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A NEW SPECIES OF *TEGASTES* (COPEPODA: HARPACTICOIDA) ASSOCIATED WITH A SCLERACTINIAN CORAL AT ENEWETAK ATOLL

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Abstract.—The harpacticoid copepod *Tegastes acroporanus,* new species, is associated with the scleractinian coral *Acropora florida* (Dana) at Enewetak Atoll. Until now only one harpacticoid species, *Tegastes georgei* Marcus and Masry, 1970, from *Stylophora* and *Pocillopora* in the Gulf of Elat, has been known to be associated with hard corals. The two species of *Tegastes* from corals resemble each other in the form of leg 5 in the female, but differ in the nature of the setae on the exopod of leg 4 and in the degree of sexual dimorphism in the first antenna of the male.

Although many cyclopoid copepods are associated with Scleractinia (Humes, 1979), harpacticoids have not developed associations with hard corals to the same extent. At present the only harpacticoid known to live with corals is *Tegastes georgei* Marcus and Masry, 1970. These authors found it with *Stylophora* and *Pocillophora* in the Gulf of Elat.

The specimens from the Marshall Islands reported here were collected by the author and Dr. Charles T. Krebs during field work made possible by the support and facilities of the Enewetak Marine Biological Laboratory, Enewetak. (The name of the atoll was formerly spelled Eniwetok.)

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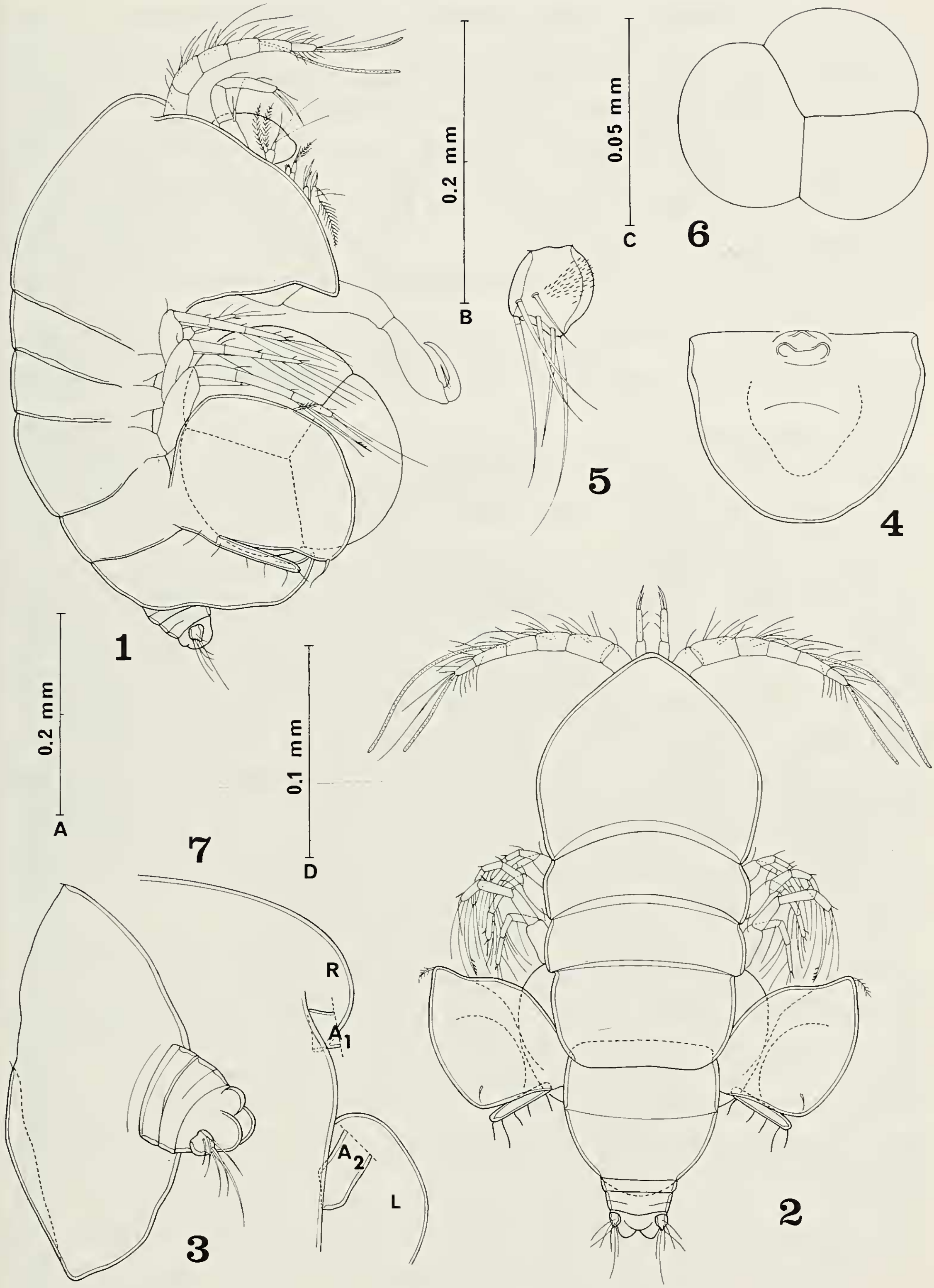
The observations and measurements were made on specimens cleared in lactic acid. All figures were drawn with the aid of a camera lucida. The letter after the explanation of each figure refers to the scale at which it was drawn. The abbreviations used are: R = rostrum, A_1 = first antenna, A_2 = second antenna, and L = labrum.

Harpacticoida G. O. Sars, 1903
Tegastidae G. O. Sars, 1904
Tegastes Norman, 1903
Tegastes acroporanus, new species
Figs. 1–26

Type-material.—109 ♀♀, 85 ♂♂ from *Acropora florida* (Dana), in 2 m, western end of Bogon Island, Enewetak Atoll, Marshall Islands, 23 June 1969. Holotype ♀, allotype, and 155 paratypes (90 ♀♀, 65 ♂♂) deposited



Figs. 1–7. *Tegastes acroporanus*, female. 1, Lateral (A); 2, Dorsal (A); 3, Genital and postgenital segments, lateral (B); 4, Genital segment, with outline of postgenital segments shown by broken line, ventral (B); 5, Caudal ramus, lateral (C); 6, Egg sac, lateral (A); 7, Rostrum and part of labrum, lateral (D).

in the National Museum of Natural History, Smithsonian Institution, Washington, D.C.; the remaining paratypes in the collection of the author.

Female.—Body (Figs. 1, 2) relatively large. Length 0.54 mm (0.50–0.57 mm) and greatest dorsoventral thickness 0.32 mm (0.30–0.35 mm), based on 10 specimens. Greatest width at level of cephalosome approximately 0.20 mm. Segment of leg 1 fused with cephalosome. Genital segment (Fig. 3) produced ventrally with concave anterior surface. Greatest diagonal length of segment 265 μm. In ventral view genital segment 143 × 165 μm, a little wider than long (Fig. 4). Abdomen (postgenital segments) small, 80 μm long, and 3-segmented (Fig. 3).

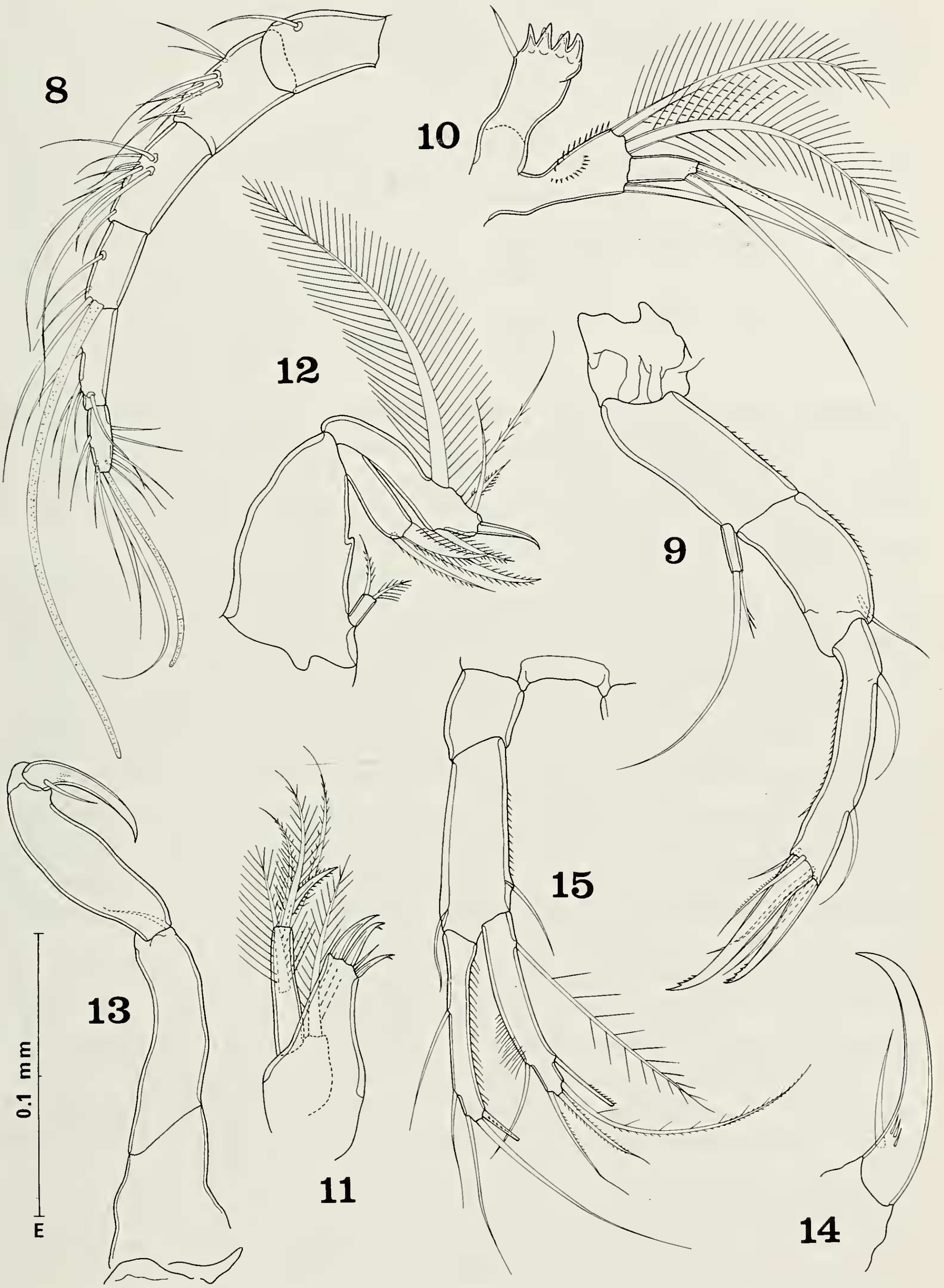
Caudal ramus (Fig. 5) minute, 20 × 20 μm, bearing six smooth setae, longest seta 52 μm. Portion of lateral surface of ramus with very small spinules.

Egg sac (Fig. 6) 240 × 212 μm, usually containing three eggs, each egg approximately 167 × 120 μm. Occasionally only two eggs in egg sac (Fig. 2). Egg sac held between large scooplike fifth legs and anterior concave surface of genital segment.

Rostrum (Fig. 7) a small prominence. First antenna (Fig. 8) 6-segmented and 196 μm long. Lengths of segments (measured along posterior margin): 31 (39 μm along anterior margin), 36, 34, 29, 34, and 24 μm respectively. Armature: 1, 8, 9, 3 + 1 aesthete, 5, and 10 + 1 aesthete. All setae naked.

Second antenna (Fig. 9) 3-segmented and 140 μm long not including terminal spines. Exopod 9 × 3.5 μm, bearing two unequal terminal setae. Endopod with first segment bearing one seta; second segment carrying two marginal setae and having terminally four slender setae and two stout slightly clawlike elements with small inner subapical teeth. Inner margin of basipod and first segment of endopod with row of small spinules; similar spinules along outer margin of second segment of endopod.

Labrum (Fig. 1) prominent. Mandible (Fig. 10) with precoxa armed terminally with a seta and four teeth (two middle teeth with double tips). Coxa-basis ornamented with crescentic row of spinules, bearing distally two inner plumose setae and one outer smooth seta. Endopod with three terminal smooth setae. First maxilla (Fig. 11) with precoxa bearing three spines (two of them with a subapical tooth) and one small seta. Coxa with one plumose seta. Basipod with one plumose seta midway along its length and provided terminally with three plumose setae and a barbed spine. Second maxilla (Fig. 12) with syncoxa bearing proximally a small rectangular endite with two setae, followed by a marginal notch and finally by a larger endite bearing three setae. Basis elongate with a terminal smooth clawlike spine and having five setae, one very large with unusually long lateral hairs. Maxilliped (Fig. 13) elongate, approximately 255 μm including coxa. Endopod, or "hand," about 100 μm long. Claw 60 μm and bearing one seta and a few spinules (Fig. 13). Otherwise maxilliped without armature or ornamentation.



Figs. 8–15. *Tegastes acroporanus,* female. 8, First antenna, ventral (E); 9, Second antenna, outer (C); 10, Mandible, anterior (C); 11, First maxilla, posterior (C); 12, Second maxilla, posterior (C); 13, Maxilliped, inner (D); 14, Claw of maxilliped, outer (C); 15, Leg 1 and intercoxal plate, anterior (D).

Leg 1 (Fig. 15) with 1-segmented endopod and exopod. Legs 2–4 (Figs. 16, 18, 19) with 3-segmented rami. Formula for armature as follows:

P_1	coxa	0-0	basis	1-1	exp	2, 3		
					enp	1, 3, 1, 1		
P_2	coxa	0-0	basis	1-0	exp	1-1;	1-1;	1, 3, 2
					enp	0-1;	0-2;	1, 2, 2
P_3	coxa	0-0	basis	1-0	exp	1-1;	1-1;	1, 3, 3
					enp	0-1;	0-2;	1, 2, 3
P_4	coxa	0-0	basis	1-0	exp	1-0;	1-1;	1, 3, 2
					enp	0-1;	0-2;	1, 2, 1

Spinelike setae on all four legs with minutely truncate tips. Exopod and endopod of leg 1 (Fig. 15) about equal in length. Third endopod segment of leg 2 in one female with abnormal armature 2, 2 (Fig. 17). Exopod of leg 4 with distal of two inner setae on third segment enlarged, shaped like a curved blade, with subapical outer teeth (Fig. 19).

Leg 5 (Fig. 20) with greatly enlarged scooplike baseoendopod (Fig. 21) and elongate slender exopod. Baseoendopod approximately 218 × 130 μm, with an outer smooth seta, a plumose inner seta, and a smooth seta at distal outer corner. Exopod 105 × 18 μm, bearing five naked setae.

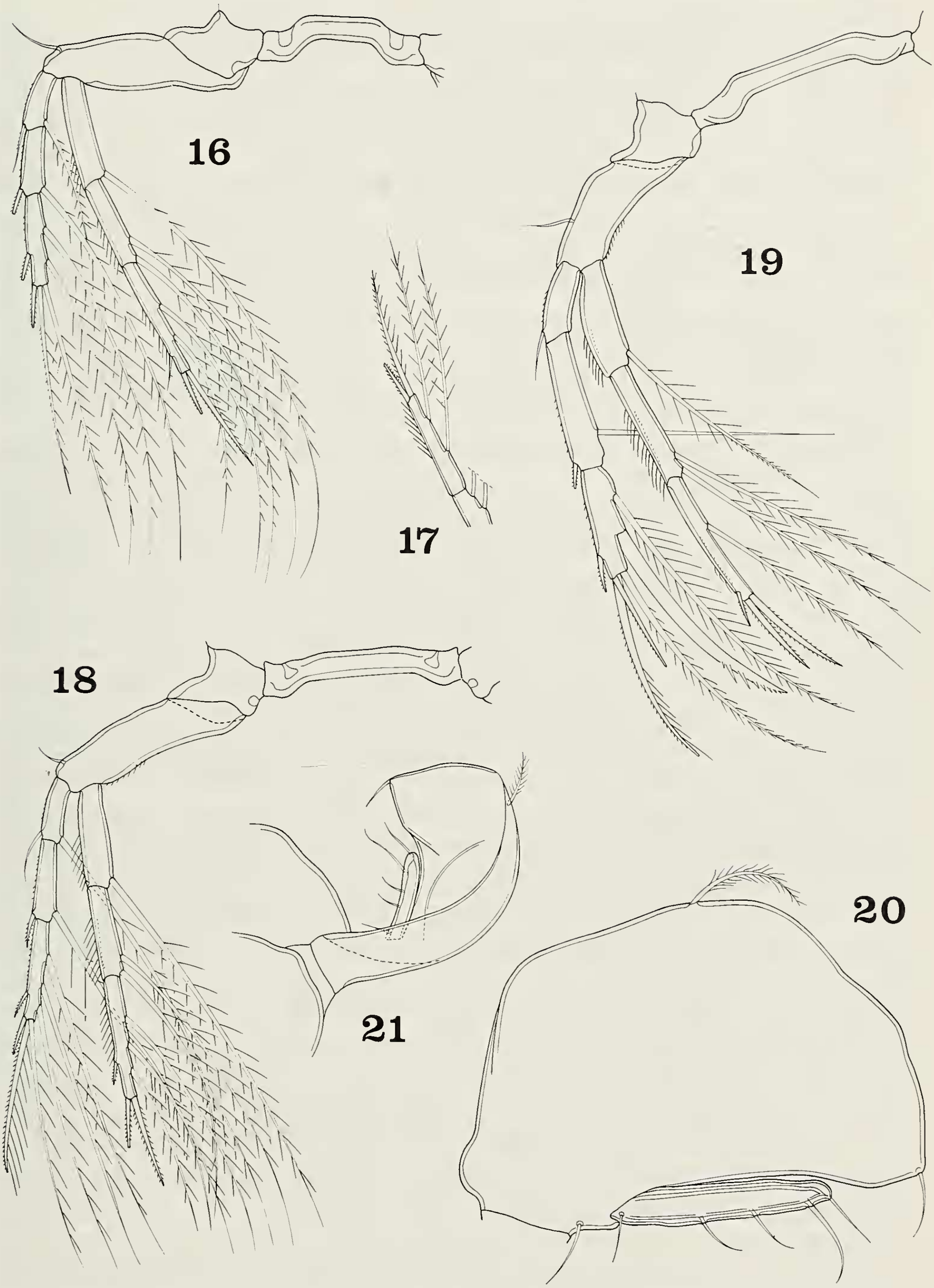
Living specimens in transmitted light opaque gray, eye red, eggs gray.

Male.—Body (Fig. 22) resembling in general form that of female. Length 0.47 mm (0.46–0.48 mm) and greatest dorsoventral thickness 0.28 mm (0.28–0.29 mm), based on 10 specimens. Greatest width at level of cephalosome approximately 0.18 mm. Genital segment produced ventrally, with spermatophore-reservoir divided into anterior foliose lappet concave posteriorly and posterior rounded lobe separated by smaller lobes (Fig. 23). Abdomen and caudal ramus similar to female.

Rostrum like that of female. First antenna (Figs. 24, 25) 7-segmented, 161 μm long, and showing strong sexual dimorphism. Lengths of segments (measured along posterior margin): 33 (36 μm along anterior margin), 31, 17.5, 45, 8, 40.5, and 14 μm respectively. Formula for armature: 1, 8, 6 + 1 aesthete, 9 + 1 aesthete, 1, 3, and 10 + 1 aesthete. All setae naked. Sixth segment with swollen proximal part and recurved, almost clawlike distal part.

Second antenna, labrum, mandible, first maxilla, second maxilla, maxilliped, and legs 1–4 similar to those in female. Abnormalities in armature of legs noted as follows: one male with 1, 2, 1, 1 on endopod of leg 1, and another male with 2, 3 on third segment of endopod of leg 3.

Leg 5 (Fig. 26) with a single seta on baseoendopod. Free segment elongate, 57 × 7 μm, bearing two smooth outer marginal setae and two long unilaterally barbed terminal setae.



Figs. 16–21. *Tegastes acroporanus,* female. 16, Leg 2 and intercoxal plate, anterior (D); 17, Third segment of endopod of leg 2, anterior (D); 18, Leg 3 and intercoxal plate, anterior (D); 19, Leg 4 and intercoxal plate, anterior (D); 20, Leg 5, antero-outer (D); 21, Leg 5, anterior (B).

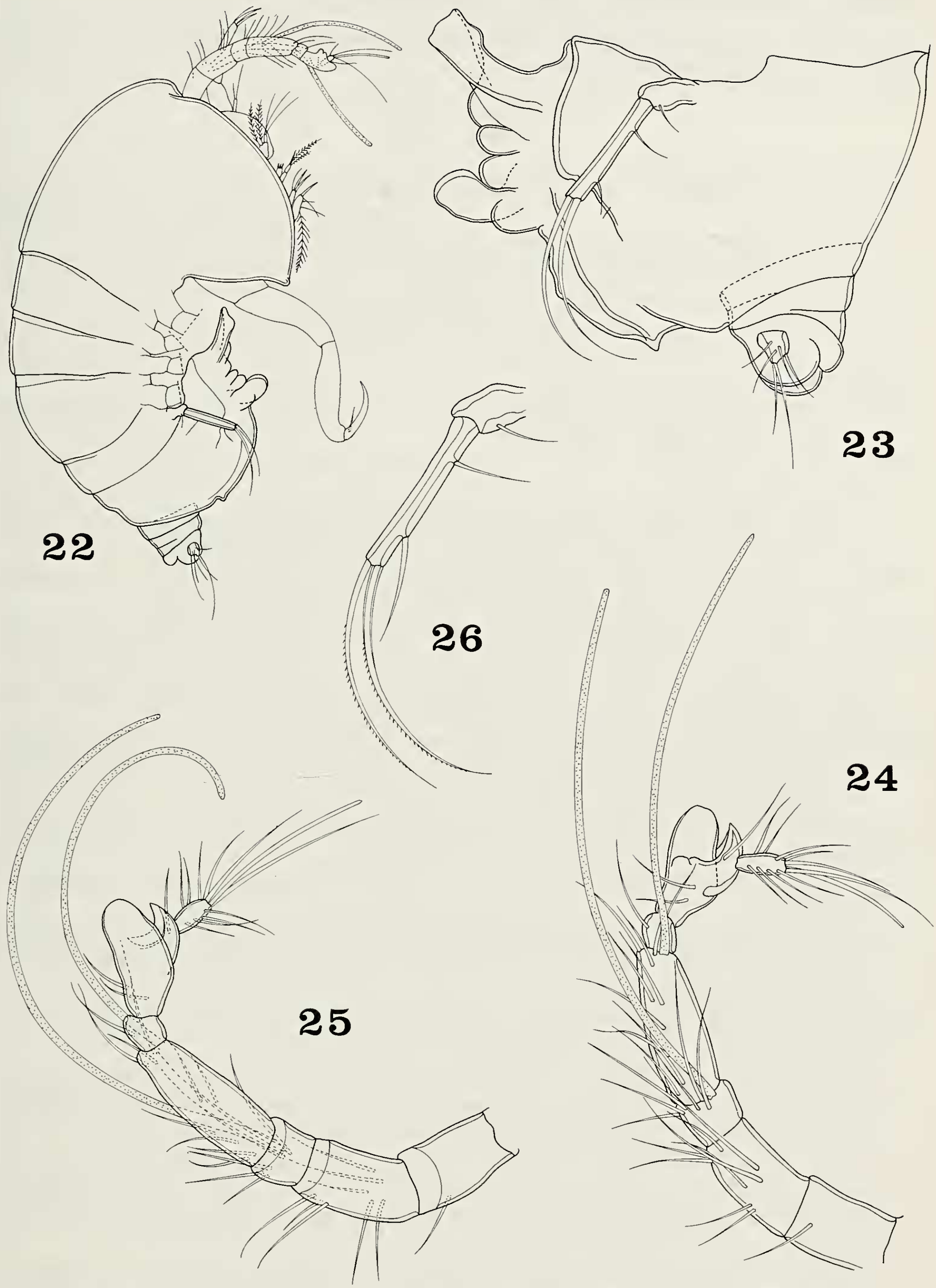
Color as in female.

Etymology.—The specific name *acroporanus* is a combination of the generic name of the host coral and the suffix *-anus,* signifying belonging to.

Remarks.—The genus *Tegastes* Norman, 1903, contains at present 25 valid species. In only 11 of these are both sexes known. In 12 species males are unknown and in two species females have not been described. Most species of *Tegastes* are free-living. However, three species (including the new species described above) are now known to be associated with invertebrates. *Tegastes knoepffleri* Médioni and Soyer, 1967, occurs with the bryozoan *Schizobrachiella sanguinea* (Norman) at Banyuls in southern France (Médioni and Soyer, 1967). *Tegastes georgei* Marcus and Masry, 1970, lives on the scleractinian corals *Stylophora* sp. and *Pocillopora* sp. in the Gulf of Elat, Red Sea (Marcus and Masry, 1970).

The expanded nature of the baseoendopod of the fifth leg in the female serves to distinguish *Tegastes acroporanus* from 15 species in which females are known and where the baseoendopod is not expanded and in some cases is triangular and tapered distally. These species are: *T. areolatus* Monard, 1935, *T. brasiliensis* Jakobi, 1953, *T. calcaratus* Sars, 1910, *T. clausi* Sars, 1904, *T. dalmatinus* Petkovski, 1955, *T. elenae* Marcus, 1963, *T. falcatus* (Norman, 1868), *T. flavidus* Sars, 1904, *T. grandimanus* Sars, 1904, *T. longimanus* (Claus, 1863), *T. nanus* Sars, 1904, *T. neapolitanus* (Claus, 1863), *T. pulcher* Pesta, 1932, *T. riedli* Pesta, 1959, and *T. tenuis* Pesta, 1932. The remaining 10 species may be separated from the new species on other grounds. In *T. andrewi* (T. Scott, 1894) the inner margin of the hand of the maxilliped has a curved spiniform process and a dilated appendage. In *T. chalmersi* Thompson and A. Scott, 1903, the length of the female is 0.3 mm and the hand of the maxilliped has spinules along the inner edge. In *T. georgei* Marcus and Masry, 1970, the third segment of the exopod of leg 4 bears a forked seta. In *T. knoepffleri* Médioni and Soyer, 1967, the maxilliped has several spines and a ciliated cup on the second segment. In *T. minutus* Sewell, 1940, the length of the female is 0.29 mm and the hand of the maxilliped is produced proximally. In *T. perforatus* Lang, 1935, the male first antenna is 8-segmented with the last 3 segments relatively unmodified. In *T. porosus* Petkovski, 1955, the female genital segment is drawn out into 2 spikes. In *T. satyrus* (Claus, 1860) the baseoendopod of the fifth leg in the female is narrow, of about equal length throughout, and rounded terminally. In *T. seurati* Monard, 1936, the baseoendopod of leg 5 in the female is quadrangular and the hand of the maxilliped is swollen proximally. In *T. edmondsoni* Pesta, 1932, the hand of the maxilliped bears spinules along the inner side.

A close relationship between *Tegastes acroporanus* and *T. georgei* is suggested by the nature of leg 5 in the female. *T. acroporanus* differs from the Red Sea species in having 6 apical setae on the endopod of the second



Figs. 22–26. *Tegastes acroporanus,* male. 22, Lateral, with legs 1–4 amputated (A); 23, Urosome, lateral (D); 24, First antenna, ventral (E); 25, First antenna, dorsal (E); 26, Leg 5, lateral (E).

antenna, in having 6 setae (none of them forked) on the third exopod segment of leg 4, and in showing strong sexual dimorphism in the sixth segment of the first antenna of the male.

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