

**Two new species of *Opisthotrochopodus*
(Polychaeta: Polynoidae: Branchinotogluminae) from the Lau and
the North Fiji Bac-arc Basins, southwestern Pacific Ocean**

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Abstract.—*Opisthotrochopodus segonzaci*, a new species of branchiate polynoid polychaete from the Lau and the North-Fiji Bac-arc Basins, southwestern Pacific Ocean, differs from the other species of the genus in having short dorsal cirri with rounded tips on the anterior segments and achaetous modified parapodia on segment 21. *Opisthotrochopodus trifurcus*, a new species from the North-Fiji Basin, is unique in the genus in having trifurcate neurosetae on the posterior modified segment.

Polynoid polychaetes of the subfamily Branchinotogluminae Pettibone, 1985 include three genera (*Branchinotogluma* Pettibone, 1985; *Opisthotrochopodus* Pettibone, 1985; and *Peinaleopolynoe* Desbruyères & Laubier, 1988) and ten species to date. Most of them are known from deep-sea chemosynthetic communities. The subfamily was established by Pettibone (1985) when *B. hessleri*, *B. sandersi*, *B. grasslei*, and *O. alvinus* were described from the Galápagos Spreading Center, and the East Pacific Rise at 21°N. Some of these species were later reported from the Explorer and the Juan de Fuca Ridges, Northeastern Pacific, as well as *O. tunnicliffeae* (Pettibone 1988). From the hydrothermal rift-area of the Mariana Bac-arc Basin in the western central Pacific, two additional polynoids, *B. burkensis* and *O. marianus*, were described (Pettibone 1989). About some hundreds kilometers North of this basin, *O. japonicus* was found associated with the hydrothermal vents of Kaikata seamount by Miura & Hashimoto (1991). A branchiate polynoid species, *Peinaleopolynoe sillardi*, was also described from a non-hydrothermal environment but attracted to enriched sediments

in experimental trays disposed on the deep-sea floor in the North Atlantic Ocean to study the influence of organic matter on colonization processes (Desbruyères & Laubier 1988). The genus was newly included in the subfamily by Pettibone (1993), along with the description of the second species, *P. santacatalina*, associated with a whale skeleton in the bathyal Santa Catalina Basin.

Polynoid polychaetes collected by the French submersible *Nautilie* from the hydrothermal community of the central part of the North-Fiji and the Lau Basins were studied and *Branchipolynoe pettiboneae* Miura & Hashimoto, 1991 in Branchipolynoinae was reported associated with mytilid mollusks by Desbruyères et al. (1994). Two other polynoids, *Thermopolynoe branchiata* in Lepidonotopodinae and *Thermiphione fijiensis* in Iphioninae, have been described previously (Miura 1994). In this study, two new species of the genus *Opisthotrochopodus* are described. The types are deposited in the Museum National d'Histoire Naturelle de Paris (MNHN), and the National Museum of Natural History, Smithsonian Institution (USNM).

Some additional specimens were used for SEM or histological observation at Kagoshima University (KU).

Subfamily Branchinotogluminae

Pettibone, 1985

Opisthotrochopodus Pettibone, 1985

Opisthotrochopodus segonzaci,

new species

(Figs. 1–4)

Material examined.—Vailili, Lau Basin, Nautila Dive 10, 22 May 1989, BIOLAU Station 2, 23°13'S 176°38'W, 1750 m, Holotype (MNHN UD 852), 3 paratypes (including 1 modified, MNHN UD 853). White Lady, North Fiji Basin, Dive 20, 15 Jul 1989, STARMER II Station 4, 16°59.50'S, 173°55.47'E, 2000 m, 9 paratypes (4 modified, MNHN UD 854, USNM 171052), 4 specimens (2 modified, KU).

Description.—Holotype 29 mm long, 14 mm wide including parapodia, with 21 segments, including first achaetous tentacular segment. Largest paratype 49 mm long, 19 mm wide, with 21 segments. Body short, spindle-shaped, slightly tapered anteriorly and posteriorly, flattened ventrally, arched dorsally (Figs. 1a, 2a–d). Integument smooth. Preserved specimens pale.

Elytra 10 pairs, on segments 2, 4, 5, 7, 9, 11, 13, 15, 17, and 19, large, imbricated, oval, smooth, white or colorless (Fig. 2a); last pair on segment 19 much smaller on holotype and on specimens with modified posterior segments than on others. Dorsal cirri on non-elytrigerous segments with short cylindrical cirrophores, and short styles with rounded tips, extending to tips of neurosetae (Figs. 1e, g, 2c, 3d, e, h, i). Branchiae arborescent, separated into two groups: upper groups on lateral bases of elytraphores or dorsal tubercles; lower groups on bases of notopodia (Fig. 3d–i); present on segments 3–19 on holotype and on specimens with modified posterior segments (Fig. 1c, e, f), or on segments 3–21

on specimens with non-modified segments (Figs. 2c, 3a, d–i).

Prostomium bilobed. Anterior lobes prominent, cylindrical, extending anteriorly, with frontal filaments; median antenna inserted in anterior notch, with short cylindrical ceratophore and subulate style extending to about tip of palp; palps thick, smooth, extending beyond prostomium, with rounded tips (Fig. 2c, d). Tentacular segment fused to prostomium, indistinct; tentaculophores lateral to prostomium, annulated, achaetous, with two pairs of tentacular cirri, stout, short, as long as tentaculophores, with rounded or convex distal tips (Fig. 2c, d).

Segment 2 with first pair of elytraphores, biramous parapodia, and ventral or buccal cirri attached basally on prominent cirrophores lateral to mouth, with styles similar to tentacular cirri, longer than following ventral cirri (Figs. 2c, d, 3c). Mouth opening situated between segments 1 and 2 (Figs. 1a, 2b, d). Muscular pharynx encircled distally by four pairs of small papillae, subequal in size; bearing lateral lamellar expansions with four distal papillae, and numerous small papillae forming proximal band; two pairs of jaws without denticulations on inner border (Fig. 2e).

Segment 3 with first pair of arborescent branchiae, dorsal cirri, short ventral cirri and biramous parapodia similar to segment 2; dorsal cirri short, with rounded tips (Figs. 2c, d, 3d). Following biramous parapodia, with short notopodia on anterodorsal sides of large neuropodia (Fig. 3d–i). Notopodia subconical, with projecting acicular lobes hidden by numerous notosetae, and enclosed antero-dorsally by flaring bracts (Fig. 3d–i). Neuropodia subconical, deeply notched on upper part (Fig. 3d–i).

Ventral segmental papillae long, attached to bases of neuropodia on segment 12, and extending to bases of ventral cirri; 5 pairs of flat semioval ventral lamellae on segments 13–17 on holotype and on half of specimens (Fig. 1a, b), or lacking both papillae and lamellae on other specimens (Fig.

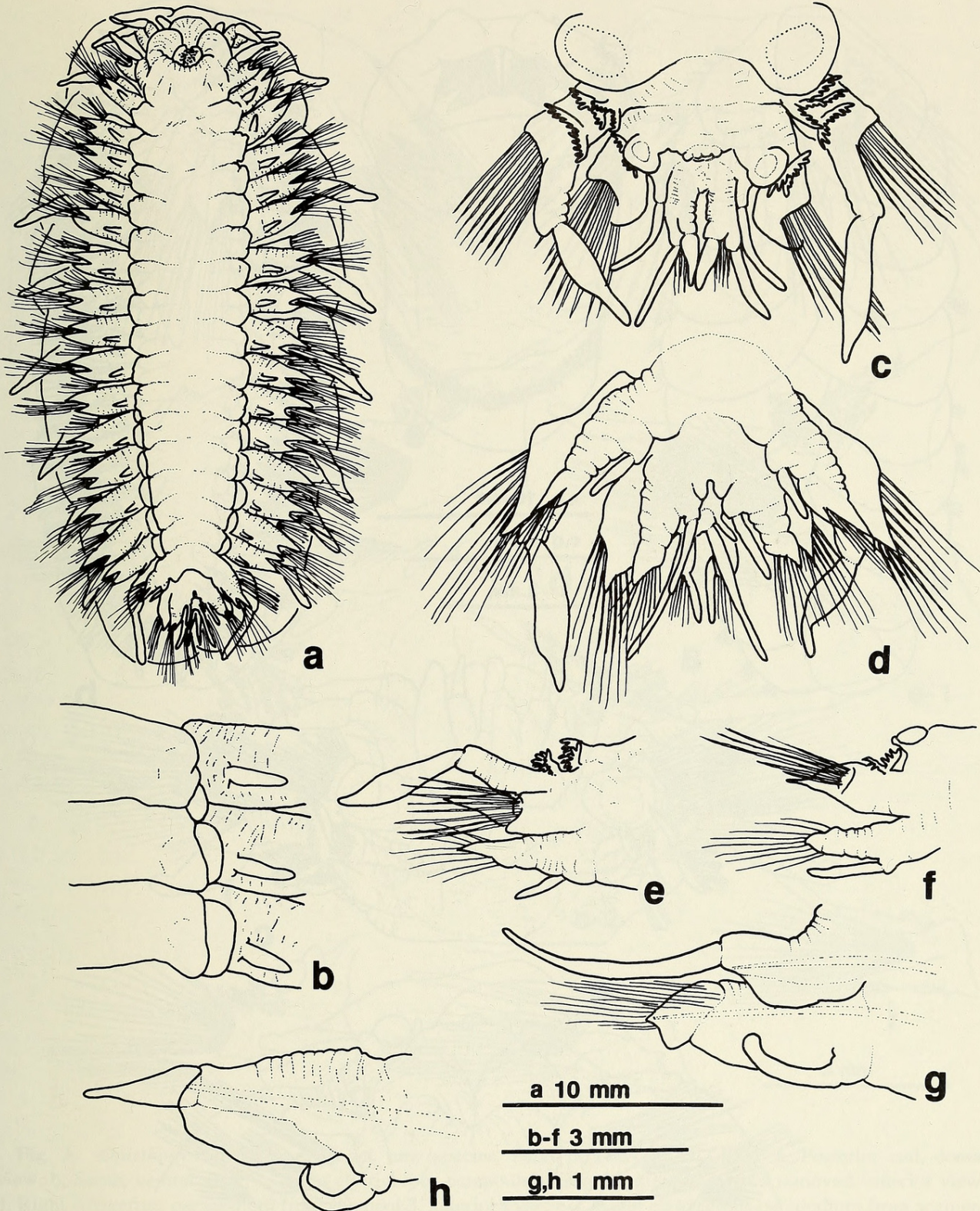


Fig. 1. *Opisthotrochopodus segonzaci*, new species. Holotype (MNHN UD 852): a, Ventral view; b, Left halves of segments 12–14, ventral view; c, Posterior end, dorsal view; d, Same, ventral view; e, Right cirrigerous parapodium from segment 18, anterior view; f, Right elytrigerous parapodium from segment 19, elytron removed, anterior view; g, Right cirrigerous parapodium from segment 20, anterior view; h, Right cirrigerous parapodium from segment 21, anterior view.

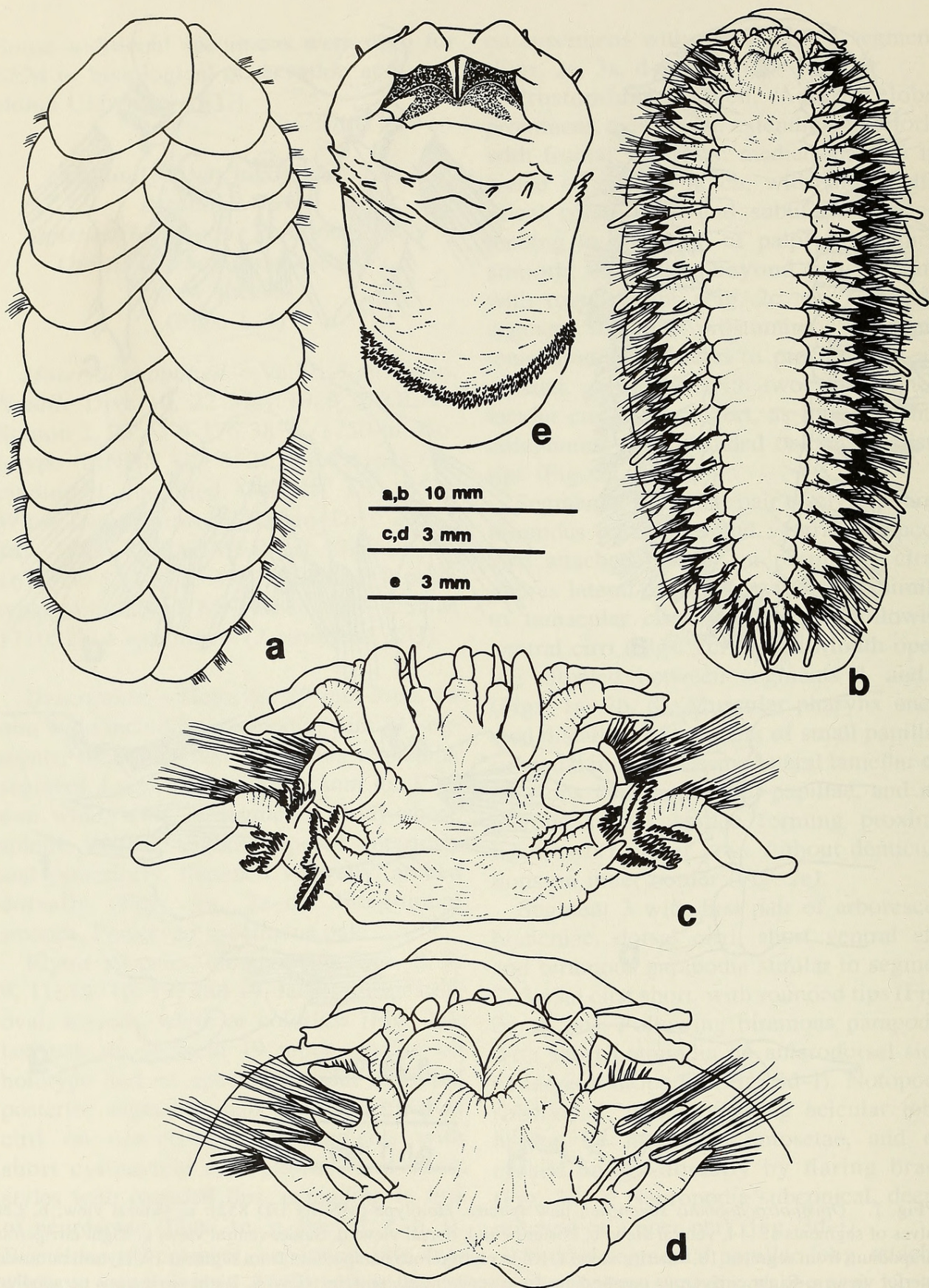


Fig. 2. *Opisthotrochopodus segonzaci*, new species. Paratype (MNHN UD 853): a, Dorsal view; b, Ventral view; c, Anterior end, dorsal view; d, Same, ventral view; e, Pharynx of another paratype (MNHN UD 854), ventral view.

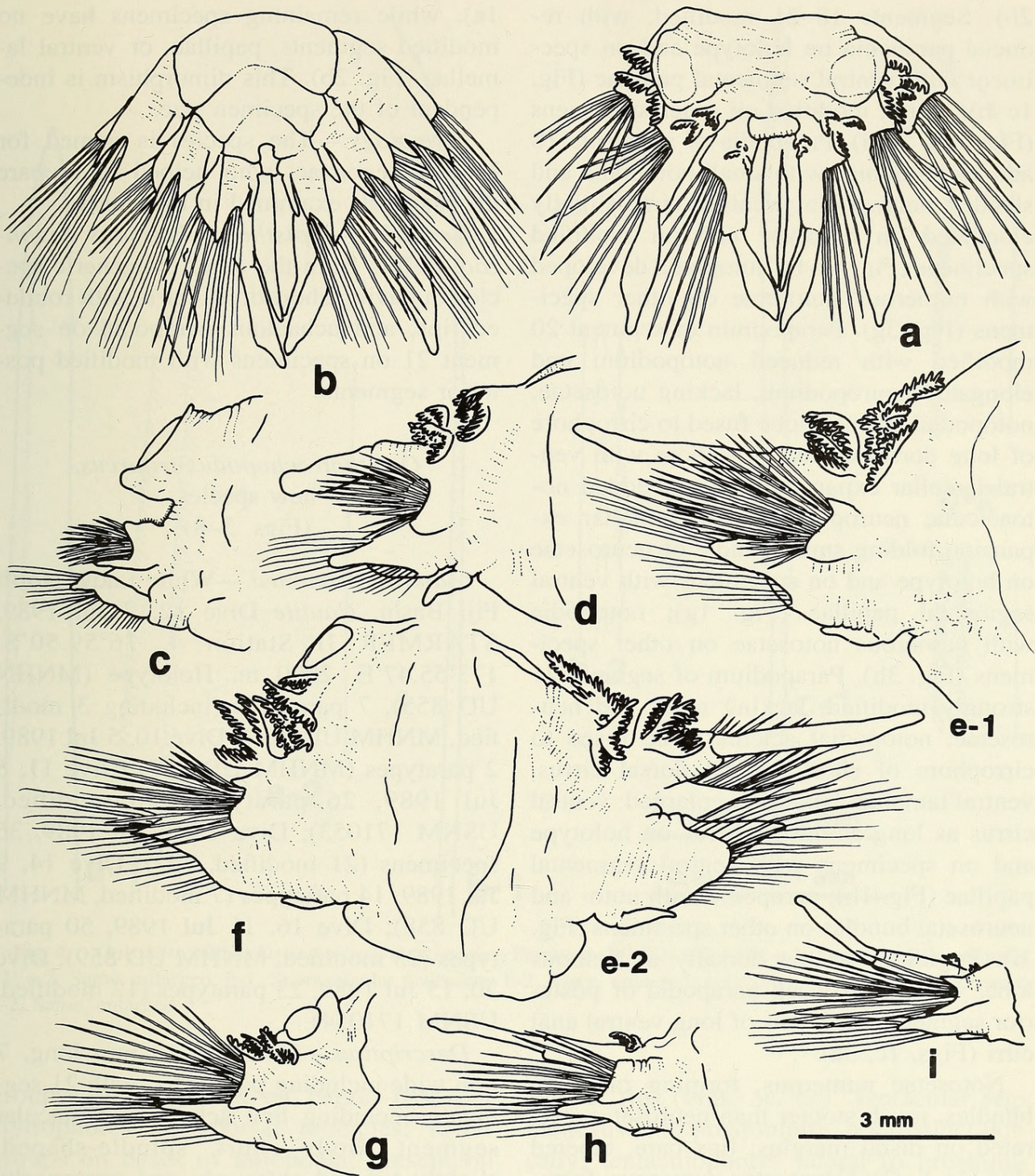


Fig. 3. *Opisthotrochopodus segonzaci*, new species. Paratype (MNHN UD 853): a, Posterior end, dorsal view; b, Same, ventral view; c, Right elytrigerous parapodium from segment 2, elytron removed, anterior view; d, Right cirriferous parapodium from segment 3, anterior view; e-1, Right elytrigerous parapodium from segment 10, elytron removed, anterior view; e-2, Same, posterior view; f, Right elytrigerous parapodium from segment 11, elytron removed, anterior view; g, Right elytrigerous parapodium from segment 19, elytron removed, anterior view; h, Right cirriferous parapodium from segment 20, anterior view; i, Right cirriferous parapodium from segment 21, anterior view.

2b). Segments 18–21 modified, with reduced parapodia on holotype and on specimens with ventral segmental papillae (Fig. 1c–h), or not modified on other specimens (Figs. 2b, 3g–i). Parapodia of segments 18 and 19 biramous, with small notopodia and slender neuropodia; ventral cirri slightly elongated on holotype and on modified specimens (Fig. 1c–f); notopodia developed with numerous notosetae on other specimens (Fig. 3g). Parapodium of segment 20 modified with reduced notopodium and elongated neuropodium, lacking notosetae; notopodial acicular lobe fused to cirrophore of long dorsal cirrus; cirrophore with ventral lamellar expansion and embedded notoacacula; neuropodium with lamellar expansion folding small bundle of neurosetae on holotype and on specimens with ventral segmental papillae (Fig. 1g); notopodia with numerous notosetae on other specimens (Fig. 3h). Parapodium of segment 21 strongly modified, lacking noto- and neurosetae; notopodial acicular lobe fused to cirrophore of short conical dorsal cirrus, ventral lamellar expansion enlarged; ventral cirrus as long as dorsal cirrus on holotype and on specimens with ventral segmental papillae (Fig. 1h); parapodia with noto- and neurosetal bundles on other specimens (Fig. 3i). Pygidium visible dorsally as bulbous lobe, wedged between parapodia of posterior segments, with pair of long ventral anal cirri (Figs. 1c, 3a)

Notosetae numerous, forming radiating bundles, much stouter than neurosetae, serrated on distal margins; tips bare, tapered (Fig. 4a-1, -2). Neurosetae numerous, forming fan-shaped bundles. Supraacicular neurosetae with numerous prominent spines in two rows; tips bare, tapered (Fig. 4b-1, -2). Subacicular neurosetae serrated on distal margins; tips bare, tapered, hooked (Fig. 4c-1, -2).

Variation in paratypes.—Half of the 16 complete specimens have modified parapodia on segments 18–21, with long ventral papillae on segment 12, and flat semi-oval ventral lamellae on segments 13–17 (Fig.

1a), while remaining specimens have no modified segments, papillae, or ventral lamellae (Fig. 2b). This dimorphism is independent of the specimen size.

Etymology.—The species is named for Michel Segonzac, who helped to prepare the materials examined in this study.

Remarks.—*Opisthotrochopodus segonzaci* differs from the other congeneric species in having short dorsal cirri with rounded tips, and achaetous parapodia on segment 21 on specimens with modified posterior segments.

Opisthotrochopodus trifurcus,
new species
(Figs. 5–8)

Material examined.—White Lady, North Fiji Basin, *Nautila* Dive 12, 7 Jul 1989, STARMER II Station 4, 16°59.50'S, 173°55.47'E, 2000 m, Holotype (MNHN UD 855), 7 paratypes (including 3 modified, MNHM UD 856); Dive 10, 5 Jul 1989, 2 paratypes (MNHM UD 857); Dive 11, 6 Jul 1989, 26 paratypes (15 modified, USNM 171053); Dive 13, 8 Jul 1989, 36 specimens (21 modified, KU); Dive 14, 9 Jul 1989, 14 paratypes (7 modified, MNHM UD 858); Dive 16, 11 Jul 1989, 50 paratypes (23 modified, MNHM UD 859); Dive 20, 15 Jul 1989, 23 paratypes (12 modified, USNM 171054).

Description.—Holotype 15 mm long, 7 mm wide including parapodia, with 21 segments, including first achaetous tentacular segment. Body short, spindle-shaped, slightly tapered anteriorly and posteriorly, flattened ventrally, slightly arched dorsally (Figs. 5a, b, 6a, b). Preserved specimens pale.

Elytra 10 pairs, on segments 2, 4, 5, 7, 9, 11, 13, 15, 17, and 19; large, imbricated, oval, smooth, white or colorless; first pair subreniform (Figs. 5a, 6a). Dorsal cirri on non-elytrigerous segments with short cylindrical cirrophores, and very long cirriform styles with tapered tips (Fig. 7b, c, e). Branchiae arborescent, separated into two

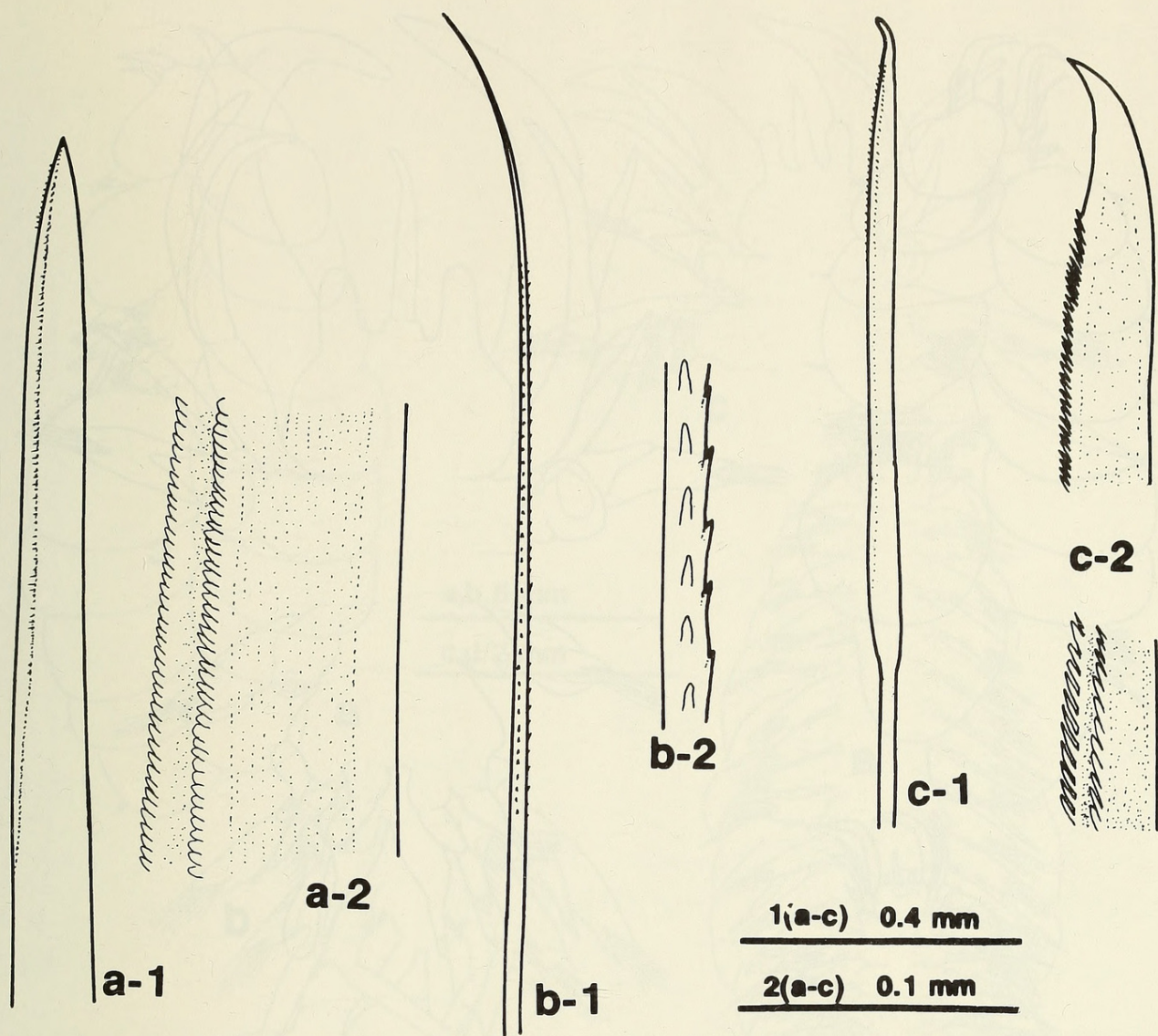


Fig. 4. *Opisthotrochopodus segonzaci*, new species. Paratype (MNHN UD 853): a-1, Notoseta from segment 11; a-2, Same, enlarged; b-1, Supraacicular neuroseta; b-2, Same, enlarged; c-1, Subacicular hooked neuroseta; c-2, Same, enlarged.

groups: upper groups on lateral bases of elytophores and dorsal tubercles; lower groups on bases of notopodia; present on segments 3–18 on specimens with modified posterior segments (Figs. 5b, 7b–d), or on segments 3–21 on specimens with non-modified parapodia (Fig. 6a–d); dorsal tubercles nodular, projecting (Fig. 7b, c).

Prostomium bilobed. Anterior lobes prominent, cylindrical, extending anteriorly, without frontal filaments; median antenna inserted in widely incised anterior notch, with very short ceratophore and subulate style, half as long as palp; palps thick, smooth, twice as long as prostomium, with

slender tips (Figs. 5c, 6c). Tentacular segment fused to prostomium, not distinct dorsally; tentaculophores lateral to prostomium, smooth, achaetous, with two pairs of tentacular cirri, slender, longer than tentaculophores (Figs. 5a–c, 6a–c).

Segment 2 with first pair of elytophores, biramous parapodia, and ventral or buccal cirri with short cirrophores and styles similar to tentacular cirri, longer than following ventral cirri; notopodium long, conical, with projecting acicular lobe and several notosetae; neuropodium long, conical, with numerous neurosetae (Fig. 7a). Muscular pharynx encircled distally by four pairs of

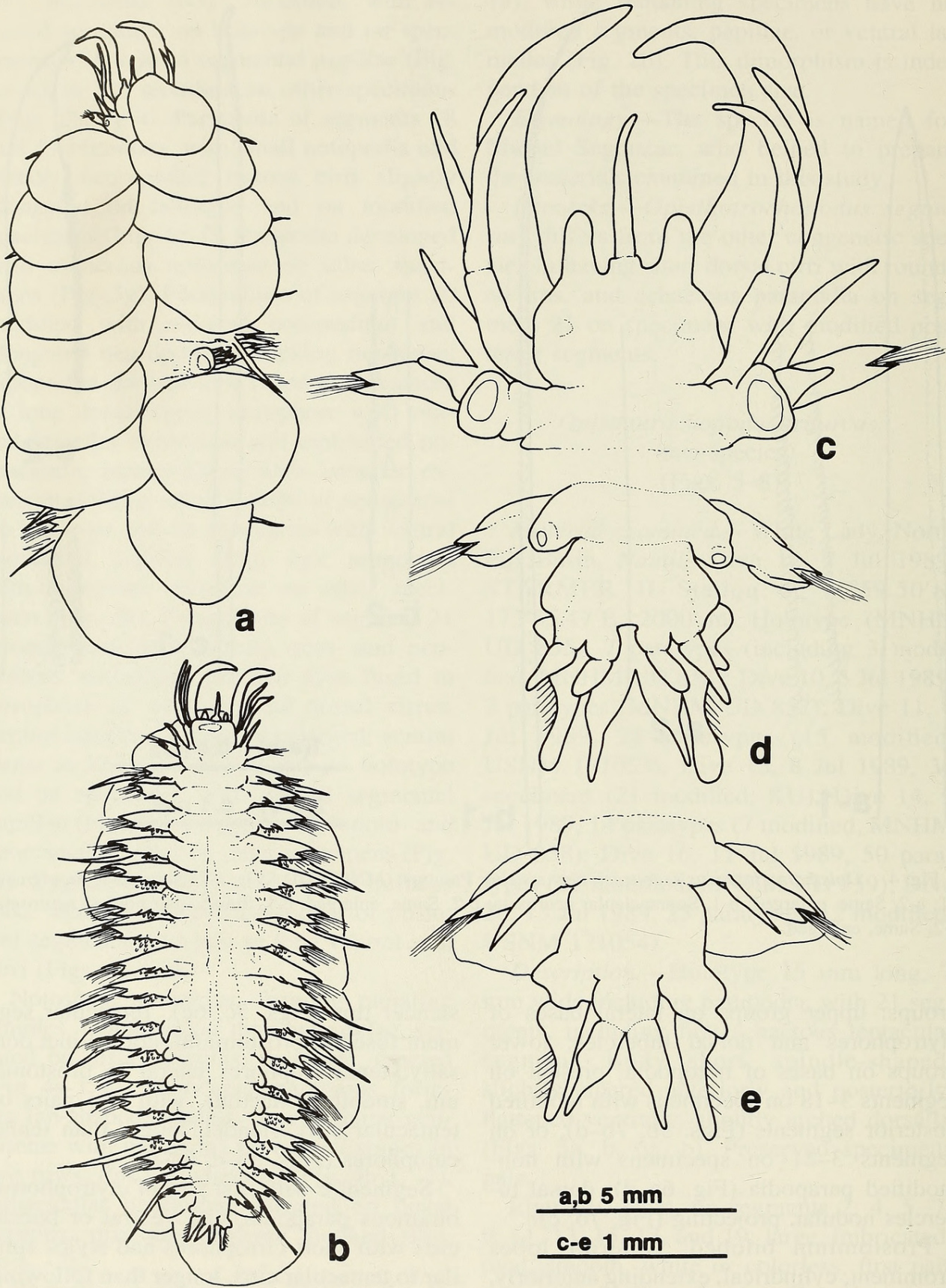


Fig. 5. *Opisthotrochopodus trifurcus*, new species. Holotype (MNHN UD 855): a, Dorsal view; b, Ventral view; c, Anterior end, dorsal view; d, Posterior end, dorsal view; e, Same, ventral view.

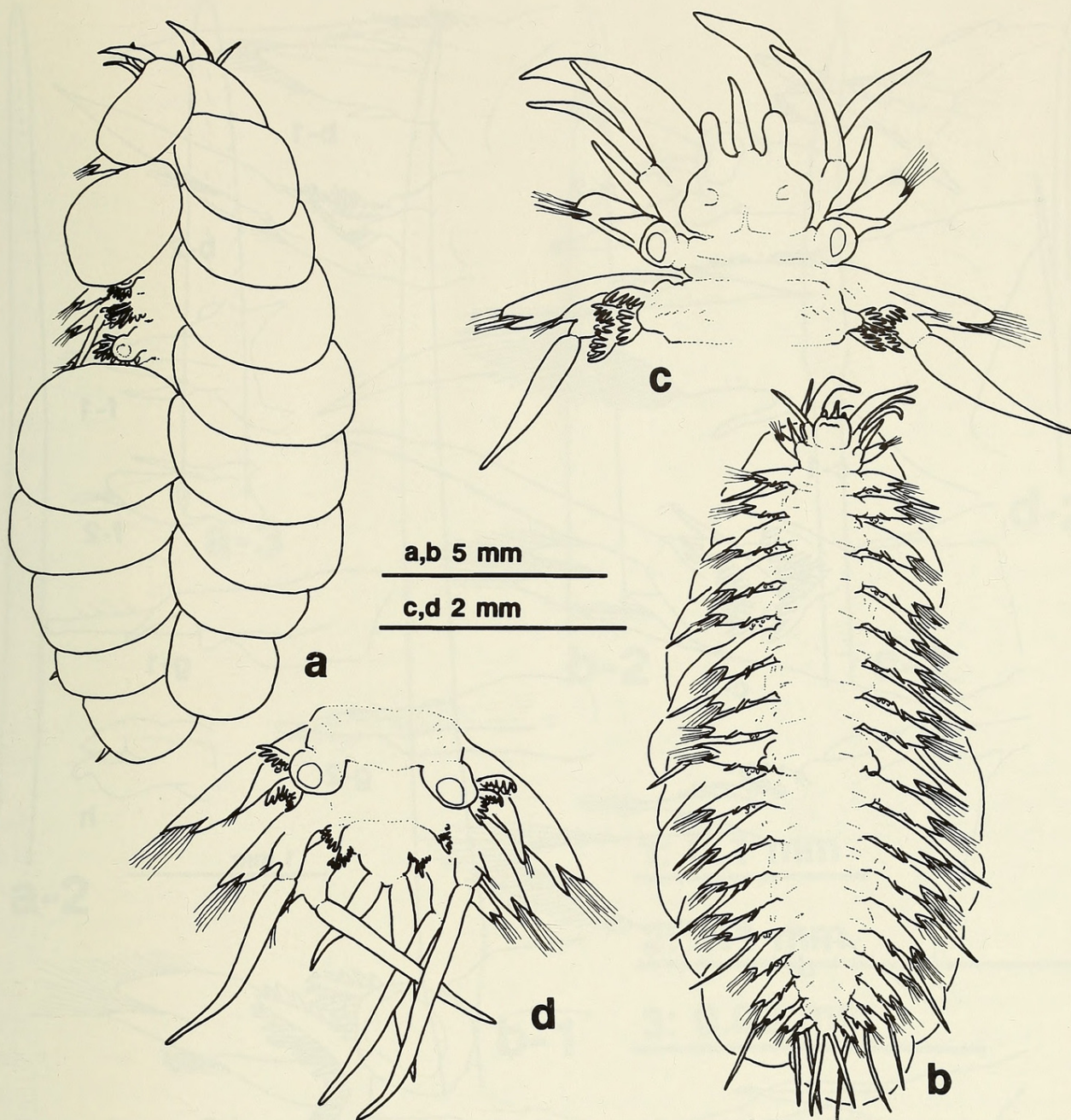


Fig. 6. *Opisthotrochopodus trifurcus*, new species. Paratype (KU): a, Dorsal view; b, Ventral view; c, Anterior end, dorsal view; d, Posterior end, dorsal view.

large papillae, subequal in size; two pairs of jaws with denticulations on inner borders (observation on dissected paratypes).

Segment 3 with first pair of arborescent branchiae, dorsal cirri, ventral cirri, biramous parapodia similar to segment 2, and triangular dorsal tubercles; dorsal cirri long, with tapered tips (Fig. 7b). Following biramous parapodia, with short notopodia on anterodorsal sides of large neuropodia on segments 4–17 (Fig. 7c–d). Notopodia long,

conical, with several notosetae; neuropodia long, conical, deeply notched on upper part (Fig. 7c–d).

Ventral segmental papillae on segment 12, as long as segment; 5 pairs of flat semi-oval ventral segmental lamellae present on segments 13–17 on holotype and on half of specimens (Fig. 5b), or lacking semi-oval segmental lamellae and bearing short ventral segmental papillae on segment 11 on other specimens (Fig. 6b). Segments 18–21

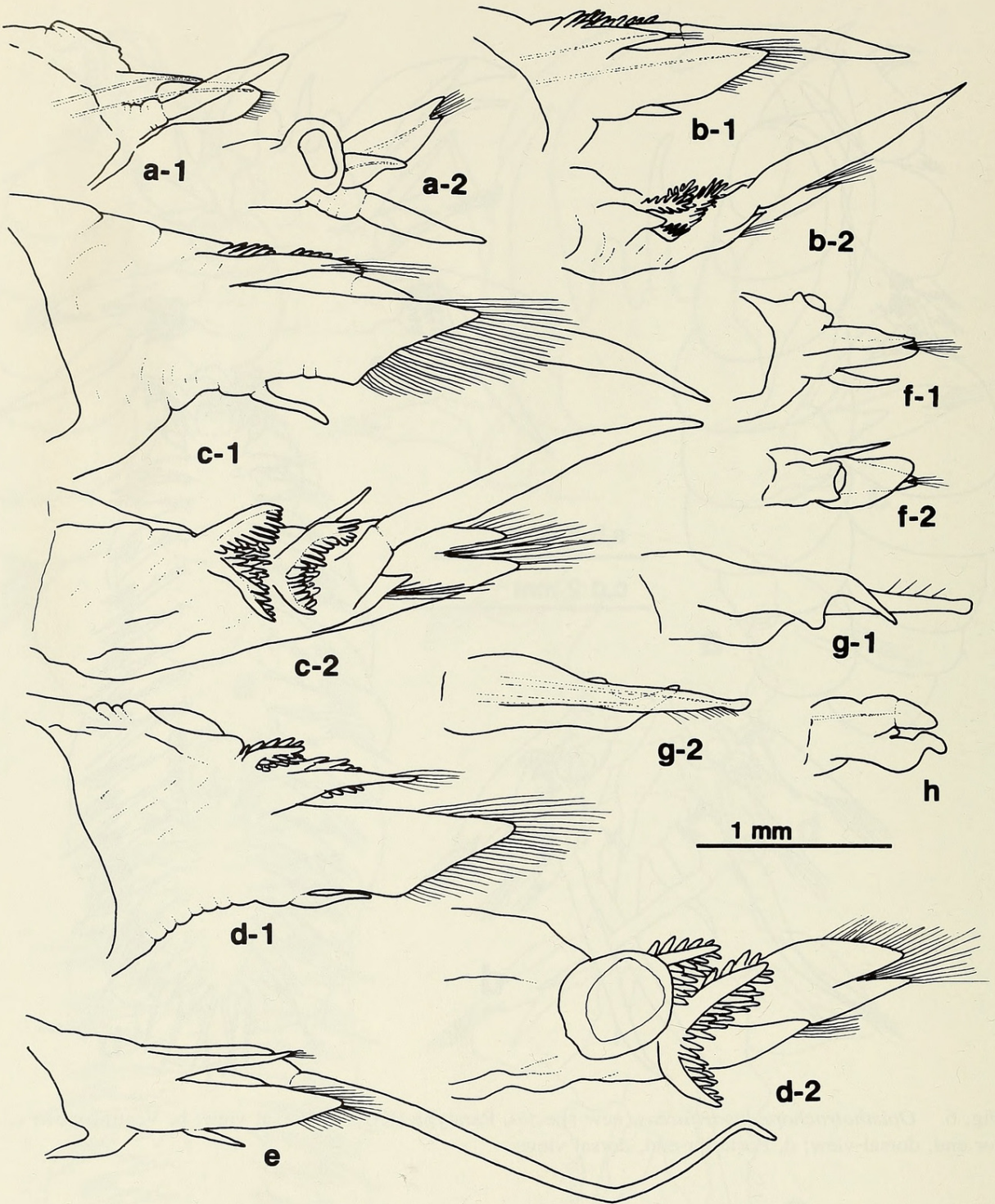


Fig. 7. *Opisthotrochopodus trifurcus*, new species. Holotype (MNHN UD 855): a-1, Left elytrigerous parapodium from segment 2, elytron removed, anterior view; a-2; Same, dorsal view; b-1, Left cirrigerous parapodium from segment 3, anterior view; b-2, Same, dorsal view; c-1, Left elytrigerous parapodium from segment 10, elytron removed, anterior view; c-2, Same, dorsal view; d-1, Left elytrigerous parapodium from segment 11, elytron removed, anterior view; d-2, Same, dorsal view; e, Left cirrigerous parapodium from segment 18, anterior view; f-1, Left elytrigerous parapodium from segment 19, elytron removed, anterior view; f-2, Same, dorsal view; g-1, Left cirrigerous parapodium from segment 20, anterior view; g-2, Same, dorsal view; h, Left cirrigerous parapodium from segment 21, anterior view.

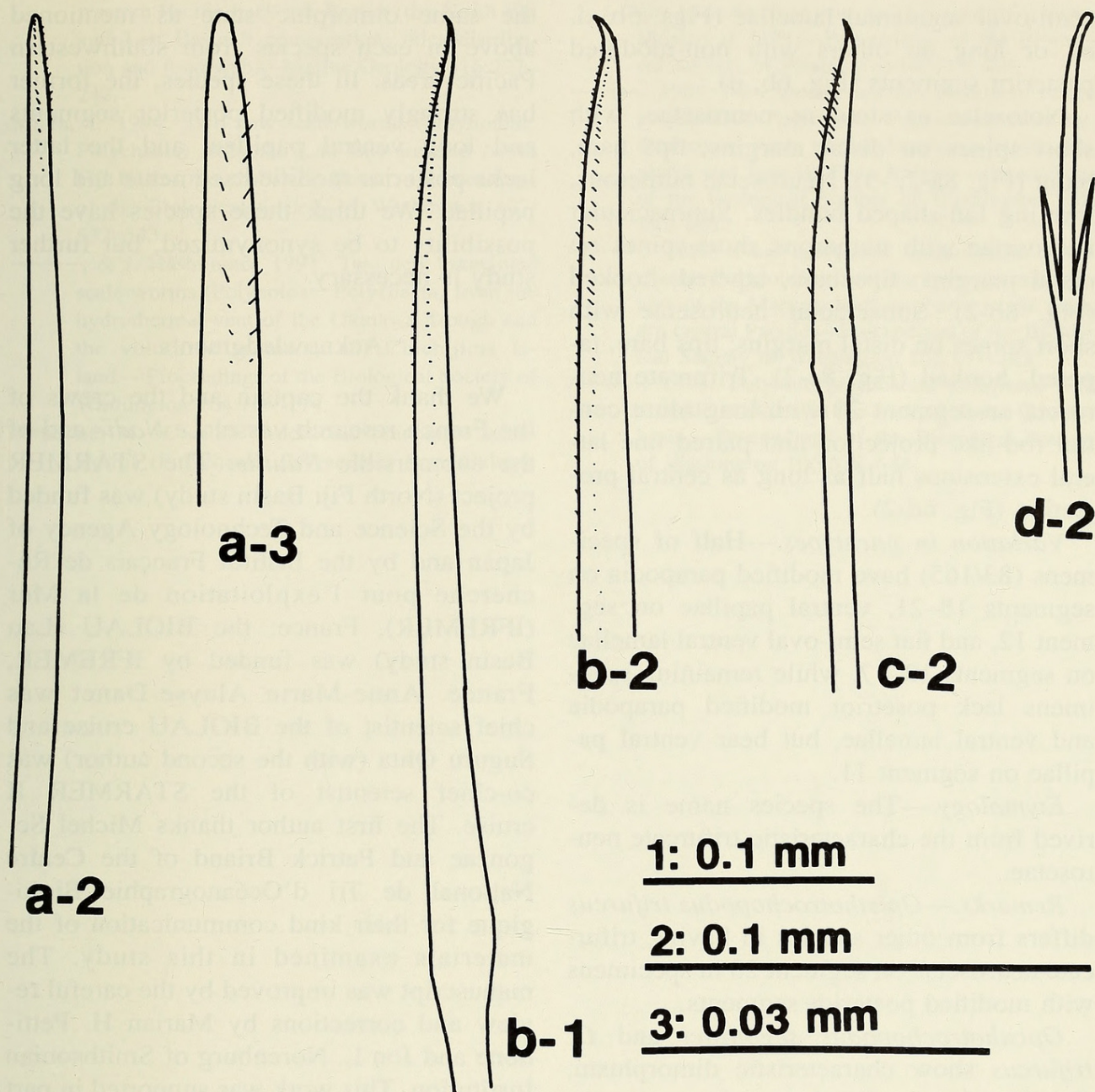


Fig. 8. *Opisthotrochopodus trifurcus*, new species. Holotype (MNHN UD 855): a-2, Notoseta from segment 10; a-3, Same, enlarged; b-1, Supraacicular neuroseta; b-2, Same, enlarged; c-2, Subacicular hooked neuroseta; d-2, Trifurcate neuroseta from segment 20.

modified, with reduced parapodia (Figs. 5b, d, e, 7c–h) on holotype and on specimens with semi-oval segmental lamellae, or not modified on specimens without segmental lamellae (Fig. 6b, d). Segment 18 modified slightly, with parapodia bearing very long dorsal cirri (Fig. 7e). Segment 19 with achaetous notopodia bearing broad dorsal lamellar expansion (Fig. 7f). Segment 20 modified strongly, with long achaetous notopodia bearing bifurcate distal end; dorsal

digitiform expansion and ventral fringed lamella; club-shaped neuropodia fringed by trifurcate neurosetae found only on segment 20 (Fig. 7g). Segment 21 reduced in size, achaetous, with uniramous parapodia; notopodia digitiform, with embedded acicula and very short cirri; ventral cirri, with basal lamellar expansion and digitiform short cirriform distal end (Fig. 7h). Pygidium with pair of anal cirri; anal cirri short on specimens with modified posterior segments and

semi-oval segmental lamellae (Figs. 5b, d, e), or long on others with non-modified posterior segments (Fig. 6b, d).

Notosetae as stout as neurosetae, with short spines on distal margins; tips bare, blunt (Fig. 8a-2, -3). Neurosetae numerous, forming fan-shaped bundles. Supraacicular neurosetae with numerous short spines on distal margins; tips bare, tapered, hooked (Fig. 8b-2). Subacicular neurosetae with short spines on distal margins; tips bare, tapered, hooked (Fig. 8c-2). Trifurcate neuroseta on segment 20 with long blunt central rod-like projection and paired fine lateral extensions half as long as central projection (Fig. 8d-2).

Variation in paratypes.—Half of specimens (83/165) have modified parapodia on segments 18–21, ventral papillae on segment 12, and flat semi-oval ventral lamellae on segments 13–17, while remaining specimens lack posterior modified parapodia and ventral lamellae, but bear ventral papillae on segment 11.

Etymology.—The species name is derived from the characteristic trifurcate neurosetae.

Remarks.—*Opisthotrochopodus trifurcus* differs from other species in having trifurcate neurosetae on segment 20 in specimens with modified posterior segments.

Opisthotrochopodus segonzaci and *O. trifurcus* show characteristic dimorphism. One type has modified posterior segments. In this type, ventral segmental papillae and lamellae are fully developed. The other type has no modified posterior segments nor ventral segmental lamellae. The dimorphism is independent of the size of specimens in these species. As none of specimens had matured gametes, it is not clear if this is sexual dimorphism. The dimorphism was reported also in *Themopolynoe branchiata* by Miura (1994).

A couple of species, *Opisthotrochopodus alvinus* and *Branchinotogluma hessleri*, which were recorded from the Galápagos Spreading Center and the East Pacific Rise at 21° (Pettibone 1985, 1988) show almost

the same dimorphic state as mentioned above in each species from southwestern Pacific areas. In these species, the former has strongly modified posterior segments and long ventral papillae, and the latter lacks posterior modified segments and long papillae. We think these species have the possibility to be synonymized, but further study is necessary.

Acknowledgments

We thank the captain and the crews of the French research vessel *Le Nadir* and of the submersible *Nautille*. The STARMER project (North Fiji Basin study) was funded by the Science and Technology Agency of Japan and by the Institut Français de Recherche pour l'exploitation de la Mer (IFREMER), France; the BIOLAU (Lau Basin study) was funded by IFREMER, France. Anne-Marie Alayse-Danet was chief scientist of the BIOLAU cruise and Suguru Ohta (with the second author) was co-chief scientist of the STARMER II cruise. The first author thanks Michel Segonzac and Patrick Briand of the Centre National de Tri d'Océanographie Biologique for their kind communication of the materials examined in this study. The manuscript was improved by the careful review and corrections by Marian H. Pettibone and Jon L. Norenburg of Smithsonian Institution. This work was supported in part by grants-in-aid for the first author from the Ministry of Education, Culture and Science, Japan (No. 03640630) and Kato Foundation for the Promotion of the Bioscience Researches.

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