palp article bears ctenate rather than simple setae in males.

Brusca (1983) noted that oostegite-bear-

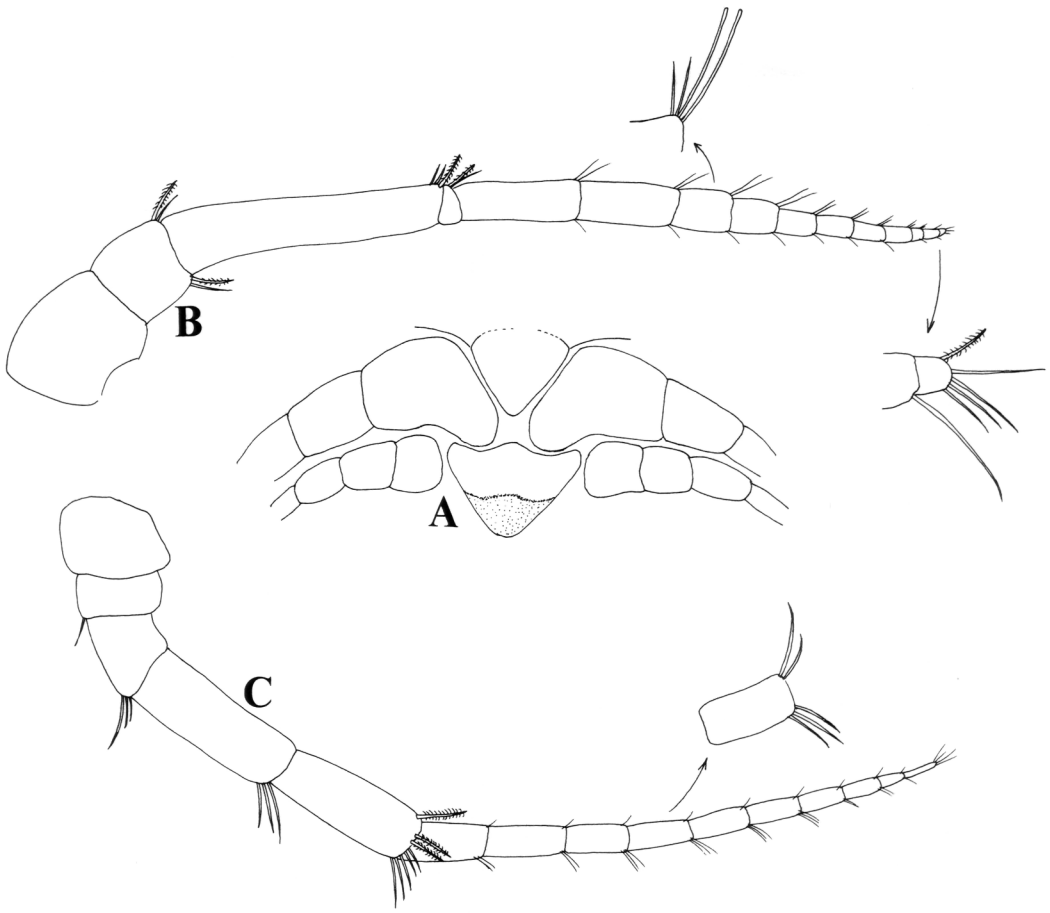

Fig. 2. *Aega francoisae* n. sp. A, frontal lamina, clypeus, labrum of female paratype (10.7 mm); B, left antennule of male paratype (9.2 mm); C, left antenna of male paratype (9.2 mm).

ing females of the families Aegidae, Corallanidae and Cymothoidae tend to replace the maxillipedal spines with PMS; *Aega francoisae* has both PMS and spines. Bruce (1988) stated that in Aegidae the mandible possesses a molar process and a 3- or 4-articulate palp. *Aega francoisae* has a molar process and a 3-articulate palp.

A review of the figures in the published literature on *Aega,* and examination of various species during this study, indicates that the morphology of the frontal lamina, clypeus and labrum can be variable and extremely valuable in distinguishing among closely related species of *Aega.* Unfortunately these structures have often not been illustrated by previous workers. In *A. francoisae* the clypeus and labrum appear to be fused into a single frontal "plate." The apparent shape of this plate varies depending upon the angle at which the specimen is viewed.

Prior to this description only three species of *Aega* had been recorded from the Galápagos Islands (Brusca 1987). *Aega acuminata* Hansen, 1897 is Panamic in distribution, occurring at depths greater than 1000 m, and Brusca (1983) assigned this species to the subgenus *Aega. Aega plebia* Hansen, 1897 and *A. longicornis* Hansen, 1897, like *A. francoisae* belong to Brusca's subgenus *Rhamphion. Aega plebia* is widespread

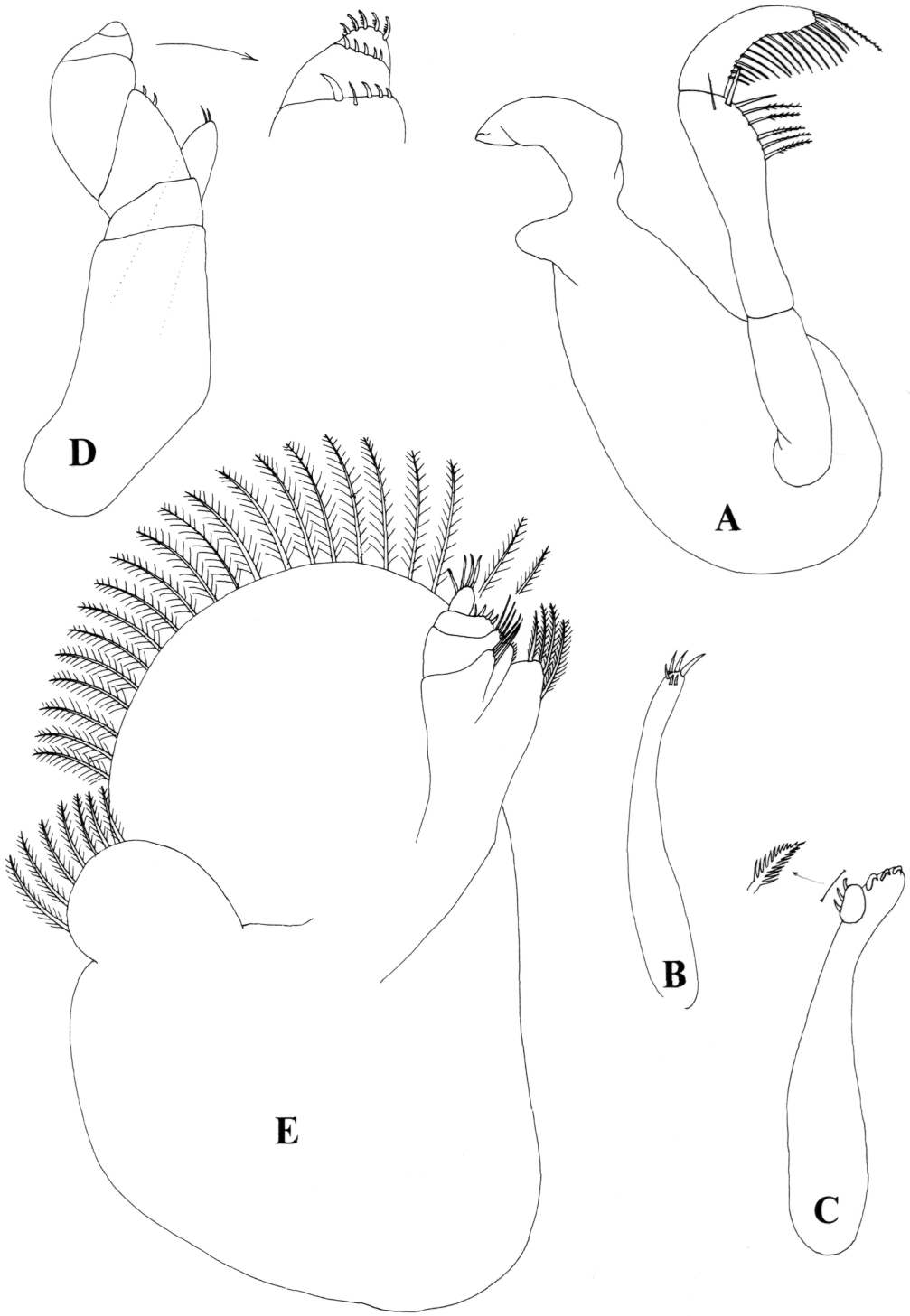

Fig. 3. *Aega francoisae* n. sp. A, left mandible of holotype; B, left maxillule of male paratype (9.2 mm); C, left maxilla of male paratype (9.2 mm); D, right maxilliped of male paratype (9.2 mm); E, right maxilliped of holotype.

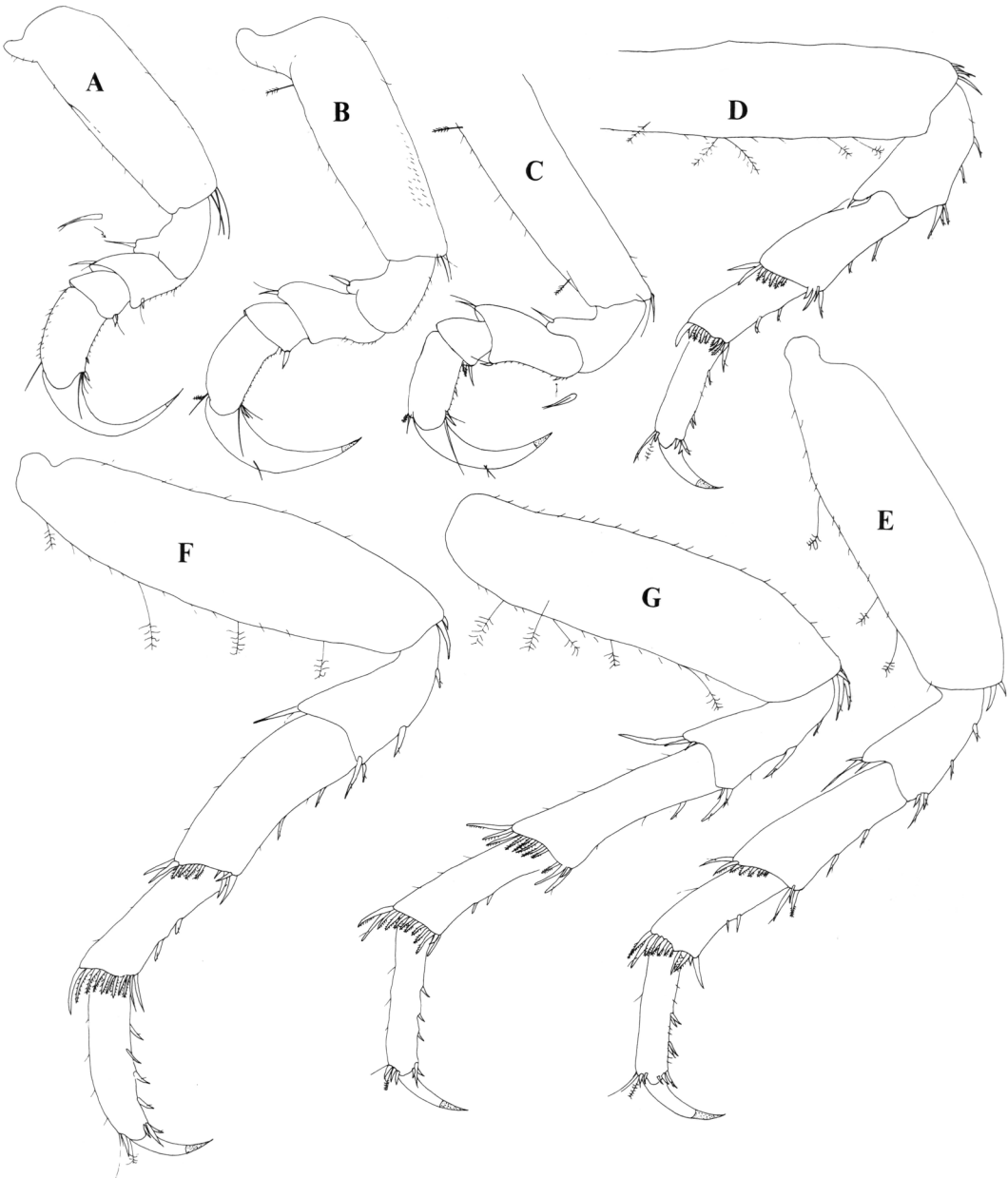

Fig. 4. *Aega francoisae* n. sp. Left pereopods of holotype (female): A, pereopod 1; B, pereopod 2; C, pereopod 3; D, pereopod 4; E, pereopod 5; F, pereopod 6; G, pereopod 7.

throughout the Panamic and northwest Pacific temperate regions at depths exceeding 500 m. *Aega longicornis,* collected at *Albatross* Station 3402 (eastern Pacific Expedition) in 1891 at 0°57′30″S, 89°3′30″W at 842 m, is only known from the nonovigerous female holotype. Of these three species, *A. longicornis* most closely resembles *A. francoisae.*

Aega francoisae can be distinguished from

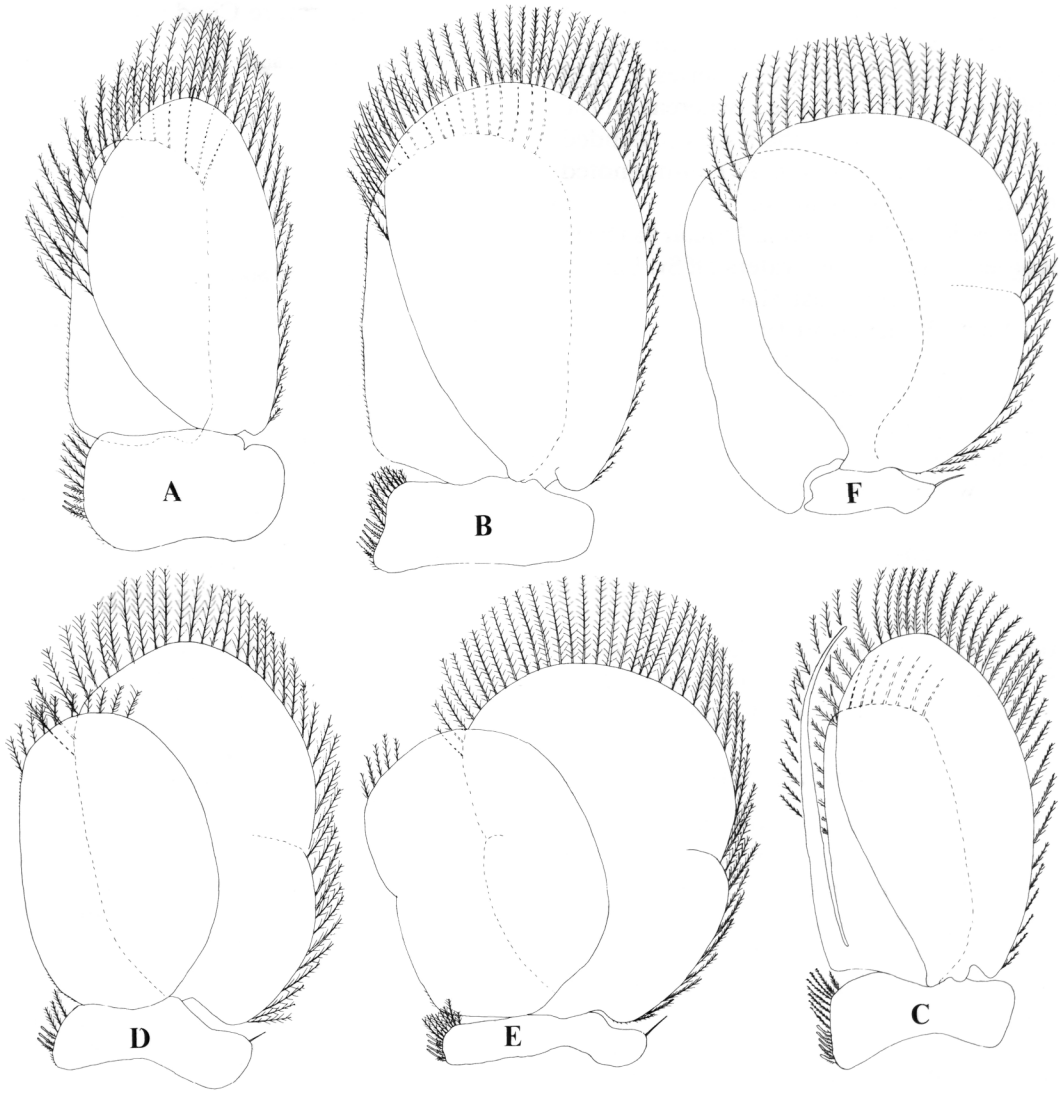

Fig. 5. *Aega francoisae* n. sp. Right pleopods: A, pleopod 1 of female paratype (10.7 mm); B, pleopod 2 of female paratype (10.7 mm); C, pleopod 2 of male paratype (9.2 mm); D, pleopod 3 of male paratype (9.2 mm); E, pleopod 4 of male paratype (9.2 mm); F, pleopod 5 of male paratype (9.2 mm).

A. longicornis by the following features: short antennae extending only to the second pereonite; incisor of mandible prominent, tooth-like, not blunt; molar process present; maxillule with 3 stout apical and 3 subapical spines; uropodal exopod with one large spine apically; uropods only slightly longer than pleotelson.

None of the oostegial females had eggs or embryos in the brood pouch. However, 4 embryos were present in the sample sent to us by Dr. Monniot, suggesting that at least one of the oostegial females had been recently gravid. It is possible that the embryos were lost from the brood pouch during the ascent from 316 m depth to the surface, while in the collection basket of the *Johnson-Sea-Link*. Species of the genus *Aega* are

thought to feed primarily on fish blood (Hansen 1897, Brusca 1983). Oostegite-bearing females of the type series do not appear to have recently fed, whereas all the males appear to have their guts distended with blood. F. Monniot (pers. comm.) noted no damage to the ascidian.

The ascidian *Halocynthia hispida* has been recorded from shallow waters off Sri Lanka, Tasmania, South Australia, Victoria and New South Wales (Kott 1985, Millar 1988). Monniot & Monniot (1989) describe two morphotypes for this species from the Galápagos region, a shallow-water SCUBA-collected hard form with a thick tunic, and a deep-water submersible-collected form with a soft hairy tunic. *Aega francoisae* came from the deep-water morph.

Etymology.—*Aega francoisae* is named for Dr. Françoise Monniot, Muséum National d'Histoire Naturelle, Paris, who found the isopods in the ascidian host and kindly forwarded them to R. C. Brusca.

Acknowledgments

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