NINE NEW SPECIES OF ANILOCRA (CRUSTACEA: ISOPODA: CYMOTHOIDAE) EXTERNAL PARASITES OF WEST INDIAN CORAL REEF FISHES

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Anilocra laticauda Milne Edwards, 1840 and A. leachii Schiedtce, 1866 are declared nomina dubia. The Martinique and Peru specimens of A. laevis are shown to represent 2 species: A. haemuli and A. laevis, respectively. A table distinguishing the species of genus Anilocra in the Caribbean Sea is included.

Introduction

Six species in the genus Anilocra Leach, 1818, have been described from the New World, A. laticauda Milne Edwards, 1840; A. mexicana Saussure, 1857; A. laevis Miers, 1877; A. plebeia Schioedte and Meinert, 1881; A. acuta Richardson, 1910; and A. meridionalis Richardson, 1914. Schioedte and Meinert (1881) synonymized A. mexicana Saussure and A. laticauda Milne Edwards; and Trilles (1975) suggested A. laevis Miers was a synonym of A. laticauda. Various other authors, summarized by Trilles and Vala (1975), have reported Anilocra laticauda from members of 11 families of marine fishes in the Caribbean Sea. Hochberg and Ellis (1972) and Williams and Williams (1977) have suggested that other species of Anilocra occur in the Caribbean. In the present study 1379 specimens of isopods in the genus Anilocra from the West Indies were examined (1198 were collected by the authors from 823 fishes) and separated into 9 species based on the characters listed in Table 1.

Materials and Methods

Host fishes were individually collected with multiprong and conventional spears, quinaldine fish relaxant, or handheld nets and lights at night, using
SCUBA and skin-diving techniques. Hosts were placed immediately into individual plastic bags and held in a mesh diving bag until moved to the laboratory (usually within 2 hours of capture). Isopods were removed, hosts were measured to the nearest millimeter, weighed to the nearest 0.1 gram and damage noted. Isopods were measured alive (total length and width) using slight pressure on the dorsal surface to straighten any curling, and preserved in 70% ethanol. Mouthparts and appendages were mounted in glycerine jelly. Whole isopods were photographed with a Nikon F2 camera with 55 mm Micro-Nikkor lens; an extension tube, and a 2× tele-converter were added to photograph some males. Drawings of the whole animal, dorsal and lateral views, were made from projections of these photographs. Telsons of the illustrated species were drawn in a natural or somewhat depressed position; therefore, the length of telsons in the dorsal views do not represent the actual total lengths. Total lengths of the telsons may be obtained by referring to the lateral views. Mouthparts and appendages were drawn with the aid of a Bausch & Lomb Tri-simplex micro-projector. Underwater photographs are by the senior author unless otherwise noted.

Comparative material included specimens from the National Museum of Natural History (USNM), the Rosenstiel School of Marine and Atmospheric Sciences, University of Miami (UMML); the Muséum National d’Histoire Naturelle, Paris (MNN); the British Museum of Natural History (BMNH); Gulf Coast Research Laboratory (GCRL); Naturhistoriska Riksmuseet, Stockholm (NR); Museum of Comparative Zoology, Harvard (MCZ); Zoologisches Museum, Humboldt-Universitat, Berlin (ZMB); and Florida Atlantic University, vertebrate collection (FAU).

All measurements are in millimeters unless otherwise noted. Lengths of fish hosts are standard lengths in millimeters. Descriptions of isopods are made from specimens from the type-host only. Only materials personally collected or examined by the authors are used for the host and locality data of each species of Anilocra. All data are those of the authors unless otherwise noted. Additional biological information concerning these isopods will be reported elsewhere.

Anilocra haemuli, new species
Figs. 1, 2, 4, 5, 271

Anilocra laevis Miers, 1877: 672–673, Martinique specimen only.
Anilocra laticauda.—Boone. 1921:95, in part; Bowman and Díaz-Ungría,
Isopods examined.—356 (225 females with a marsupium, 31 mature females without a marsupium, 74 immature females, 3 transitionalis, and 23 males or juveniles).

Type-host and locality (date).—French grunt, Haemulon flavolineatum (Desmarest), La Parguera, Puerto Rico (August 1975 to August 1979).

Location.—Female attached beneath eye of host (Fig. 1). Immature females or transitionalis attached adjacent to females, or beneath eye when adult females were not present. Males attached under adult females.

Type-specimens.—Holotype (female) USNM 184796; allotype (male) USNM 184797; 8 paratypes USNM 184798-184805; 10 paratypes in author’s collection.

**Fig. 4.** *Anilocra haemuli*, ♀ with marsupium: A, Lateral view; B, Dorsal view; C, Apex of maxilla 1; D, Maxilla 1; E, Apex of distal segment of mandibular palp; F, Mandibular palp; G, Distal lobes of maxilla 2; H, maxilla 2; I, Scales on maxilla 2; J, Apex of body of mandible; K, Body of mandible; L, Apex of palp of maxilliped; M, Seta from margin of maxilliped; N, Maxilliped. Mouthparts 29×, enlarged details of mouthparts 363×. Scale in mm.

**Fig. 5.** *Anilocra haemuli*. A–D, ♀ with marsupium: A, Pereopod 1, 10×; B, Pereopod 7, 10×; C, Left uropod, 10×; D, Frons and left antenna. E–M, ♂: E, Dorsal view; F, Pereopod 1; G, Pereopod 6; H, Pereopod 7; I, Left uropod; J, Natatory seta from uropod; K, Sensory seta from pleopod 2; L, Coupling seta from pleopod 2; M, Pleopod 2; N, Dactyl of ♂ pleopod 2, 10×. ♂ pleopod, uropod and pleopod 44×; setae 371×. Scales in mm.

1967, USNM 122768), Punta Araya, Gulf of Cariaco (USNM 107091); Martinique (Chafanjon, 1873–1884, IS-421 MNHN); Antillen (ZMB 3004); no locality (ZMB 4958).

**Diagnosis.**—Anterior margin of head truncate, flexed and produced into lobe between bases of antennae 1. Posteroventral angle of pereonite 6 slightly produced, of pereonite 7 produced, that of pereonite 7 overlapping pleonite 1. Shortest pereonite 2, longest 6. Body axis distorted less than 5°. Telson
as wide as long to \( \frac{1}{3} \) wider than long. Pereopods 2–4 without swelling on outer margin of dactyl. Dactylius of pereopod 7 shorter than propodus. Uropod not reaching posterior margin of telson. Endopod of uropod extending beyond posterior end of exopod.

**Further details.**—Body oval, length-width ratio 2.5 (2.1–2.9). Head width-length ratio 2.1 (1.6–2.5). Antennae 1 8-merous. Antennae 2 9–10-merous, reaching from \( \frac{2}{3} \) length to posterior edge of pereonite 1. Distance between eyes 47% (42–51%) of head width. Distal segment of mandibular palp with 5–10 simple setae, second segment with or without setae. Pleotelson sub-circular, posterior margin obtusely pointed. Color of body yellow to light brown in life; upper lateral surface (when attached to host) noticeably more pigmented.

Penis lobes of male separate. Appendix masculina of male pleopod 2 linear, with unmodified apex. Basis of pleopod 2 with 2 sensory and 4 coupling setae. Fifty-five females with oostegites were 21–40 long (mean 29.9); 8–15 wide (mean 11.7). Three females lacking oostegites were 29–34 long (mean 31.6); 11–13 wide (mean 12). Twelve immature females were 21–32 long (mean 28); 8–14 wide (mean 11.4). One transitional was 10 long, 3 wide; lacked appendix masculina and penis lobes. One male was 7 long, 2 wide; with pereopod 7 fully developed. Three juveniles were 4 long, 1 wide; with pereopod 7 reduced; appendix masculina reduced.

**Remarks.**—Seventy-five *Anilocra haemuli* were collected on 67 *Haemulon flavolineatum* 88–184 (mean 122) long; 30 on 22 *H. aurolineatum* 103–154 (mean 133.8) long; 8 on 7 *H. chrysargyreum* 123–158 (mean 147.6) long; 3 on 2 *H. carbonarium* 162–175 (mean 168.5) long; 1 on 1 *H. macrostomum* 115 long; 26 on 22 *Epinephelus guttatus* 143–279 (mean 181.3) long; 41 on 29 *Paranthias furcifer* 121–213 (mean 162.8) long; 72 on 55 *Epinephelus fulvus* 86–235 (mean 171.3) long; and 5 on 3 *Epinephelus cruentatus* 135–142 (mean 138.7) long.

This parasite was attached in the subocular region (Fig. 1) with 2 exceptions: a single female isopod was attached above the eye of a *Haemulon flavolineatum* (off Punta Cadena, Puerto Rico, 21 July 1976); and 1 female was attached above the eye of an *Epinephelus guttatus* which had additional female specimens attached below each eye (Fig. 2) (Wallin 1978) (St. Croix, June 1975—Herb Taylor, pers. comm.). The isopod caused slight to moderate damage of the tissue underlying the attachment site; in some cases,
bone deformation was observed. Often, on the *Haemulon* spp., the area of attachment of the parasite was pigmented with an orange color like that in the mouths of these fishes.

The name is taken from the genus of the type-host.

*Anilocra holocentri*, new species

Figs. 3, 6, 7, 27C


Isopods examined.—52 (28 females with a marsupium, 5 mature females without a marsupium, 9 immature females, 1 transitional and 9 males).


Location.—Female attached in the interorbital region of the head (Fig. 3). Immature female or transitional usually attached anterior to female on the upper lip of the host or interorbitally when no adult female was present.

Type-specimens.—Holotype (female) USNM # 184813; allotype (male) USNM # 184814; 8 paratypes USNM # 184815–184822; 10 paratypes in authors' collection.

Additional hosts and localities (date).—*Holocentrus ascensionis*, La Parguera (24 February 1959, USNM 107833; 11 August 1964, USNM), west coast, Punta Cadena (21 July 1976), Corcega (8 February 1976), Aguadailla, Crashboat Pier (3 January 1976), Las Coronas (23 July 1976); St. John, U.S. Virgin Islands, Lameshure Bay (9 November 1958, UMML 4737 Voss Ref. No. 32, 2263; 2 August and 15 September 1970, USNM Acc. No. 294746; 2 March 1977), Europa Bay (16 February 1959, UMML 5110 Aquis. No. 226-100); St. Thomas, U.S. Virgin Islands, east end of Congo Cay (3 March 1977), Buck Island (5 March 1977). No Host Indicated.—Puerto Rico, Vieques Island (8 February 1899, USNM 32655); St. Thomas, U.S. Virgin Islands (February and April 1935, USNM 86371; MCZ 3151); St. Croix, U.S. Virgin Islands (ZMB 25667); Sandy Point, Patagonia, Strait of Magellan (March 1872, MCZ 3153).


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**Fig. 7. Anilocra holocentri.** A–D, ♀ with marsupium: A, Pereopod 1, 10×; B, Pereopod 7, 10×; C, Left uropod, 10×; D, Frans and left antennae. E–M, ♀: E, Dorsal view; F, Pereopod 1; G, Pereopod 6; H, Pereopod 7; I, Left uropod; J, Natatory seta from uropod; K, Sensory seta from pleopod 2; L, Coupling seta from pleopod 2; M, Pleopod 2. N, Dactyl of ♀ pereopod 2, 10×. δ pereopods, uropod, and pleopod 44×; setae 371×. Scales in mm.
Further details.—Body elongate oval, length-width ratio 2.7 (2.4–3.1). Head width-length ratio 3.3 (2.7–3.9). Antennae 1–8-merous. Antennae 2.9–10-merous, reaching from 1/3 length to almost posterior edge of pereonite 1. Distance between eyes 49% (46–53%) of head width. Distal segment of mandibular palp with 7–8 simple setae, second segment with or without setae. Pleotelson heart-shaped to round. Color of dorsal surface of body dark brown, ventral light brown in life.

Penis lobes of male separate. Appendix masculina of male pleopod 2 linear, with unmodified apex. Basis of pleopod 2 with 2 sensory and 4 coupling setae. Seventeen females with oostegites were 32–46 long (mean 39); 12–17 wide (mean 14.5). Four females lacking oostegites were 36–41 long (mean 39); 14–15 wide (mean 14.8). Six immature females were 13–35 long (mean 27.8); 7–13 wide (mean 10.2). One transitional was 13 long, 4 wide; lacked penis lobes, appendix masculina 67% length found in the male. Nine males were 5–9 long (mean 5.9); 1–2 wide (mean 1.3), with pereopod 7 fully developed to absent.

Remarks.—Thirty-seven Anilocra holocentri were collected from 28 Holocentrus ascensionis length 120–203 (mean 159.4). Some erosion of scales and loss of pigment occurred in the area of isopod attachment. The immature females or transitionals usually attached anterior to the female on the upper lip of the host. In Florida, a “squirrel fish” was photographed with a female attached between the eyes and a male or transitional attached beneath 1 eye (Chess 1975).

The name is taken from the genus of the host.

Anilocra myripristis, new species
Figs. 8, 11, 12, 27B


Isopods examined.—35 (19 females with a marsupium, 12 immature females, 1 transitional, and 3 males)

Type-host and locality (date).—Blackbar soldierfish, Myripristis jacobus Cuvier, Mona Island, Puerto Rico (April 1975–November 1980).

Location.—Female attached in the interorbital region of the head (Fig. 8). Immature female or transitional usually attached beneath eye, or interorbitally when no adult female present.

Type-specimens.—Holotype (female) USNM # 184823; allotype (male) USNM # 184824; 8 paratypes USNM # 184825–184832; 10 paratypes in authors' collection.

Additional localities (date).—Dominican Republic, south coast, La Caleta (23 November 1978), Bahia de Caldero (24 November 1978); Bahama Is-
Diagnosis.—Anterior margin of head truncate, flexed and produced into lobe between bases of antennae 1. Posteroverentral angle of pereonite 6 slightly produced, of pereonite 7 produced, that of pereonite 7 overlapping pleonite 1. Shortest pereonite 2, longest 6. Body axis distorted less than 5°. Telson $\frac{1}{10}$ more narrow to $\frac{1}{10}$ wider than long. Pereopods 2–4 without swelling on outer margin of dactyl. Dactylus of pereopod 7 shorter than propodus. Uropod extending beyond posterior margin of telson. Endopod of uropod extending beyond posterior end of exopod.

Further details.—Body elongate oval, length-width ratio 2.7 (2.3–3.1). Head width-length ratio 2.3 (2.0–2.7). Antennae 1 8-merous. Antennae 2 8–10-merous, reaching from $\frac{1}{2}$ to $\frac{3}{4}$ length of pereonite 1. Distance between eyes 45% (35–49%) of head width. Distal segment of mandibular palp with 5–10 simple setae, second segment with or without setae, pleotelson square. Color of dorsal surface of body light reddish-brown, ventral yellow in life.

Penis lobes of male separate. Appendix masculina of male pleopod 2 linear, with unmodified apex. Basis of pleopod 2 with 1 sensory and 4 coupling setae. Fifteen females with oostegites were 29–40 long (mean 34.8); 10–15 wide (mean 13.1). Nine immature females were 18–31 long (mean 26.3); 6–12 wide (mean 9.4). One transitional was 9 long, 2.5 wide; lacked penis lobes, appendix masculina not reduced. Three males were 6–7 long (mean 6.7); 1–2.5 wide (mean 1.5); with pereopod 7 reduced to fully developed.

Remarks.—Twenty-eight Anilocra myripristis were collected from 23 Myripristis jacobus, length 99–164 (mean 125.7). Some erosion of scales and loss of pigment occurred in the area of isopod attachment.

The name is taken from the genus of the host.

Anilocra acanthuri, new species
Figs. 9, 13, 14, 27A


Anilocra sp.—Williams and Williams, 1977:15, in part.

Isopods examined.—245 (75 females with a marsupium, 14 mature females without a marsupium, 70 immature females, 14 transitionalis, and 72 males).

Type-host and locality (date).—Doctorfish, Acanthurus chirurgus (Bloch), La Parguera, Puerto Rico (April 1975–December 1978).

Location.—Female attached beneath and slightly anterior to the base of

![Diagram of Anilocra myripristis](image)
Fig. 12. Anilocra myripristis. A–D, ♀ with marsupium: A, Pereopod 1, 10×; B, Pereopod 7, 10×; C, Left uropod, 10×; D, Frons and left antennae. E–M. ♂ E, Dorsal view; F, Pereopod 1; G, Pereopod 6; H, Pereopod 7; I, Left uropod; J, Natatory seta from uropod; K, Sensory seta from pleopod 2; L, Coupling seta from pleopod 2; M, Pleopod 2. N, Dactyl of ♀ pereopod 2, 10×. ♂ pereopods, uropod, and pleopod 44×; setae 371×. Scales in mm.

the pectoral fin (Fig. 9). Transitionals were attached to the inner surfaces of the pectoral or pelvic fins, on the body near the female, or in the "female" position when no female was present; males were attached to the inner surfaces of the pectoral or pelvic fins.

Fig. 13. Anilocra acanthuri, ♀ with marsupium: A, Lateral view; B, Dorsal view; C, Apex of maxilla 1; D, Maxilla 1; E, Apex of distal segment of mandibular palp; F, Mandibular palp; G, Distal lobes of maxilla 2; H, Maxilla 2; I, Scales on maxilla 2; J, Apex of body of mandible; K, Body of mandible; L, Apex of palp of maxilliped; M, Seta from margin of maxilliped; N, Maxilliped. Mouthparts 29×, enlarged details of mouthparts 363×. Scale in mm.

Type-specimens.—Holotype (female) USNM # 184767; allotype (male) USNM # 184768; 8 paratypes, USNM # 184769–184775; 10 paratypes in authors' collection.

Additional hosts and localities (date).—Acanthurus chirurgus, Puerto Rico, Corsega, north of Punta Cadena (6 February 1976), Las Coronas, south of Puerto Real (23 July 1976), Culebra Island, northeast coast (16

**Diagnosis.**—Anterior margin of head truncate, flexed and produced into lobe between bases of antennae 1. Posteroventral angles of pereonites not produced, that of pereonite 7 overlapping no pleonite. Shortest pereonite 2, longest 6. Body axis distorted less than 5°. Telson 1/10 to 1/5 wider than long. Pereopods 2–4 without swelling on outer margin of dactyl. Dactylus of pereonite 7 shorter than propodus. Uropod not reaching posterior margin of telson. Endopod of uropod not reaching the posterior end of exopod to extending beyond end of exopod.

**Further details.**—Body elongate oval, length-width ratio 2.9 (2.5–3.3). Head width-length ratio 2.2 (1.6–2.6). Antennae 1-merous. Antennae 2–10-merous, reaching from 1/2 length to beyond posterior edge of pereonite 1. Distance between eyes 65% (53–74%) of head width. Distal segment of mandibular palp with 5–12 simple setae, second segment with or without setae. Pleotelson oval. Color of dorsal surface of body black to lead-gray, ventral gray, in life.

Penis lobes of male separate. Appendix masculina of male pleopod 2 linear, with unmodified apex. Basis of pleopod 2 with 1 sensory and 4 coupling setae. Thirty-six females with oostegites were 29–40 long (mean 34.4); 9–14 wide (mean 12.0). Six females lacking oostegites were 35–40 long (mean 37); 11–13 wide (mean 12.5). Fifty-three immature females were 10–34 long (mean 20.1); 2–11 wide (mean 6). Ten transitionals were 7–10 long (mean 8.8); 1.5–3.0 wide (mean 2.2). Forty-nine males were 4–8 long (mean 5); 1–2 wide (mean 1.2), with pereopod 7 absent to fully developed.

**Remarks.**—One hundred fifty-four Anilocra acanthuri were collected on 74 Acanthurus chirurgus 58–211 (mean 139.3) long and 72 on 45 Acanthurus bahianus 106–178 (mean 136.9) long. Some erosion of scales occurred in the area of isopod attachment. The isopods from A. bahianus were slightly longer (32–43) and wider (11–15) than those from the type host, and the coxae were slightly longer.

Acanthus chirurgus was frequently parasitized by another cymothoid isopod, Agarna cumulus (Haller), in the gill chamber. Of the 73 fish parasitized by Anilocra acanthuri, 38 were also parasitized by Agarna cumulus. In addition, of 214 fish collected without Anilocra acanthuri, 17 were parasitized by Agarna cumulus.

A specimen of A. acanthuri (USNM 101838) recorded from the blue tang, Acanthus coeruleus Schneider, traced to the original field notes of the collector, was actually collected from Acanthus hepatus (=A. chirurgus).
The name is taken from the genus of the host.

**Anilocra chromis**, new species

Figs. 10, 15, 16, 27G

4nilocra laticauda.—Boone, 1927:139, in part.

Isopods examined.—301 (185 females with a marsupium, 20 mature females without a marsupium, 47 immature females, 28 transitionals, and 21 males).

Type-host and locality (date).—Brown chromis, Chromis multilineatus (Guichenot), La Parguera, Puerto Rico (August 1975–June 1978).

Location.—Attached beneath eye of host (Fig. 10).

Type-specimens.—Holotype (female) USNM # 184786; allotype (male) USNM # 184787; 8 paratypes USNM # 184788–184795; 10 paratypes in authors’ collection.


**Further details.**—Body oval, length-width ratio 2.6 (2.3–3.4). Head width-length ratio 2.2 (1.7–2.4). Antennae 1 8-merous. Antennae 2 9–10-merous, reaching from 1/6 to full length of pereonite 1. Distance between eyes 52% (45–63%) of head width. Distal segment of mandibular palp with 4–7 simple setae, second segment with or without setae. Pleotelson shield-shaped. Color of dorsal surface of body dark gray and off white, in life. Upper lateral surface (when attached to host) countershaded 1/4 to 1/2 width of body, dark gray, the remainder of dorsal and all ventral off-white. Basis of pereopods on dark side, dark gray.

Penis lobes of male separate. Appendix masculina of male pleopod 2 linear, with unmodified apex. Basis of pleopod 2 with 1 sensory and 4 coupling setae. One hundred thirty-two females with oostegites were 16–28 long
Anilocra abudefdufi, new species
Figs. 17, 19, 27H

Anilocra laticauda.—Boone, 1921:95, in part.

Isopods examined.—77 (48 females with a marsupium, 4 mature females without a marsupium, 13 immature females, 7 transitionals, 2 males, and 3 juveniles).

Type-host and locality (date).—Sergeant major, Abudefduf saxatilis (Linnaeus), Nalunega, San Blas Islands, Panama (25–30 October 1980).

Location.—Attached beneath eye of the host (Fig. 17).

Type-specimens.—Holotype (female) USNM # 184758; 9 paratypes USNM # 184759–184766; 41 paratypes in author’s collection.

Additional hosts and localities (date).—Abudefduf saxatilis, Panama, Colon Reef (2 May 1911, USNM 43772), Torro Point (19 May 1911, USNM 43773), Ft. Randolf, Limón Bay (17 January 1978. GCRL, POD 121), San Blas Islands near Porvenier Island (January 1979, Dr. John Cubit, Coll.) Isla Arena and Isla del Rosario, near Cartegena, Colombia, S.A. (30 March 1978, Carol Sanner, Coll.). No Host Indicated.—Panama, Fort Sherman, Limón Bay, Colon (24 April 1972, Dawson 1542, GCRL), María Chiquita, Colon (27 April 1972, Dawson 1544, GCRL), Galeta Island, Colon (29 April 1972, Dawson 1546; 17 November 1972, Dawson 1601, GCRL), Devils Beach, Colon (16 November 1972, Dawson 1600, GCRL), Ft. Randolf, Limón Bay, Colon (13 November 1972, Dawson 1596; 7 March 1974, Dawson 1691, GCRL).

Diagnosis.—Anterior margin of head truncate, flexed and produced into lobe between bases of antennae 1. Posteroventral angle of pereonite 6 slightly produced, of pereonite 7 produced, that of pereonite 7 overlapping pleonite 1. Shortest pereonite 2, longest 6. Body axis distorted less than 5°. Telson 1/10 more narrow to 1/5 wider than long. Pereopods 2–4 with swelling on outer margin of dactyl. Dactylus of pereopod 7 shorter than propodus. Uropod not reaching posterior margin of telson to extending beyond posterior margin of telson. Endopod of uropod not reaching posterior end of exopod to extending beyond end of exopod.

Further details.—Body oval, length-width ratio 2.5 (2.2–2.9). Head width:length ratio 2.8 (2.3–3.4). Antennae 1 8-merous. Antennae 2 9–11-merous, reaching from 2/3 length to beyond posterior edge of pereonite 1. Distance between eyes 52% (47–63%) of head width. Distal segment of mandibular palp with 10–11 simple setae, second segment with or without setae. Pleotelson broadly rounded. Color of dorsal surface of body dark brown, countershaded to light brown to yellow. Upper lateral surface (when attached to host) countershaded 1/3 to 3/4 width of body, dark brown, the remainder of dorsal and all ventral, light brown to yellow. Pereopods of dark side often dark brown.

Forty-six females with oostegites were 19–31 long (mean 26.4); 7.5–13.5

Wide (mean 11.1). Four females without oostegites were 23–24.1 long (mean 23.7); 9.5–11 wide (mean 10.3). Thirteen immature females were 13–24 long (mean 18.2); 4–10 wide (mean 6.2). Seven transitional were 7.8–11 long (mean 10.2); 2–3.5 wide (mean 2.8); lacked penis lobes, appendix masculina 25 to 50% length found in male. Two males were 7–8.5 long and 2 wide. Two males were 4–4.5 long and 1 wide.

Remarks.—Fifty-one *Anilocra abudefdufi* were collected from 32 *Abudefduf szaatilis*, length 50–108 (mean 92.6); also 14 *Anilocra abudefdufi* were collected (by Carol Sanner and Dr. John Cubit) from 10 *Abudefduf*

Fig. 19. *Anilocra abudefdufi*, ♀ with marsupium: A, Lateral view; B, Dorsal view; C, Apex of maxilla 1; D, Maxilla 1; E, Apex of distal segment of mandibular palp; F, Mandibular palp; G, Distal lobes of maxilla 2; H, Maxilla 2; I, Scales on maxilla 2; J, Apex of body of mandible; K, Body of mandible; L, Apex of palp of maxilliped; M, Seta from margin of maxilliped; N, Maxilliped; O, Pereopod 1; P, Pereopod 7; Q, Left uropod; R, Frons and left antenna; S, Dactyl of pereopod 2. Mouthparts 29x, enlarged details of mouthparts 36x, pereopods and uropod 10x. Scales in mm.
**Anilocra holacanthi**, new species

Figs. 18, 20, 21, 27F


*Anilocra sp.*—Williams and Williams, 1977:15, in part.

Isopods examined.—113 (58 females with a marsupium, 9 mature females without a marsupium, 23 immature females, 3 transitionals, and 20 males).

Type-host and locality (date).—Rock beauty, *Holacanthus tricolor* (Bloch), La Parguera, Puerto Rico (September 1975–February 1977).

Location.—Female attached beneath eye of the host (Fig. 18). Transitionals and males attached adjacent to the female, or beneath the eye when no female was present.

Type-specimens.—Holotype (female) USNM # 184806; allotype (male) USNM # 184807; 8 paratypes USNM # 184808–184812; 10 paratypes in authors’ collection.


Further details.—Body expanded oval, length-width ratio 2.2 (1.9–2.6). Head width-length ratio 2.6 (2.2–2.9). Antennae 1 8-merous. Antennae 2 9–10-merous, reaching from ½ length to near posterior edge of pereonite 1.

Distance between eyes 54% (49–58%) of head width. Distal segment of mandibular palp with 4–8 simple setae, second segment with or without setae. Pleotelson rectangular. Color of dorsal surface of body black to lead gray, ventral gray, in life.

Penis lobes of male separate. Appendix masculina of male pleopod 2.
Anilocra, with unmodified apex. Basis of pleopod 2 with no sensory and 4 coupling setae. Fifty females with oostegites were 21–33 long (mean 26); 9–14 wide (mean 11.9). Nine females lacking oostegites were 23–29 long (mean 25.6); 11–13 wide (mean 11.8). Twenty-three immature females were 11–25 long. (mean 20.2); 4–11 wide (mean 8.1). Three transitional were 11–15 long (mean 12.7); 4–5 wide (mean 4.3); penis lobes present; appendix masculina 10 to 50% of the length present in males. Nineteen males were 4–7 long (mean 4.9); 1–2 wide (mean 1.3); with pleopod 7 absent to fully developed.

Remarks.—One hundred four Anilocra holacanthi were collected on 65 Holacanthus tricolor, length 52–171 (mean 104.8). Isopods attached in the area of oostegite attachment. Often a dark pigment occurred under the site of attachment. Extensive bone deformation was not observed. The name is taken from the genus of the host.

Anilocra chaetodontis, new species
Figs. 22, 24, 25, 27E

Anilocra laticauda.—Hochberg and Ellis, 1972:84, in part; Moore, 1902:172, in part.

Anilocra sp.—Williams and Williams, 1977:15, in part.

Iso pods examined.—189 (78 females with a marsupium, 10 mature females without a marsupium, 63 immature females, 5 transitional and 33 males).

Type-host and locality (date).—Four-eye butterflyfish, Chaetodon capistratus Linnaeus, La Parguera, Puerto Rico (September 1974–March 1977).

Location.—Female attached beneath eye of the host (Fig. 22). Transitional and males attached adjacent to females, or beneath the eye when no females were present.

Type-specimens.—Holotype (female) USNM # 184776; allotype (male) USNM # 184777; 8 paratypes USNM # 184778–184785; 10 paratypes in authors’ collection.


**Further details.**—Body expanded oval, length-width ratio 2.2 (1.9–2.5). Head width-length ratio 2.6 (2–3). Antennae 1 8-merous. Antennae 2 9-10-merous, reaching from 1/2 to 3/5 length of pereonite 1. Distance between eyes 53% (47–65%) of head width. Distal segment of mandibular palp with 7–12 simple setae, second segment with or without setae. Pleotelson broadly rounded. Color of dorsal surface of body black to lead gray, ventral gray, in life.

Penis lobes of male separate. Appendix masculina of male pleopod 2 linear, with unmodified apex. Basis of pleopod 2 with 1 sensory and 4 coupling setae. Fifty-three females with oostegites were 18–28 long (mean 23); 8–13 wide (mean 10.6). Five females lacking oostegites were 22–26 long.
Anilocra partiti, new species
Figs. 23, 26, 27D

Isopods examined.—13 (6 females with a marsupium, 2 females without a marsupium, 3 immature females, and 2 transitionalis).

Type-host and locality (date).—Bicolor damselfish, Pomacentrus partitus Poey, Discovery Bay, Jamaica (7–9 January 1980).

Location.—Attached beneath eye of the host (Fig. 23).

Type-specimens.—Holotype (female) USNM # 184833; 5 paratypes USNM # 184834–184837.

Additional localities (date).—Jamaica, Rio Bueno (10–11 January 1980).


Further details.—Body expanded oval, length-width ratio 2.0 (1.7–2.2). Head width-length ratio 2.4 (2.1–3.1). Antennae 1 8-merous. Antennae 2 9–10-merous, reaching from almost to posterior edge to beyond posterior edge of pereonite 1. Interocular distance 59% (50–69%) of head width. Distal segment of mandibular palp with 4–7 simple setae, second segment with or without setae. Pleotelson broadly rounded. Color of dorsal and ventral surfaces of body and pereopods black to slate gray in life. Six females with oostegites were 12–16 long (mean 13.7); 5.5–7.4 wide (mean 6.9). Two females lacking oostegites were 12.0–13.5 long; 6.0–6.5 wide. Three immature females were 8.3–12.0 long (mean 9.7); 3.7–4.5 wide (mean 4). Two transitionalis were 7.6–9.0 long; 3.2–4.0 wide; lacking penis lobes; appendix masculina 25% length probably found in male.

Remarks.—These parasites were collected from 11 Pomacentrus partitus, length 31–51 (mean 43.2). Some erosion of scales occurred in the area of isopod attachment.

The name is taken from the specific epithet of the host.

Anilocra laevis Miers, 1877

Anilocra laevis Miers, 1877:672–673, pl. 68, fig. 6; Gerstaecker, 1901:264–265.

Isopods examined.—1 female syntype of Anilocra laevis 1879-21 (BMNH).

Type-host.—Unknown.

Type-locality.—Martinique and Peru.

Type-specimens.—"a specimen from each locality (Martinique and Peru) is in the collection" (BMNH) (Miers 1877).
Antennae, pereopod 7, and uropod; and a description for *A. laevis*. The measurements of the specimen of syntype (length 41.0; width 15.0) do not precisely correspond to the original measurement (length 40.2; width 15.9). The length-width ratio of the syntype (2.73) does not correspond to the length-width ratio of the measurements (2.53) or the ratio taken from the original figure (2.55). The dorsal view of Miers (1877, Pl. LXVIII, Fig. 6) does not correspond to the dorsal view of the syntype. The telson is wider than long in the syntype, but as long as wide in the figure and the width of pleonite 5 of the figure is approximately ¾ the length of the telson, but in the syntype this width is equal to the length of the telson. Because Miers (1877) illustrated light-shaded (Pl. LXIX, Fig. 4) and dark-shaded (Pl. LXIX, Fig. 5) isopods, and the illustration of *A. laevis* (Pl. LXVIII, Fig. 6) was dark-shaded, the figure must represent a dark-colored isopod. The syntype, however, is not dark, but light yellow in color. The illustration of the frons and antennae (Pl. LXVIII, Fig. 6a) do not agree with the syntype, because the bases of antennae 1 are covered by the frons in the illustration, but exposed on the syntype; and the frons extends posteriorly beyond the bases of antennae 2 in the figure, but only between the bases of antennae 1 in the syntype. Pereopod 7 (Pl. LXVIII, Fig. 6b) is not the same in the figure, where the merus is shorter than the carpus, and the syntype, where the merus is longer than the carpus. The uropods of the figure (Pl. LXVIII, Fig. 6c) and the syntype vary in the width of the basis. Twice the greatest width of the basis is approximately equal to the length of the exopod in the figure, but much less than the length of the exopod in the syntype. The description disagrees with the syntype by the posteroventral angle of pereonite 7 being broad, obtuse, and rounded instead of narrow, acute, and pointed; coxae 4 being obtuse, instead of acutely pointed posteriorly; bases of antennae 1 covered by the frons, instead of exposed; posteroventral angle of pereonite 6 not produced (posterior margins straight), instead of slightly produced; posterior margin of telson rounded, instead of obtuse pointed; and antennae 2 being 9-merous instead of 10-merous.

The length-width ratios and illustrations for *A. laevis* do not correspond with the remaining syntype, and many of the characters found in the description disagree with the syntype. Obviously *A. laevis* was not described from the syntype from Martinique, but from the syntype from Peru. Also, the 2 specimens represent 2 distinct species: *Anilocra laevis* from Peru, and *Anilocra haemuli* from Martinique.

*Anilocra laevis* may be distinguished from *A. haemuli* by having the bases of antennae 1 covered by the frons; a frons which extends posterior of the bases of antennae 2, instead of between the bases of antennae 1; posteroventral angle of pereonite 7 broad, obtuse and rounded, instead of acutely pointed; posterior margin of telson rounded, instead of obtusely pointed; coxae 4 obtuse, instead of acutely pointed posteriorly; and body darkly colored, instead of yellow to light brown in color.

**Remarks.**—The syntype of *A. laevis* from Peru is missing; only the syntype from Martinique remains in the British Museum of Natural History (Joan P. Ellis, pers. comm.). Miers (1877) provided measurements; illustrations of the dorsal view of the entire isopod, ventral view of frons and
Anilocra laticauda Milne Edwards, 1840, nomen dubium

Anilocra laticauda Milne Edwards, 1840:259.

**Type-host.**—Unknown.

**Type-locality.**—Caribbean Sea ("la mer des Antilles").

**Type-specimens.**—Unknown.

**Description.**—Antennae 1 not nearly reaching posterior margin of head. Coxae 6 and 7 weakly pointed posteriorly. Pleotelson very large, expanded near midlength, notably wider than pleonite 5, rounded posteriorly. Uropod rami oval, inner same size as outer or smaller. Length about 14 lines (translation of original description in French).

**Remarks.**—The above paragraph is all that was given in the original description to identify a species described as *Anilocra laticauda* by Milne Edwards in 1840. The locality could apply to any of the 9 species described in the present work. The antennae length noted could apply to individual specimens in any of these 9 species. Depending on how the terms "weakly pointed" are interpreted, coxae 6 and 7 of individual specimens in any of 5 to 9 of these species could be so described. Individual specimens of all but 1 of these 9 species possess a pleotelson which is expanded near midlength, notably wider than pleonite 5, and rounded posteriorly. The uropod relationship in the original description could apply to individuals in any of 6 of these species. The length stated above falls approximately within the size ranges of 8 of these species. With no original illustration, no precise locality, and a very limited original description, the isopod described as *A. laticauda* cannot be identified. To aid in determining this species, a search was made for possible undescribed type material and/or redescriptions based on the original material of Milne Edwards (1840).

Two lots of specimens from the Muséum National d'Histoire Naturelle in Paris could have possibly been the type for *A. laticauda*, IS-492 and IS-294. Neither vial contained the printed label typical of the holotypes of *Milne Edwards* (J. Forest, pers. comm.). IS-492 contained 1 specimen of *A. haemuli* and 1 of *A. acanthuri*. The original description of *A. laticauda* lists the measurements for only a single specimen. Also, the original length 29.6 mm (14 lines), is much shorter than the length of either of these specimens, 34.5 and 36.5 mm. IS-492 contained a single specimen of *Anilocra haemuli* 32 mm in length. Trilles (1975) suggested that this specimen is much closer to the original length reported for *A. laticauda* and is more

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Fig. 27. New species of *Anilocra*, ? with marsupia: A. *A. acanthuri*; B. *A. myripinrhis*; C. *A. holocentri*; D. *A. parriti*; E. *A. chaetodontis*; F. *A. holacanthi*; G. *A. chromis*; H. *A. abedifug*; I. *A. haemuli*. All 1.8×.
Table 1.—Characters distinguishing the species of Anilocra known from the Caribbean Sea.

<table>
<thead>
<tr>
<th>Species:</th>
<th>haemuliferous</th>
<th>holocentri</th>
<th>myripristis</th>
<th>acanthocephalus</th>
<th>crinoides</th>
<th>abudefduf</th>
<th>holacanthus</th>
<th>charidotomis</th>
<th>partis?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uropod reaching posterior margin of telson</td>
<td>no</td>
<td>no</td>
<td>yes</td>
<td>no</td>
<td>yes/no</td>
<td>no</td>
<td>no</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>Endopod of uropod extending beyond posterior end of exopod</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes/no</td>
<td>yes</td>
<td>yes</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>Posterior ventral angle(s)</td>
<td>6</td>
<td>7</td>
<td>6</td>
<td>—</td>
<td>—</td>
<td>6</td>
<td>5,6</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>slightly produced in pereonite(s)</td>
<td>7</td>
<td>—</td>
<td>7</td>
<td>—</td>
<td>—</td>
<td>7</td>
<td>7</td>
<td>5,6,7</td>
<td>—</td>
</tr>
<tr>
<td>Posterior ventral angle(s)</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>—</td>
<td>—</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>produced in pereonite(s)</td>
<td>no</td>
<td>no</td>
<td>—</td>
<td>no</td>
<td>—</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Posterior ventral angle of pereonite 7 overlapping pleonite(s)</td>
<td>no</td>
<td>no</td>
<td>no</td>
<td>no</td>
<td>no</td>
<td>—</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Pereopods 2-4 with swelling on outer margin of dactyl</td>
<td>21-40</td>
<td>32-46</td>
<td>29-40</td>
<td>16-28</td>
<td>19-31</td>
<td>21-33</td>
<td>18-28</td>
<td>12-16</td>
<td></td>
</tr>
<tr>
<td>Length of females with a marsupium (mm)</td>
<td>21-40</td>
<td>32-46</td>
<td>29-40</td>
<td>16-28</td>
<td>19-31</td>
<td>21-33</td>
<td>18-28</td>
<td>12-16</td>
<td></td>
</tr>
<tr>
<td>Color, dorsal surface of female</td>
<td>yellow</td>
<td>dark brown</td>
<td>light reddish brown</td>
<td>dark-gray and light-off-white</td>
<td>dark brown and light-off-white</td>
<td>black to lead-gray</td>
<td>black to lead-gray</td>
<td>black to lead-gray</td>
<td></td>
</tr>
<tr>
<td>Location on host</td>
<td>under eye</td>
<td>between eyes</td>
<td>between eyes</td>
<td>under eye</td>
<td>under eye</td>
<td>under eye</td>
<td>under eye</td>
<td>under eye</td>
<td></td>
</tr>
</tbody>
</table>

* Body axis distorted more than 10°, all other species in the table with body axis distorted less than 5°.
† Dactylus of pereopod 7 longer than propodus, all other species in the table with dactylus of pereopod 7 shorter than propodus.
The surviving evidence is too meager ever to determine what the name “Anilocra laticauda” was intended to designate. Beginning with Schioedte and Meinert (1881), the name has been variously misused for 100 years. The name “Anilocra laticauda” should not be salvaged; it is declared a nomen dubium, and should be dropped from usage.

Anilocra leachii Schioedte, 1866, nomen dubium

Anilocra leachii Schioedte, 1866:205, pl. 11, fig. 2; Schioedte, 1868:12, pl. 1, fig. 5.

Type-host.—Unknown.
Type-locality.—West Indies.
Type-specimen.—Unknown.
Description.—Unknown.

Remarks.—Schioedte (1866) labelled seven drawings of the mouthparts of an isopod “Anilocra leachii, Kr.” No description or additional figures were provided. Schioedte (1868) noted A. leachii was very close to A. laticauda. The drawing of mouthparts should not constitute a description of a species. Furthermore, the illustration without additional figures, description, locality, or type-series is insufficient information to allow identification of the species of Anilocra. The name Anilocra leachii should be considered a nomen dubium.

Discussion

Anilocra of Caribbean fishes has been generally considered a single species over the past 140 years. This stability suggests that any species separated from the “Anilocra laticauda complex” must be morphologically very similar. Actually these species are morphologically diverse (Fig. 27). The survival of “Anilocra laticauda complex” was ensured by the combination of characters included in redescriptions based on different and multiple species of Anilocra.

Host specificity and location of adult females are very consistent in the 9 species of Anilocra described. Eight of the species are limited to 1 species or 1 genus of hosts, while 1 species infests 3 genera of hosts in 2 families. Only 4 adult female isopods were observed in abnormal positions on the host (as discussed in the species remarks) in more than 800 hosts which were collected and many thousands of hosts which were observed in the field.

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