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## Two Species of *Acanthochondria* (Copepoda: Poecilostomatoida) Parasitic on Fishes of Japan<sup>1)</sup>

Masahiro Dojiri and Ju-Shey Ho<sup>2)</sup>

**Abstract:** Two previously known species of the chondracanthid genus *Acanthochondria* (Copepoda: Poecilostomatoida) are redescribed. *Acanthochondria inimici* Yamaguti, 1939 was collected from the lionfish *Pterois volitans* (Linnaeus) and lumpfish *Inimicus japonicus* (Cuvier and Valenciennes), while *A. sixteni* Wilson, 1922 from the olive flounder *Paralichthys olivaceus* (Schlegel).

The most recent generic diagnosis for the genus *Acanthochondria* Oakley, 1927 was included in the revision of the Chondracanthidae by Ho (1970). This genus is characterized, among other features, by the absence of large processes on the cephalothorax and trunk, except on the posterior corners of the trunk, i.e. the posterior processes. Since the morphology of the oral appendages of *Acanthochondria* is relatively uniform within the genus and the general body proportions not too reliable (Ho, 1970; Kabata, 1984), species identification within the genus was problematical. Recently, however, Kabata (1984) discussed morphological criteria for species identification in this taxonomically difficult genus. The shape of the first antenna and cephalothoracic shield, ornamentation of the labrum, relative sizes of legs 1 and 2, and the morphology of the genito-abdomen were used as important taxonomic characters.

The two species, *A. inimici* and *A. sixteni*, treated herein have not been described in detail since their discovery. Precise morphological descriptions of both species, taking into account the important taxonomic characters suggested by Kabata, are presented below.

### *Acanthochondria inimici* Yamaguti, 1939

(Figs. 1-3)

**Material Examined**—5 females (4 with attached males) from gills of *Pterois volitans* from Japan (in collection of South Australian Museum) (SAM C4156); 11 females (9 with attached males) (SAM C4157) from oral cavity floor of 6 *Inimicus japonicus* caught at Tassha, Sado Island, Japan on 10 August 1978.

**Female**—Body (Fig. 1A) with relatively slender head and neck, but stout trunk. Total length 6.82 mm (6.43–7.36 mm) (including posterior process) based on 4 specimens. Head (Fig. 1A, B) devoid of processes, much longer than wide, 1.32 mm (1.28–1.40 mm) × 0.93 mm (0.91–0.96 mm), and bearing median longitudinal sclerotized bar. Neck, formed from first and second pedigers (leg-bearing body segments), elongate (Fig. 1A), but may be contracted (Fig. 1B) during preservation. Leg 2 (Fig. 1A, B) extended laterally. Trunk stout, constricted at about midlength; posterior process

<sup>1)</sup> Contributions from Sado Marine Biological Station, Niigata University, No. 455.

<sup>2)</sup> Institute of Parasitology, Department of Biology, California State University, Long Beach, California, 90840, U. S. A.

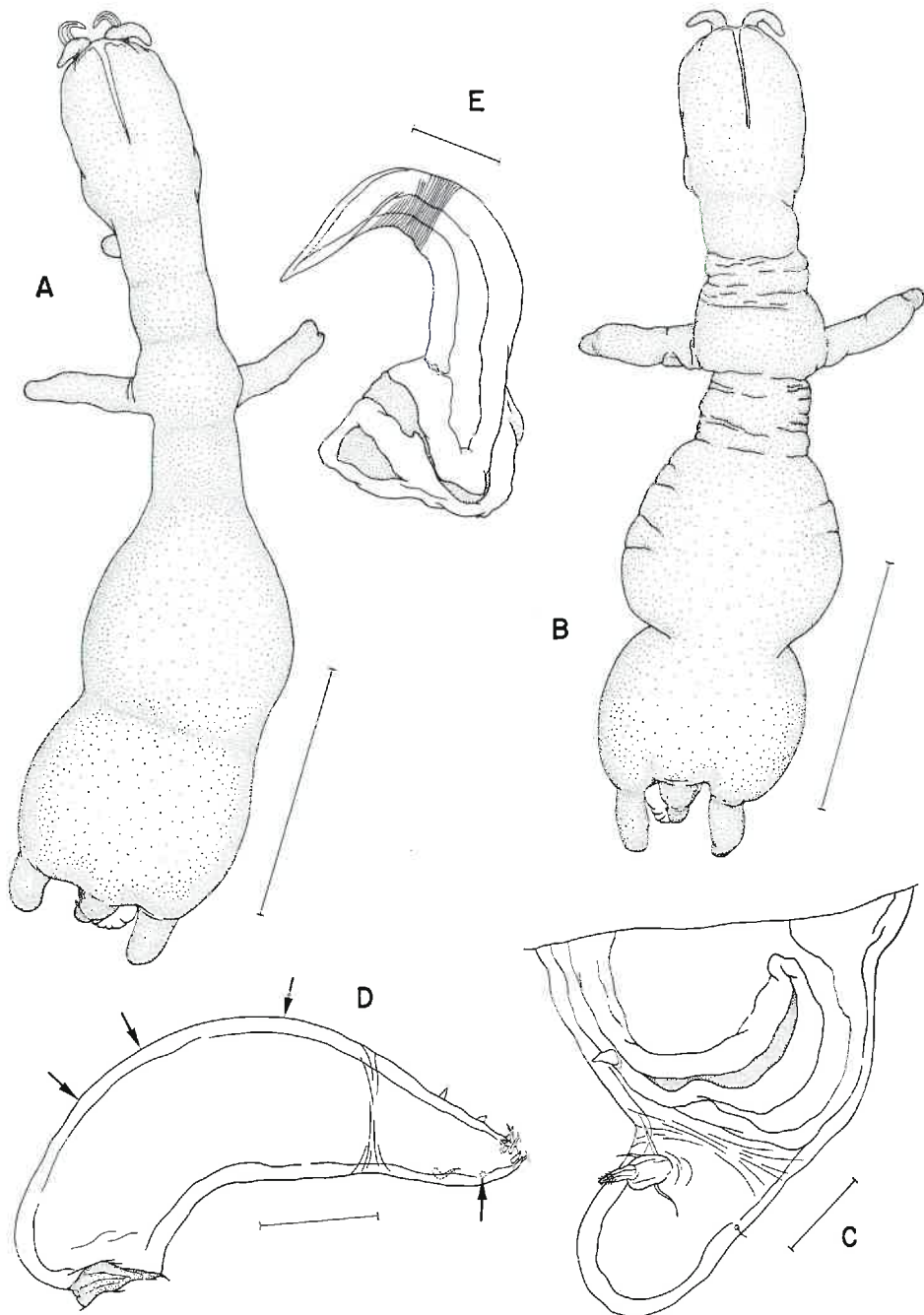


Fig. 1. *Acanthochondria inimici* Yamaguti, female: A, body, dorsal; B, body, contracted, dorsal; C, genito-abdomen, lateral; D, first antenna, dorsal (arrows indicate position of broken setae); E, second antenna, dorsal. Scales: 2.0 mm in A, B; 0.1 mm in C-E.

extending beyond distal limit of genito-abdomen. Neck and trunk combined measuring 5.49 mm (5.10–6.08 mm)  $\times$  1.75 mm (1.72–1.77 mm). Genito-abdomen (Fig. 1B) of usual form; genital segment, 207  $\times$  320  $\mu$ m, with conical element on ventral surface; abdomen, 212  $\times$  150  $\mu$ m, with rounded posterior margin and bearing a pair of dorsal setules. Caudal ramus (Fig. 1C) with swollen basal portion carrying 3 naked setae and terminating in spinulated spiniform process.

First antenna (Fig. 1D) cylindrical with slightly swollen proximal portion tapering toward distal end; basal portion with 3 setae (broken off in appendage figured, but positions of setae indicated by arrows) and distal portion with armature of 2, 2 (broken seta indicated by arrow), 8. Second antenna (Fig. 1E) 2-segmented; first segment heavily sclerotized and unarmed; second segment a strongly curved claw. Labrum (Fig. 2A) with patch of dorsal spinules and small hyaline knob on lateral margin. Mandible (Fig. 2B) with 34–39 teeth on convex side and 26–29 teeth on concave side of terminal falcate process. Paragnath (Fig. 2C) bilobed with patch of spinules. First maxilla (Fig. 2D) a lobe bearing 2 setae (1 seta spinulated), patch of spinules and a papillated process. Second maxilla (Fig. 2E) 2-segmented; first segment greatly swollen and unarmed; terminal segment with 1 large seta spinulated at tip, 1 minute naked seta, and 10–15 teeth along terminal process. Maxilliped (Fig. 2F) 3-segmented; first segment stout, unarmed; second segment with patch of spinules extending from segment proper to tip of rounded process; terminal segment a curved claw bearing conical accessory process. Leg 1 (Fig. 2G) short, bilobed; protopodal seta broken off in specimen figured (position indicated by arrow); exopod with 1 small lateral spine and about 4 small posterior spines (number variable); exopod and endopod with patch of scalelike papillae on posterior surface. Leg 2 (Fig. 2H) with elongate basal portion, and terminating in 2 rounded lobes; protopodal seta not observed in any specimen, but presumably broken off (position of seta suggested by small depression and indicated in figure by arrow).

**Male**—Body (Fig. 3A) 626–630  $\times$  207–244  $\mu$ m (measured from tip of second antenna to distal end of urosome, excluding caudal ramus); cephalothorax comprising more than half of total body length; metamerism of body indistinct. Genital segment (Fig. 3B) with pair of ventral ridges without setae. Caudal ramus (Fig. 3B) similar to that in female except bearing 1 additional medial seta.

First antenna (Fig. 3D) with armature formula 1, 1, 2+1 setule, 2+1 setule, and 8. Second antenna (Fig. 3D) with basal segment equipped with hyaline seta on dorsomedial surface; terminal claw with 2 dorsomedial setae. Mandible (Fig. 3E) with 17–18 teeth on convex side and 13–14 teeth on concave side of terminal falcate process. First maxilla (Fig. 3F) somewhat triangular in outline bearing 1 spinulated seta, 1 naked seta, 1 small patch of minute spinules, and a process carrying 2 papillae at tip. Second maxilla (Fig. 3G, H) similar to that in female except terminal process shorter and stouter, and devoid of teeth; 1 aberrant specimen with 1 or 2 teeth on terminal process. Leg 1 (Fig. 3I, J) with small medial process at base and 1 relatively large protopodal seta; right exopod (Fig. 3I) with 1 terminal element and left exopod (Fig. 3J) with 2 terminal elements; endopod represented by medial conical process. Leg 2 (Fig. 3K) with medial conical process near base; protopodal seta longer than exopodal seta (specimen from *Inimicus japonicus* with 2 setae on exopod instead of 1 in specimen from *Pterois volitans*); endopod a relatively large conical lobe.

**Remarks**—This species was first described by Yamaguti (1939) from one female and

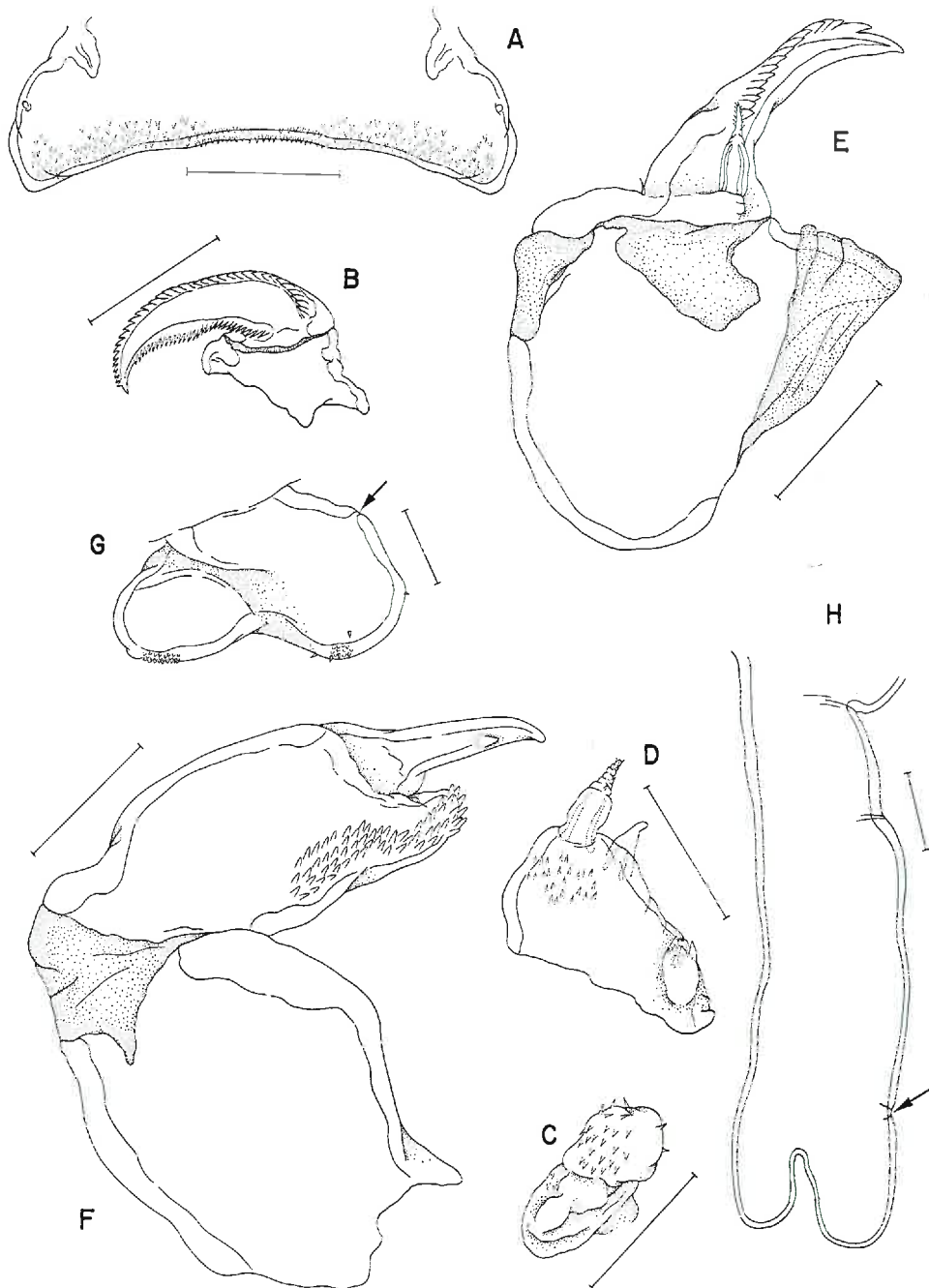


Fig. 2. *Acanthochondria inimici* Yamaguti, female: A, labrum, ventral; B, mandible, dorsal; C, paragnath, ventromedial; D, first maxilla, ventromedial; E, second maxilla, dorsal; F, maxilliped, anterodorsal; G, leg 1, ventral; H, leg 2, ventral. Arrows indicate positions of missing protopodal setae. Scales: 0.1 mm in A, B, G, H; 0.05 mm in C-F.

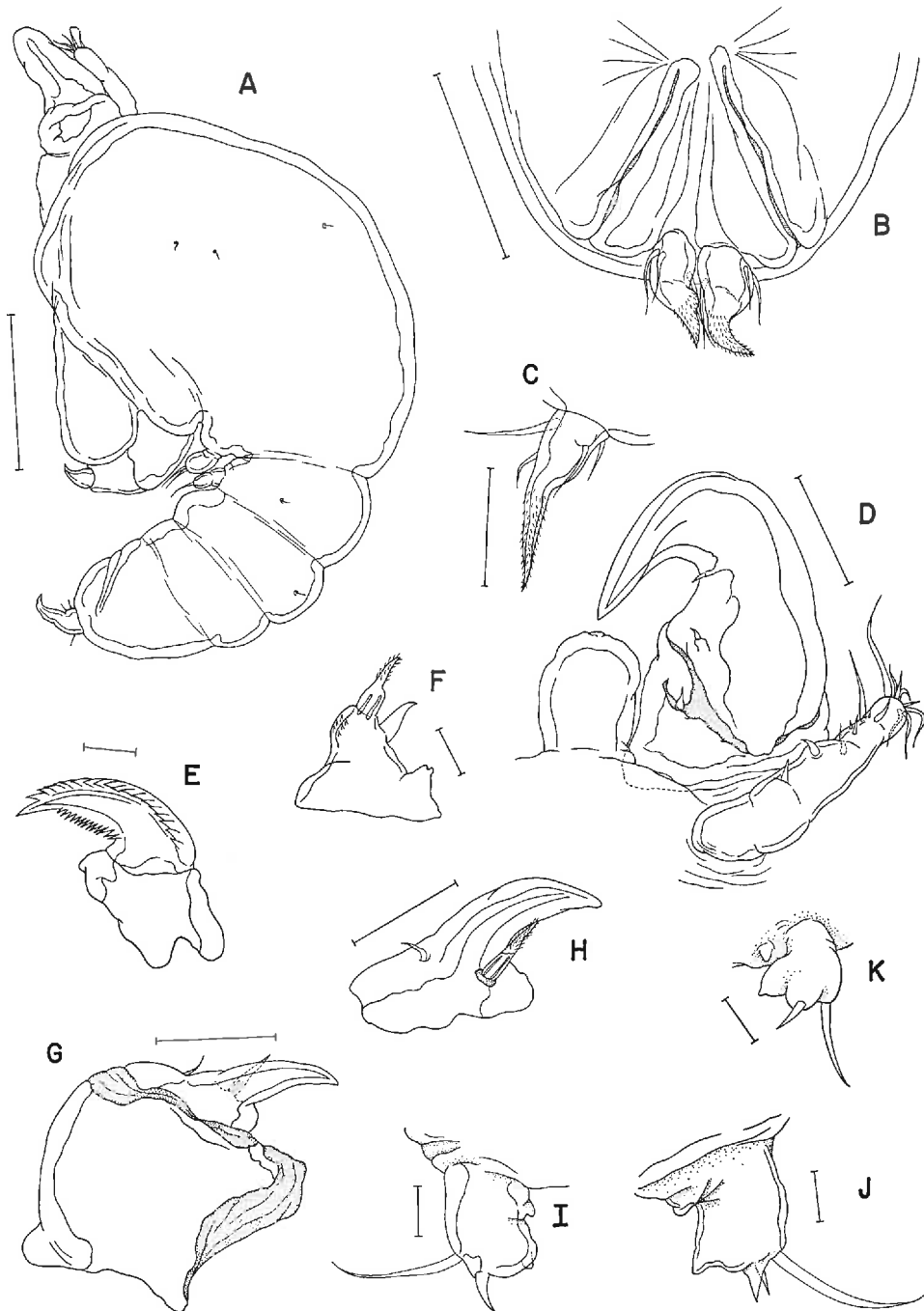


Fig. 3. *Acanthochondria inimici* Yamaguti, male: A, body, lateral; B, genital area and caudal rami, ventral; C, caudal ramus, ventral; D, first and second antennae, dorsal; E, mandible, dorsal; F, first maxilla, ventrolateral; G, second maxilla, ventral; H, tip of second maxilla, dorsal; I, leg 1, right, anterior; J, leg 1, left, anterior; K, leg 2, anterior. Scales: 0.1 mm in A; 0.05 mm in B; 0.03 mm in C, D, G, H; 0.01 mm in E, F, I-K.

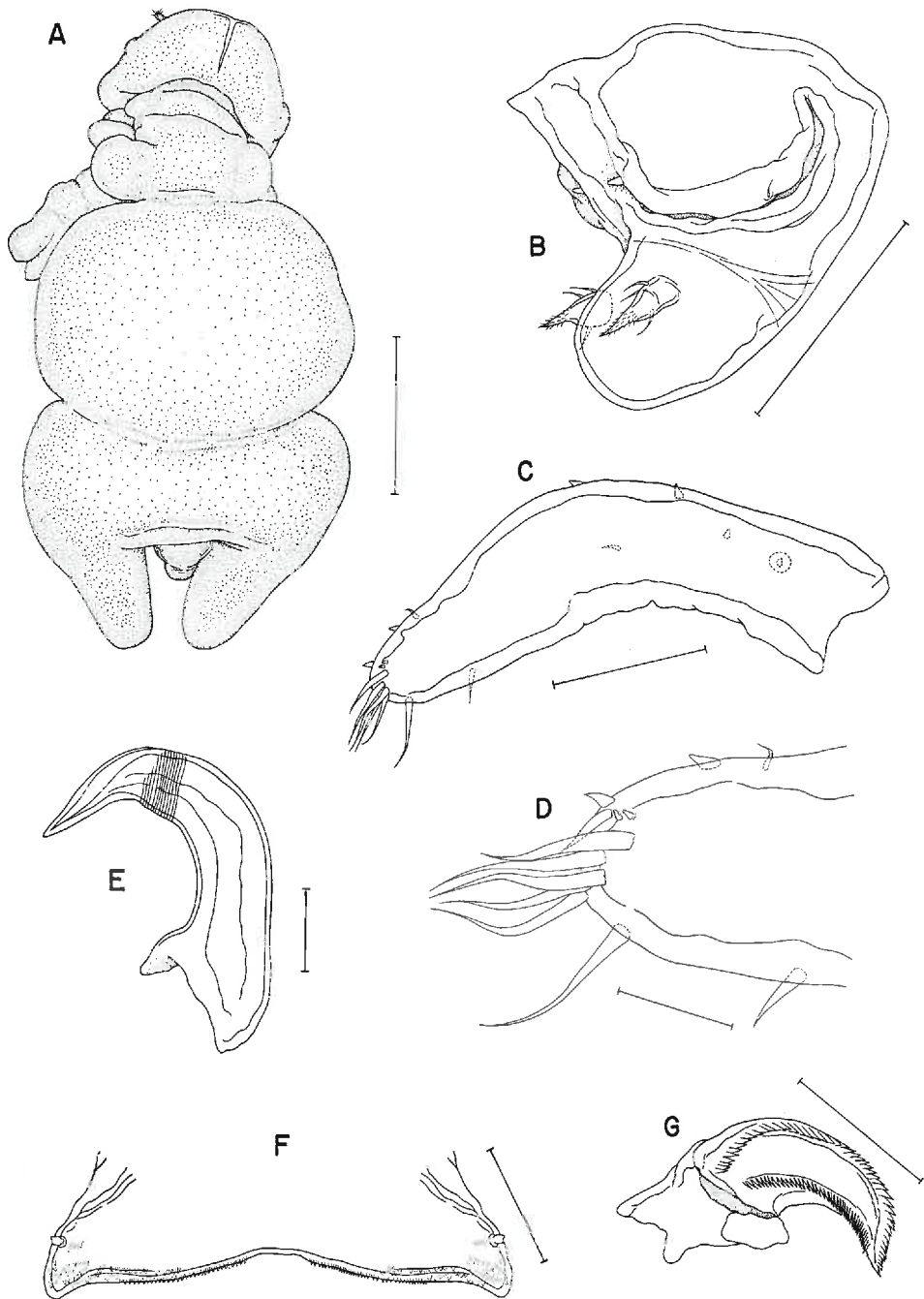


Fig. 4. *Acanthochondria sixteni* Wilson, female: A, body, dorsal; B, genito-abdomen, ventrolateral; C, first antenna, dorsal; D, tip of first antenna, dorsal; E, claw of second antenna, dorsal; F, labrum, ventral; G, mandible, dorsal. Scales: 1.0 mm in A; 0.3 mm in B; 0.1 mm in C, E-G; 0.03 mm in D.

male collected from the oral cavity of *Inimicus japonicus* (Cuvier and Valenciennes) at Tarumi, Japan. The most distinguishing features of *Acanthochondria inimici* are the elongate slender neck and long leg 2. The ornamentation and armature of leg 1 are also very unusual for chondracanthids.

*Acanthochondria inimici* appears to be primarily a parasite of the lumpfish *Inimicus japonicus* (Synancejidae), although we report the additional host record of the lionfish *Pterois volitans* (Scorpaenidae).

#### *Acanthochondria sixteni* Wilson, 1922

(Figs. 4–6)

**Material Examined**—1 female with male attached to inside of operculum of olive flounder, *Paralichthys olivaceus* caught on 20 August 1978 in a set net off Tassha, Sado Island, Japan.

**Female**—Body (Fig. 4A) stout. Total length 4.64 mm (including posterior process). Head clearly demarcated from first pediger, and measuring  $1.07 \times 1.02$  mm. First and second pedigers contracted in specimen examined; first pediger with small lateral protuberance; second pediger with conspicuous lobiform, lateral protuberances. Trunk (including neck and posterior process) very stout, constricted at mid-length,  $3.57 \times 2.07$  mm; posterior process long and cylindrical, extending beyond distal limit of genito-abdomen. Genito-abdomen (Fig. 4B) of usual form,  $498 \times 451$   $\mu\text{m}$  combined; genital segment with conical element on ventral surface and seta near egg-laying apparatus; abdomen with rounded posterior margin. Caudal ramus (Fig. 4B) with 3 naked setae and a spinulated terminal process.

First antenna (Fig. 4C, D) simple digitiform; basal half with 5 setae; distal half with formula 2, 2, 9. Second antenna (Fig. 4E) 2-segmented; first segment heavily sclerotized, broken off during dissection of specimen; second segment a curved claw. Labrum (Fig. 4F) with reentrant, spinulated posterior margin bearing small hyaline tubercle on lateral border. Mandible (Fig. 4G) 2-segmented; first segment unarmed; second segment a falcate process equipped with 42–45 teeth along convex and 37–40 teeth on concave margins. Paragnath (Fig. 5A) a spinulated lobe with small process (?) at base. First maxilla (Fig. 5B) a lobe bearing 1 large spinulated seta, 1 naked seta, a patch of spinules, and a medial papillated process. Second maxilla (Fig. 5C) 2-segmented; first segment stout and unarmed; second segment with 1 large seta spinulated at tip, 1 minute seta, and 15 teeth on terminal process. Maxilliped (Fig. 5D) 3-segmented; first segment unarmed; second segment with row of spinules; terminal segment with minute knob at base and claw bearing accessory process. Leg 1 (Fig. 5E) short, bilobed, and carrying numerous rows of spinules; protopodal seta present; exopod bulbous and endopod slightly conical. Leg 2 (Fig. 5F) with protopod, exopod, and endopod more elongate than in Leg 1, otherwise similar.

**Male**—Body (Fig. 6A)  $745 \times 284$   $\mu\text{m}$  (measured from tip of second antenna to distal end of urosome, excluding caudal ramus); cephalothorax comprising more than half of total body length; metamerism of body indistinct. Genital segment (Fig. 6B) with pair of ventral ridges, unarmed. Caudal ramus (Fig. 6B) more slender and elongate than in female.

First antenna (Fig. 6C) missing on one side and probably aberrant on other; formula of aberrant first antenna 1, 1, 1, and bifid tip. Second antenna (Fig. 6C) 2-segmented; first segment with dorsomedial seta; second segment, with 1 dorso-medial seta and 1 medial seta, terminating in strongly curved claw. Mandible (Fig.



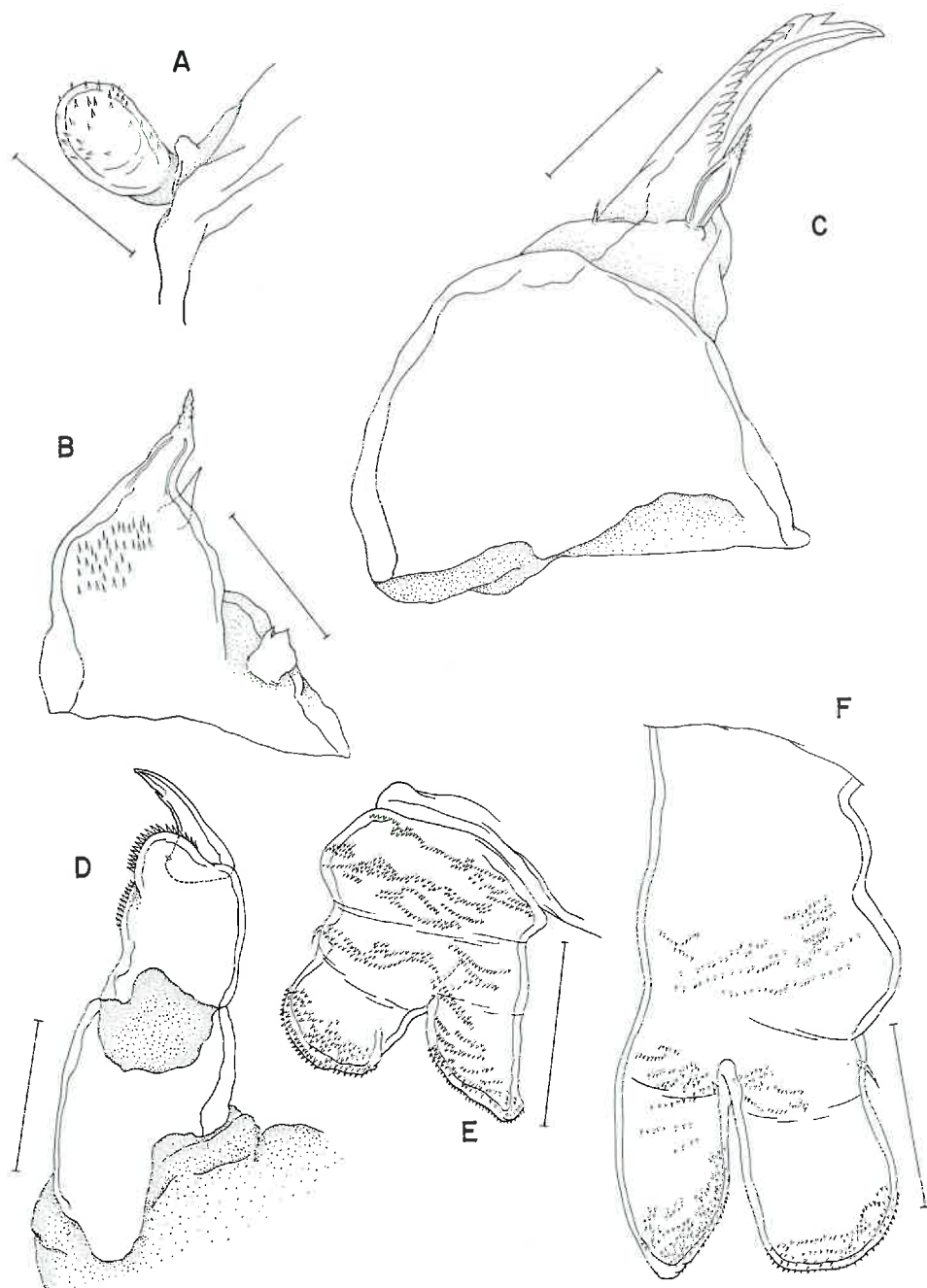


Fig. 5. *Acanthochondria sixtani* Wilson, female: A, paragnath, medial; B, first maxilla, medial; C, second maxilla, dorsal; D, maxilliped, ventral; E, leg 1 ventral; F, leg 2, ventral. Scales: 0.05 mm in A-C; 0.1 mm in D; 0.3 mm in E, F.

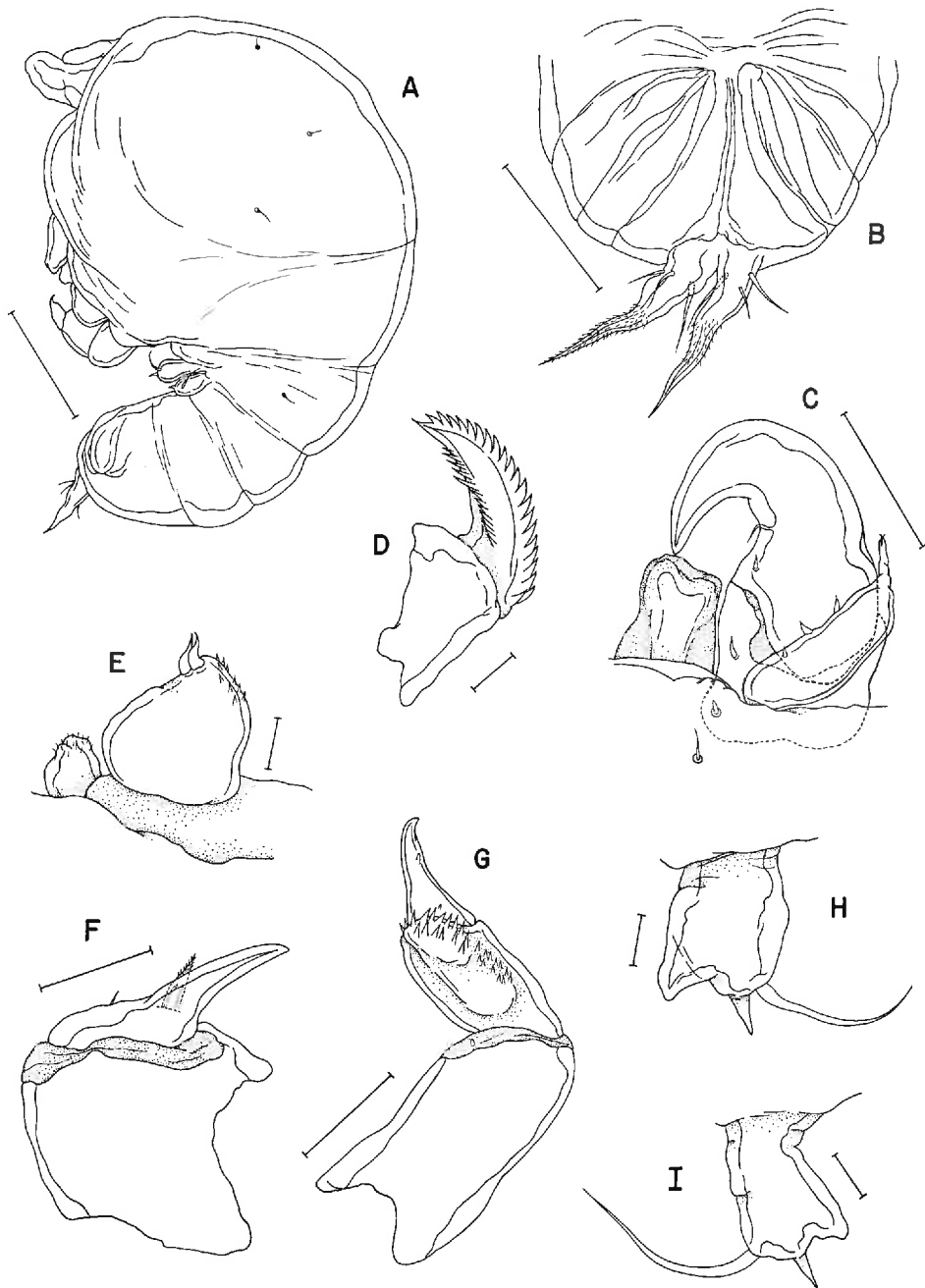


Fig. 6. *Acanthochondria sixteni* Wilson, male: A, body, lateral; B, genital area and caudal rami, ventral; C, first and second antennae, dorsal; D, mandible, dorsal; E, paragnath and first maxilla, medial; F, second maxilla, ventral; G, maxilliped, anterodorsal; H, leg 1, anterior; I, leg 2, anterior. Scales: 0.1 mm in A; 0.05 mm in B, C; 0.01 mm in D, E, H, I; 0.03 mm in F, G.

6D) with 21 teeth on convex side and 14 teeth on concave side of terminal falcate process. Paragnath (Fig. 6E) a small spinulated lobe. First maxilla (Fig. 6E) with 2 relatively small setae and patch of spinules. Second maxilla (Fig. 6F) with naked terminal process. Maxilliped (Fig. 6G) as in female except minute tubercle (seta ?) on distal border of first segment; spinules of proximal patch smaller than those of distal patch on second segment. Leg 1 (Fig. 6H) with long protopodal seta; exopod represented by conical element (seta ?); endopod a relatively large conical lobe. Leg 2 (Fig. 6I) similar to leg 1 except more slender and elongate.

**Remarks**—Wilson (1922) based his description of *Acanthochondria sixteni* on six females collected from the "... inside of the pharynx of a species of halibut at Misaki, Japan...". This species was later redescribed by Yamaguti (1939) from a single female and male from the gills of *Paralichthys olivaceus* (Temminck and Schlegel) from the Inland Sea.

The most diagnostic features of this species are:

- 1) small lateral protuberance on first pediger,
- 2) conspicuous lateral protuberance on second pediger,
- 3) long posterior process, and
- 4) spinulated legs 1 and 2.

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