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TANAIDACEANS AND ANTHURIDEAN ISOPODS COLLECTED ON THE PRESIDENTIAL CRUISE OF 1938

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Abstract.—Descriptions and illustrations are given of the following Tanaidacea and Anthuridea: *Anatanais normani*, Magdalena Bay, Lower California, Mexico; *A. marmoratus*, Galápagos Is.; *A.* sp., Cocos I.; *Tanais stanfordi*, Clipperton I.; *Paranthura californiae*, new species, Magdalena Bay; *P. algicola*, new species, California (specific locality unknown); and *Colanthura squamosissima*, Magdalena Bay.

In July and August 1938, an inspection and collecting cruise aboard the U.S.S. Houston was carried out by President Franklin D. Roosevelt. The principal collecting localities on this cruise were off Lower California, Cocos Island, Clipperton Island, the Galápagos Islands, and Old Providence Island. A report on the isopods other than Anthuridea has been recently published by Bowman (1977). A preliminary study of the Tanaidacea and Anthuridea was undertaken by Dr. K. H. Barnard, South African Museum, in 1939, but for various reasons was never published. Recently this material was placed at my disposal for re-examination by Dr. Waldo L. Schmitt, Smithsonian Institution.

Order Tanaidacea
Family Tanaidae
Anatanais normani (Richardson)
Figs. 1–2

Tanais normani Richardson, 1905a:369–370, figs. 11–13; 1905b:14–16, figs. 16–18.—Fee, 1926:10.
Anatanais normani.—Shiino, 1951:33–34, fig. 1.—Greve, 1974:115–118, fig. 1.

Description.—Body almost cylindrical, length about 5–6× width. Peraeonal somites with a few lateral setae. Abdomen 6-segmented, about ¼ total length; 4th and 5th pleonal segments narrower than preceding segments, but less so than stated by Richardson, lateral margins prominent, strongly convex, almost angular, each with 3–5 setae. Transverse sutures between pleonal segments very indistinct. Anterior margin of cephalon between eyes triangular. Body color creamy white all over at time of my observation, but according to Dr. Barnard's notes on fairly recently preserved specimens, "As preserved the specimens have the grey stippling usual in littoral tanaids, with a dark transverse band on the front of the head between the black eyes."

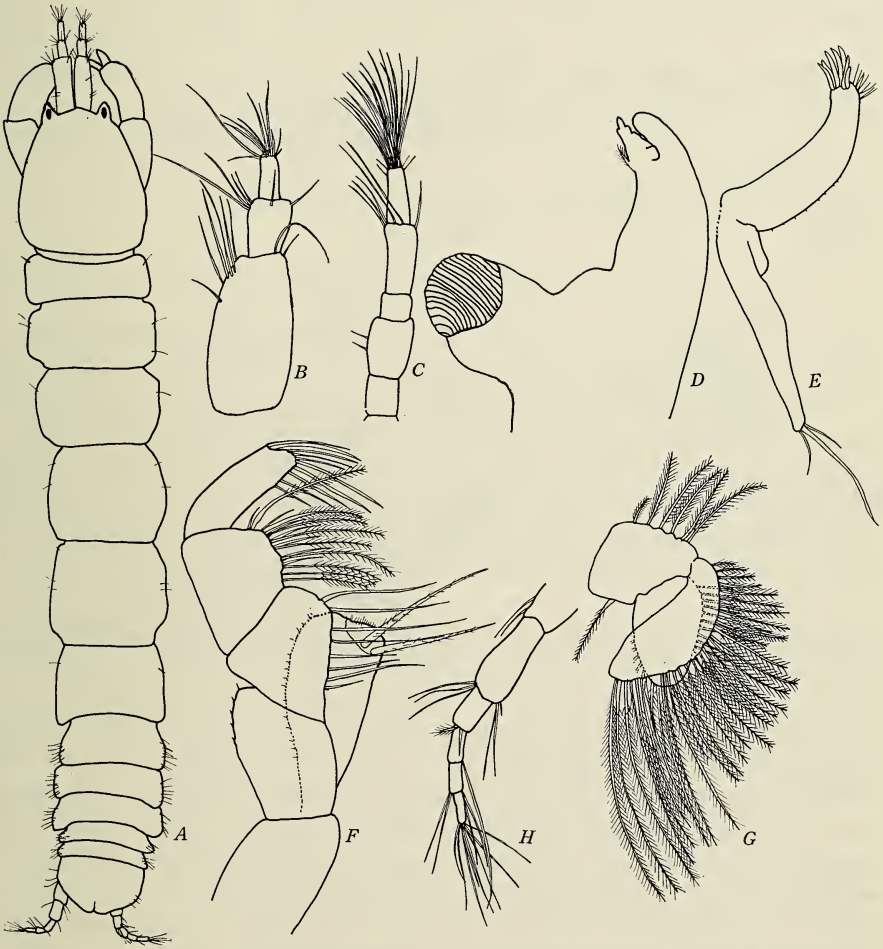

Fig. 1. *Anatanais normani*, female. *A*, Dorsal view of female; *B*, First antenna; *C*, Second antenna; *D*, Mandible; *E*, First maxilla; *F*, Maxilliped; *G*, Pleopod I; *H*, Uropod.

First antenna short, 3-segmented; 1st segment large, robust. Second antenna nearly as long as 1st antenna; 6-segmented.

Mandible without palp; pars incisiva with rounded apex; lacinia mobilis with dentate cutting margin and a plumose seta; pars molaris stout. First maxilla endite with about 7 stout terminal spines of varying length; epipodite with 3 apical setae. Maxilliped with 4-segmented palp, 1st segment wthout setae, 2nd segment with single row of about 8 setae, 3rd segment with double

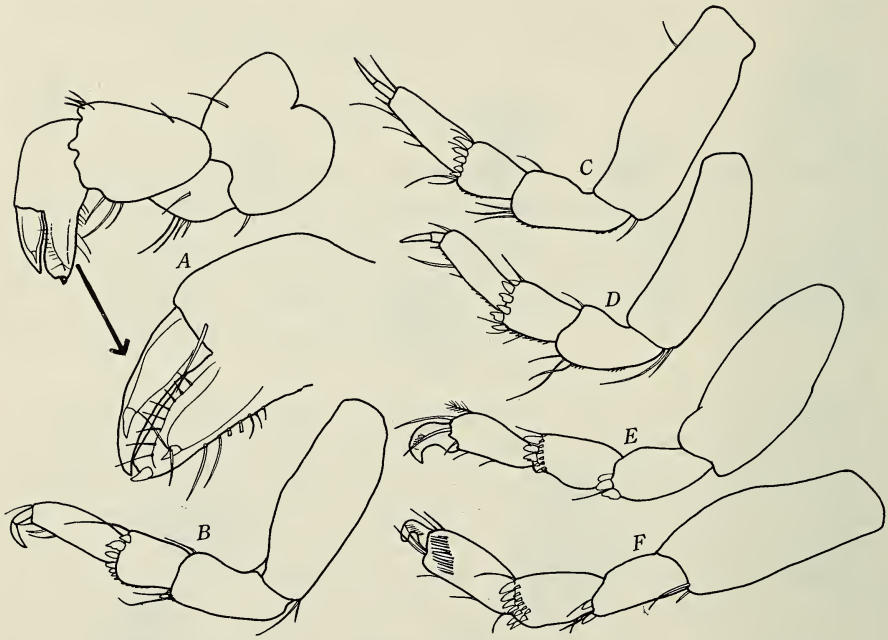

Fig. 2. *Anatanais normani*, female. *A*, Cheliped; *B–E*, Peraeopods II–V; *F*, Peraeopod VII.

row of setae, 4th segment with single row of about 10 setae; endite with 2 long setae, fringed with fine hairs.

Cheliped (peraeopod I) not so powerful in female, 5-segmented, sparsely setose; basi-ischium with triangular excavation at base; merus short, triangular; carpus stout and broad, with a small protuberance on distal margin; propodus smaller than carpus; dactylus slightly narrower and shorter than thumb. Peraeopods II–IV similar in shape; basis large, rectangular; carpus with 5 to 6 stout distal spines on posterior margin; dactylus elongate. Peraeopods V and VI similar in shape; merus with 3 stout spines at distal corner; dactylus strongly curved into hook with sharp apex. Peraeopod VII resembling peraeopod VI but with subapical row of about 12 fine setae on posterior surface of propodus.

Pleopods in 3 pairs; propodite broad with several long plumose setae on outer margin and only a single seta on inner margin; exopodite crescent-shaped, with many long plumose setae on outer margin; endopodite linguiform with similar long setae. Uropod uniramous, composed of 6 segments.

Remarks.—The present specimens from Magdalena Bay agree well with Richardson's original description and Greve's supplementary description of

the type-specimens. But some minor differences are found: (1) 6-segmented 2nd antenna as in the specimen from Japan (Shiino, 1951), and (2) shape of mandible.

Material.—3♀♀ (2.6–4.4 mm); 2 sexually undetermined specimens (already dissected, but according to Dr. Barnard's note, up to 5 mm), Lower California, Mexico, 10–15 fathoms, 18 July 1938.

Anatanais marmoratus Nordenstam
Figs. 3–4

Anatanais marmoratus Nordenstam, 1930:526–529, figs. 1–2.

Description.—Body almost cylindrical, about 5× as long as wide. Abdomen 6-segmented, about ¼× body length. Anterior margin of cephalon triangular between eyes. Eyes well developed, composed of 8–10 ocelli.

First antenna similar in shape in both sexes, 4-segmented; 1st segment largest, about 3× as long as wide and slightly longer than the remaining segments combined; terminal segment small, bearing a tuft of setae. Second antenna as long as 1st, composed of 6 segments; 1st and 3rd segments similar in length; 2nd, 4th and 5th also equal in length and longer than 3rd; terminal segment small, bearing a tuft of setae.

Mandible without palp; pars incisiva with rounded tip; right mandible with with dentate lacina mobilis, that in left mandible small and not dentate; pars molaris rather stout. First maxilla endite with about 10 sharp terminal spines. Maxilliped with 4-segmented palp; 1st segment with 1 or 2 setae; 2nd segment with about 4–5 inner setae and several outer setae; 3rd segment with about 7–8 plumose setae and a few simple setae; 4th segment with 10 setae; basis endite with a stout seta and a few simple setae.

Cheliped (peraeopod I) rather powerful in male, but not in female, 5-segmented and setose in both sexes; merus and carpus short, triangular; propodus as long as carpus in male but a little shorter than carpus in female; thumb shorter than remaining part of propodus, cutting edge armed with several setae. Peraeopod II elongate; basi-ischium 4× as long as wide; merus and carpus rectangular, ⅓× longer than basi-ischium; propodus 1½× longer than carpus; dactylus and its claw ⅔× longer than propodus. Peraeopods II and III similar in shape; basi-ischium stout, especially in peraeopod II; merus rectangular with 2 stout setae; carpus rectangular with 4 stout setae and 1 to 2 long setae; propodus slightly longer than carpus. Peraeopods V–VII similar in shape; basi-ischium stout; merus rectangular with a few stout setae and a simple seta; carpus oblong, with a row of several setae in peraeopod VII only.

Pleopods in 3 pairs, normal in shape; propodite broad with several long

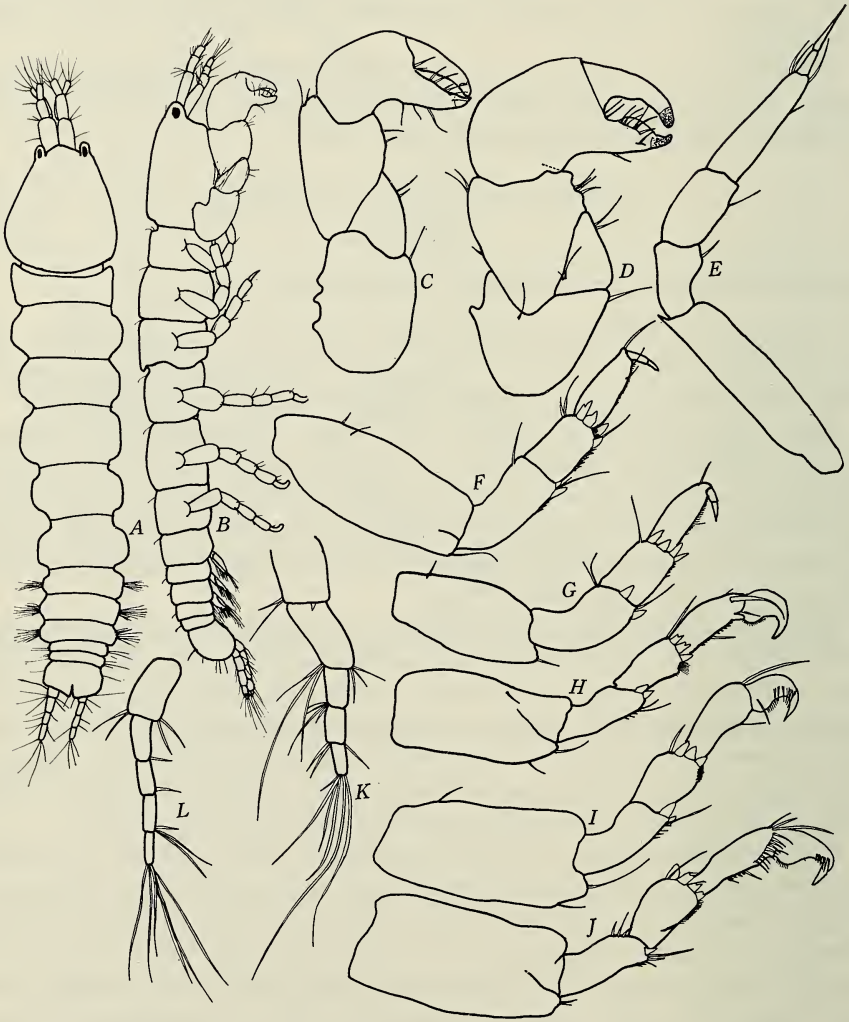

Fig. 3. *Anatanais marmoratus*. A, Dorsal view of young specimen; *B*, Lateral view of young specimen; *C*, Cheliped of female; *D–J*, Cheliped to peraeopod VII of male; *K*, Uropod of male; *L*, Uropod of female.

plumose setae on outer margin; exopodite crescent-shaped with many long plumose setae on outer margin; endopodite linguiform with similar long hairs on outer margin and a simple seta and a plumose seta on inner margin. Uropod uniramous, composed of 5 segments.

Material examined.—1 ♂ (body length unknown), 2 immature, 1 juv.,

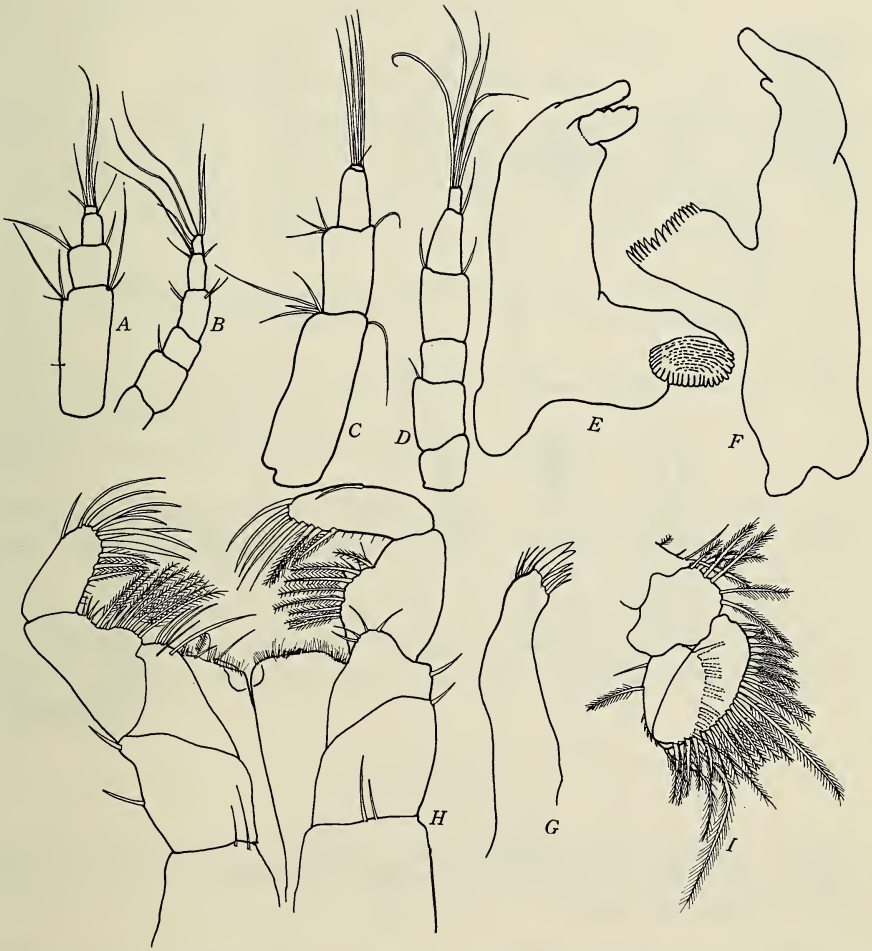

Fig. 4. *Anatanais marmoratus*. *A*, First antenna of female; *B*, Second antenna of female; *C*, First antenna of male; *D*, Second antenna of male; *E* and *F*, Mandible of male; *G*, First maxilla of female; *H*, Maxilliped of male; *I*, First pleopod of male.

Sulivan Bay, James Island, Galápagos Islands, shore collecting, 24 July 1938.

Remarks.—The present specimens from Galápagos agree fairly well with Nordenstam's original description but in some features differences are found: (1) only 5 segments in the uropod (6–8 in original), but in some tanaids, however, there is a tendency for young animals to have fewer segments in the uropod; (2) second antenna with unsegmented flagellum.

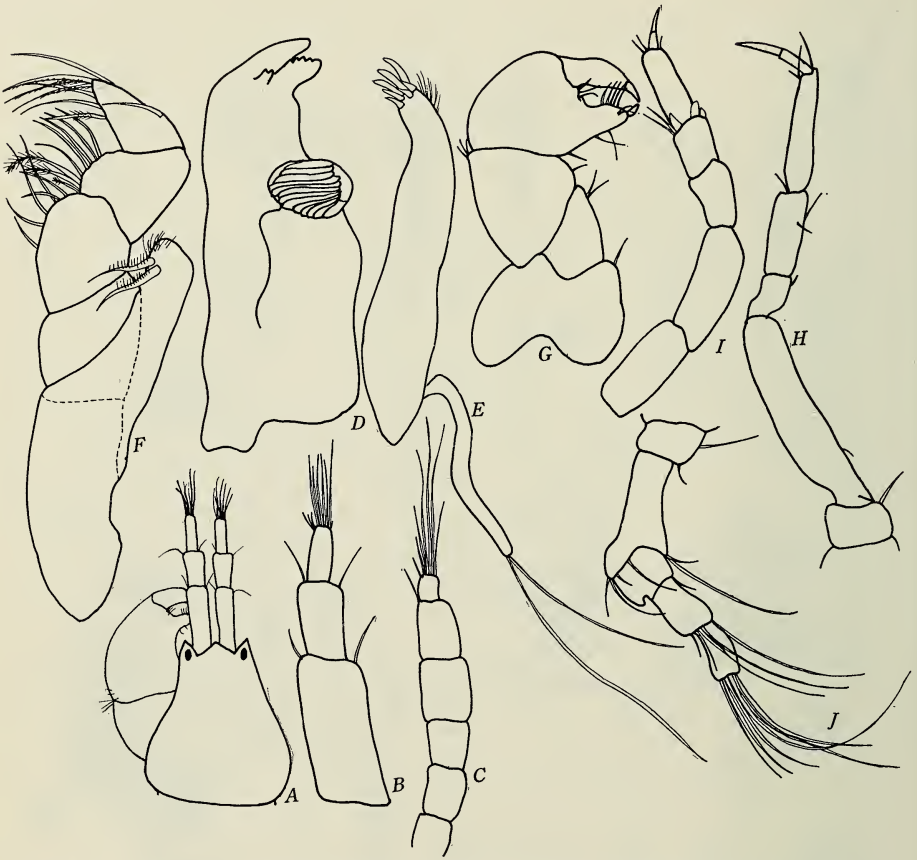

Fig. 5. *Anatanais* (?) sp., copulatory male. *A*, Cephalon; *B*, First antenna; *C*, Second antenna; *D*, Mandible; *E*, First maxilla; *F*, Maxilliped; *G*, Cheliped; *H*, Second peraeopod; *I*, Third peraeopod; *J*, Uropod.

Anatanais (?) sp.
Fig. 5

Two problematic specimens were collected from Chatham Bay, Cocos Island, by bottom sampling, 3 Aug. 1938. One of them is a copulatory male, in which 7 pleonal segments were counted (this specimen was strongly shrivelled at the time of my observation), and the other is perhaps a female with a 6-segmented pleon. According to Dr. Barnard's note the latter specimen is possibly in a protogynous copulatory male instar.

Copulatory male specimen: First antenna 3-segmented. Second antenna 6-segmented, with several long apical setae. Mandible with stout pars incisiva, dentate lacina mobilis, and pars molaris. Maxilliped with 4-seg-

mented palp and a basis endite. Cheliped rather stout. Second and 3rd peraeopods rather slender. Uropod 5-segmented.

Tanais stanfordi Richardson

Tanais stanfordi Richardson, 1901:565, Figs. 1–8.—Stephensen, 362, Figs. 1–5.—Miyadi, 1938:241, Fig. 2 [after Stephensen].—Miller, 1940:317.—Lang, 1956:255–256, Figs. 1–5; 1958:538, pls. 1–2.—Shiino, 1965:177–184, Figs. 1–4.—Kussakin and Tzareva, 1974:219–222, Fig. 2.—Gardiner, 1975: 127–138, Figs. 1–3.

Tanais fluviatilis Giambiagi, 1923:248–253, 8 Figs. (unnumbered).—Van Name, 1936:418–419, Figs. 258–259.—Mañé-Garzón, 1943:2–5, Fig. 1a, pl. 1.

Tanais sylviae Mello Leitao, 1941:203–207, 5 figs. (unnumbered).—Mañé-Garzón, 1943:6–10, Fig. 1b, 2, pl. 2.

Tanais herminiae Mañé-Garzón, 1943:10–14, Fig. 1c, pl. 3.

Material examined.—13♂♂ (2.9–3.8 mm), 93♀♀ and young (1.4–3.8 mm). Washed from bucket of algae collected in lagoon, Clipperton Island, 21 July 1938.

Remarks.—Originally described from Clipperton Island. Nothing need be added to the descriptions of this species, made quite adequately by so many researchers. A full summary of its distribution is given by Gardiner (1975: Table 1).

Order Isopoda
Suborder Anthuridea
Family Paranthuridae
Paranthura californiae, new species
Figs. 6–7

Description.—Body not very elongate, about 8× as long as wide. First to 6th peraeonal somites subequal in length, 7th about ⅗ length of others. Body creamy white all over at the time of my observation, but Dr. Barnard wrote in his notes, "As preserved, creamy white, with sparse pigment speckles, mostly in transverse lines across the middle segments of the peraeon, a more or less distinct dark patch in front of head between the black eye." Eyes mediocre with 14 to 17 ocelli. Anterolateral angles of cephalon exceed the rostral projection. Four pairs of oostegites. Without dorsal pit. Demarcation of pleonal somites visible dorsolaterally but indistinct in medial part.

First antenna with 6 distinct segments; first segment large, oblong; 2nd and 3rd segments rectangular; 4th segment small; 5th segment rectangular; terminal segment bearing several aesthetascs. Second antenna longer than the first, with 6 distinct segments; 1st segment small, triangular; second

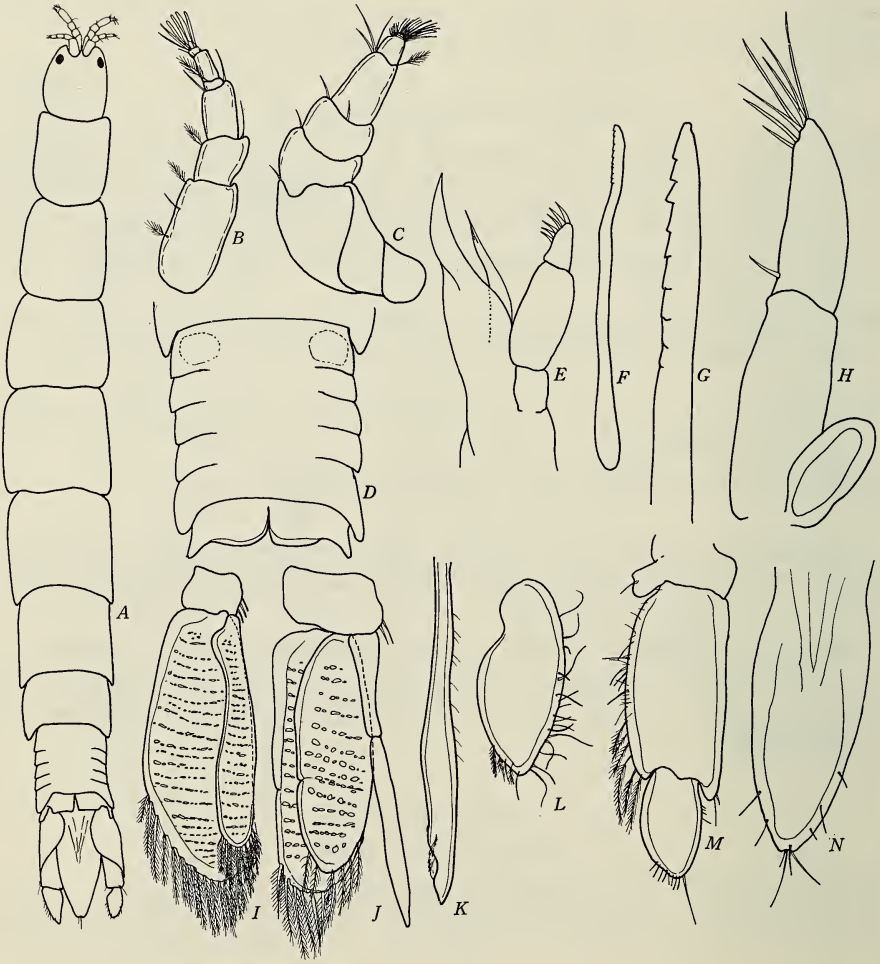

Fig. 6. *Paranthura californiae*. *A*, Dorsal view; *B*, First antenna; *C*, Second antenna; *D*, Abdomen; *E*, Mandible; *F*, First maxilla; *G*, Apical part of same; *H*, Maxilliped; *I*, First pleopod of female; *J*, Second pleopod of male; *K*, Apical part of stylus of the same; *L*, Exopod of uropod; *M*, Endopod of uropod; *N*, Telson. (*A–I* and *L–N*, female holotype; *J* and *K*, male allotype.)

segment biggest, grooved; terminal segment with tuft of setae at tip. There is no sexual difference in the morphology of both antennae.

Mandible with acute apex and 3-segmented palp; 2nd segment without seta; terminal segment bearing a row of 6–7 setae on inner border. First maxilla slender with 9–14 saw-like teeth on inner border of apical part. Maxilliped with 2 slender free segments; basal segment without rudimentary

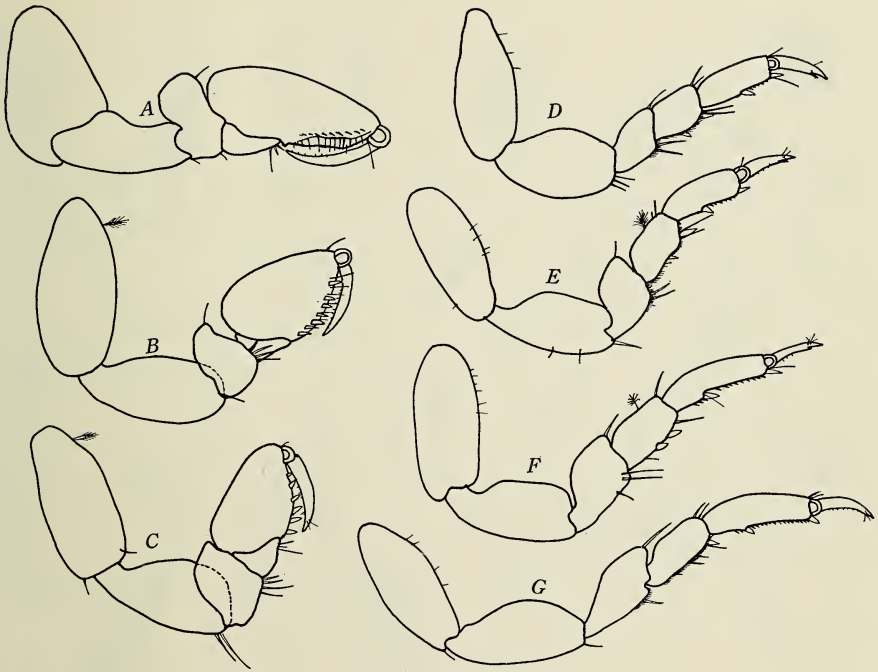

Fig. 7. *Paranthura californiae*, female holotype. *A–G*, First to seventh peraeopods.

endite found in some species of the genus; terminal segment somewhat tapering, with about 7 setae at the tip.

Peraeopods I–III subchelate. Peraeopod I big, armed with about 12 setae in a row on inner border of propodus. Peraeopods II and III each with 6–7 toothed setae on inner border of propodus. Peraeopods IV–VII ambulatory; basis and ischium oblong; merus triangular; carpus with 2 stout spines at inner part; propodus with a stout spine and 12–16 small and sharp spines.

Second pair of pleopods in male with spearhead-shaped long stylus. Endopod of uropod elongate; basal segment about twice as long as broad. Exopod of uropod ovate and slightly elongate, outer margin slightly sinuous distally, apex subacute. Telson ovate-lanceolate, slightly more than twice as long as broad, margin somewhat sinuate near base, apex rounded with a tuft of setae arising from a small indentation, dorsal surface evenly convex without sculpturing.

Material examined.—Station 3-38. Magdalena Bay, Lower California, Mexico, 18 July 1938. Dredging inside northern point of entrance to bay, 10–15 fm: ♀ holotype, 7.3 mm (USNM 82557); ♂ allotype, 5.3 mm (USNM 171242); 12♀ paratypes, 2.7–8.3 mm, 11 deposited in National Museum of

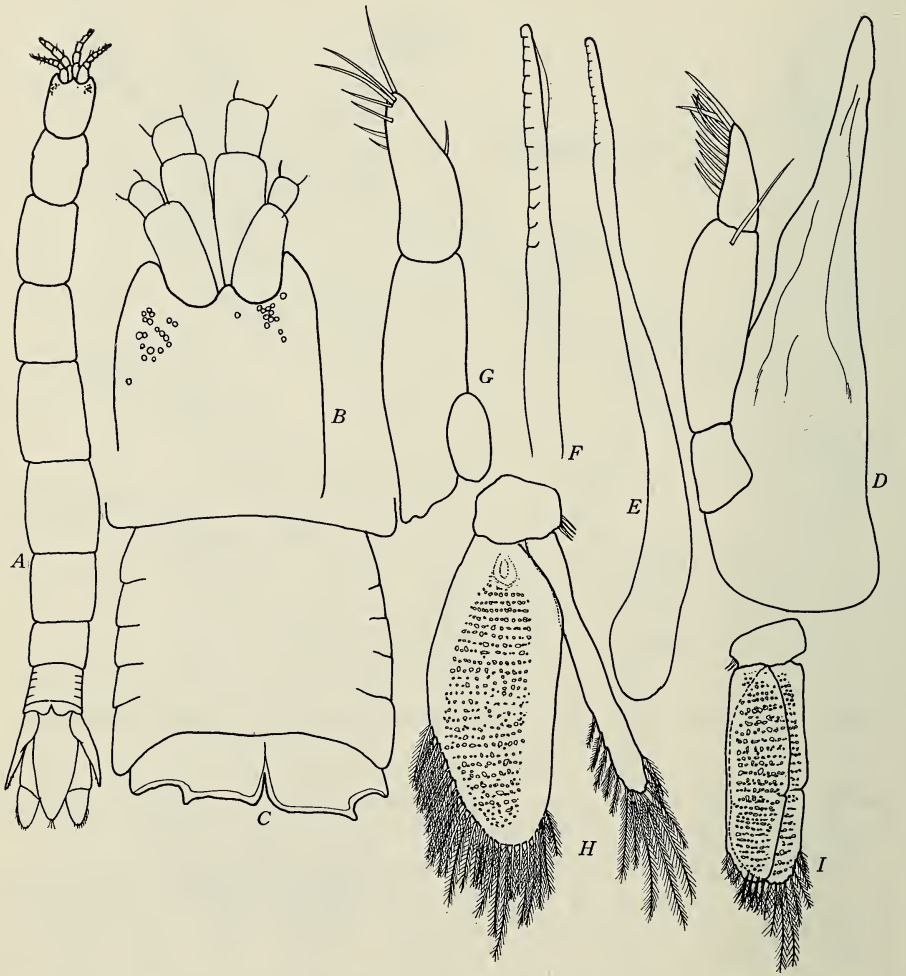

Fig. 8. *Paranthura algicola.* Female holotype, *A*, Dorsal view; *B*, Anterior part of cephalon; *C*, Abdomen; *D*, Mandible; *E*, First maxilla; *F*, Apical part of same; *G*, Maxilliped; *H*, First pleopod; *I*, Second pleopod.

Natural History (USNM 171243), and 1 deposited in Osaka Museum of Natural History (OMNH-Ar-1747).

Remarks.—The present new species is not a very distinct form in the genus. It very closely resembles *P. elegans* Menzies, 1951, from California. The former is separated, however, from the latter by the following features: (1) shape of both antennae, especially fewer segments in first antenna; (2) shape of anterior part of cephalon; (3) fused medial part of pleonal segments; (4) shape of posterior part of sixth pleonal somite; (5) less nu-

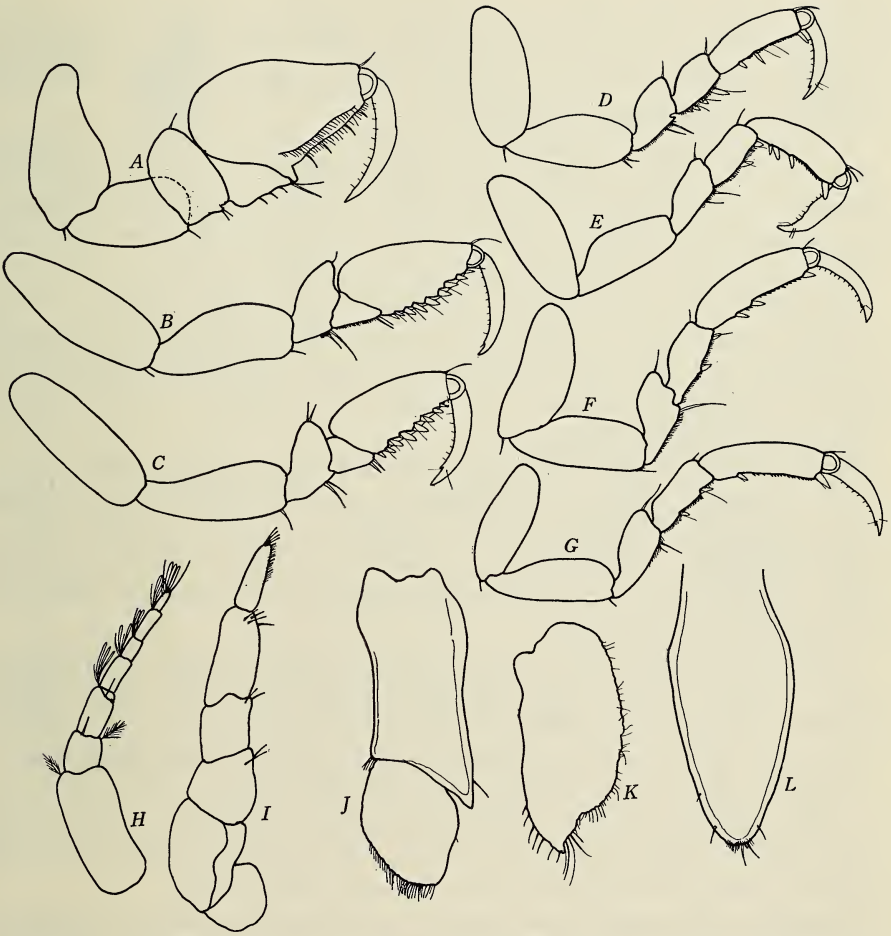

Fig. 9. *Paranthura algicola.* Female holotype, *A–G*, First to seventh peraeopods; *H*, First antenna; *I*, Second antenna; *J*, Endopod of uropod; *K*, Exopod of uropod; *L*, Telson.

merous setae on inner border of mandibular palp; and (6) indistinctly serrated border of telson.

Paranthura algicola, n. sp.
Figs. 8–9

Description.—Body elongated, about 10× as long as wide. First to 3rd and 6th peraeonal somites all subequal in length. Fourth and 5th somites equally long, ¾× third. Seventh somite about half length of 6th. Body color creamy white, as preserved in alcohol. Each eye consists of 12–19

distinct round ocelli, which are scattered separately. Anterolateral angles of cephalon exceed rostral projection. Fourth to 7th peraeopods with pairs of oostegites. Without dorsal pit. Demarcation of pleonal somites visible in dorsal view but indistinct in medial part.

First antenna with 7 distinct segments, and a small indistinct segment between 3rd and 4th segments; first segment biggest and oblong; terminal 5 segments each with 2 or 3 aesthetascs on distal corner. Second antenna 6-segmented and a little longer than the 4th. (All these observations are based only on female specimens; antennae of male is unknown).

Mandible with acute apex and 3-segmented palp; 2nd segment oblong bearing a long seta near distal end, terminal segment with row of 12 setae on inner border. First maxilla slender, with about 13 saw-like teeth on inner border of apical part. Maxilliped with 2 free segments; basal segment without rudimentary endite.

Peraeopods I–III subchelate. Peraeopod I big, propodus with row of about 12 setae. Propodus of peraeopods II and III with 6 to 8 stout spines on inner border. Peraeopods IV–VII ambulatory; basis and ischium oblong; merus triangular; carpus rectangular with 1 or 2 stout spines; propodus with 1–4 stout spines and 10–20 small denticles on inner margin. First and 2nd pleopods as in Fig. 8*H–I*.

Endopod of uropod obliquely oval, about as long as broad, inner margin short. Exopod broadly oval, with slight longitudinal fold, outer margin indented. Telson ovate-lanceolate; dorsal surface evenly but only slightly convex, about twice as long as broad, apex rounded with many small setae.

Material examined.—♀ holotype, 10.0 (USNM 82264) and ♀ paratype, 5.5 mm (OMNH-Ar-1748), from "rocky beach," California, washed from algae, 24 November 1916. This material was not derived from the Presidential Cruise, but is included at the request of Dr. Schmitt.

Remarks.—The present new species is most closely allied to *Paranthura elegans* Menzies from California but differs from the latter in the following features: (1) scattered eye ocelli; (2) coalescence of medial part of pleonal somites; and (3) shape of posterior border of sixth pleonal somite.

Colanthura squamosissima Menzies
Fig. 10

Colanthura squamosissima Menzies, 1951:114–118, Figs. 14–16.

Description.—Body not very elongate, about 8× as long as wide. First and 2nd peraeonal segments subequal in length. Third to 5th segments much longer than the preceding ones and subequal in size to one another. Sixth segment as long as each of the first 2 segments. Seventh segment almost completely supressed, very small. Seventh pair of peraeopods lacking. Four

Fig. 10. *Colanthura squamosissima*. *A*, Dorsal view; *B*, Anterior part of cephalon; *C*, Sixth pleonal somite; *D*, First antenna of male; *E*, First antenna of female; *F*, Second antenna of male; *G*, Second antenna of female; *H*, Mandible; *I*, First maxilla; *J*, Maxilliped; *K–P*, First to sixth peraeopods; *Q*, Second pleopod of male; *R*, Apical part of stylus of same; *S*, Exopod of uropod; *T*, Endopod of uropod; *U*, Telson (*A–C*, *E*, *G–P*, *S–U*, female; *D*, *F*, *Q–R*, male).

pairs of oostegites. Pleonal sutures rather distinct but not clearly visible dorsally as figured in Menzies' original description (Menzies, 1951); 6th pleonal segment fairly big. Eyes rather large, with about 11–16 distinct ocelli. Body color whitish yellow in alcohol. Anterolateral angles of cephalon exceed rostral projection. Head with small median process between the 1st antennae. Telson thin, without statocyst.

First antenna with 10 segments, segments of terminal half each bear

many brushlike aesthetascs in male; 1st antenna of female has 5 segments. Second antenna longer than 1st, no distinct difference by sex.

Mandible without palp. First maxilla with about 10 saw-like teeth on inner border of apical part. Maxilliped with only 1 free segment.

Peraeopods I–III subchelate. Peraeopod I big, armed with about 12 setae in a row near basal part of margin. Peraeopods II and III slenderer than peraeopod I; propodus with about 8 stout spines on inner margin. Peraeopods IV–VI ambulatory; basis and ischium oblong; merus triangular; carpus rectangular with 2 or 3 stout spines; propodus rectangular with 2 or 3 stout spines and many denticles on inner margin.

Male second pleopod with rather long stylus, apical part of which bears a thin hooklike structure. Uropod with broad ovate exopod arching over telson and with sinuately-margined endopod. Telson spatulate, without statocyst.

Material examined.—1♂ (3.8 mm in body length), 3♀♀ (4.1–5.4 mm in body length) and 2♀♀ (body length undetermined, because of lacking cephalon); Magdalena Bay, Lower California; July 18, 1938.

Acknowledgments

I wish to express my sincere gratitude to Dr. Saburo Nishimura, Kyoto University, for reviewing the manuscript; to the late Dr. Waldo L. Schmitt, who served as Naturalist during the Presidential Cruise of 1938, for giving me the opportunity to study such an important and interesting collection, and to Professor Emeritus Sueo M. Shiino, Mie University, for many useful suggestions on the systematics of tanaids. Last but not least I wish to thank Dr. Thomas E. Bowman, National Museum of Natural History, for his helpful cooperation. Contributions from the Osaka Museum of Natural History, No. 214.

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