

Parasitic Copepods from the Gulf
of Mexico and Caribbean Sea, I:
Holobomolochus and *Neobomolochus*

ROGER CRESSEY

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ABSTRACT

Cressey, Roger. Parasitic Copepods from the Gulf of Mexico and Caribbean Sea, I: *Holobomolochus* and *Neobomolochus*. *Smithsonian Contributions to Zoology*, number 339, 24 pages, 72 figures, 1981.—Four species of *Holobomolochus* Vervoort are described: *H. glyphisodontis* (Krøyer) from *Abudefduf saxatilis*; *H. centropristis*, new species, from *Centropristis melana*; *H. crevalleus*, new species, from *Caranx hippos*; *H. serratus*, new species, from *Scorpaena brasiliensis*; and a new genus and species, *Neobomolochus elongatus*, from *Opisthonema oglinum*. The new genus superficially resembles *Pseudoeucanthus* Brian but differs from it by the presence of three modified setae on the first antennae of *Neobomolochus*. *Bomolochus nothrus* Wilson is placed in synonymy with *Holobomolochus glyphisodontis* (Krøyer), and *Bomolochus ardeolae* Krøyer is placed in synonymy with *Bomolochus belones* Burmeister.

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Roger Cressey

Introduction

This is the first in a series of reports concerning the parasitic copepods of the Gulf of Mexico and Caribbean Sea. Between 1970 and 1976 I made several trips to Charlotte Harbor, Florida, to collect parasitic copepods from teleost fishes. Charlotte Harbor and adjacent waters comprise a major estuary on Florida's west coast and is a habitat for several marine tropical and subtropical species. The Mote Marine Laboratory, Sarasota, Florida, made its Placida, Florida, field station available to me throughout the study. I am now engaged in a similar project at Carrie Bow Cay, Belize. The collections made from these two sites will be the basis for the series. Specimens with USNM (for the former United States National Museum) numbers are deposited in the National Museum of Natural History, Smithsonian Institution.

ACKNOWLEDGMENTS.—I thank the staff of the Mote Marine Laboratory for their continued cooperation during the Florida work. Special thanks are given to Dr. Perry Gilbert, Dr. Oliver Hewitt, and Mr. William Mote. The work in Belize was facilitated by Dr. Klaus Ruetzler (Smithsonian Institution), director of the Investigations of Marine Shallow Water Ecosystems project at Carrie

Bow Cay, Belize. I thank Dr. Brian Kensley and Dr. Thomas Bowman for reviewing the manuscript and offering a number of helpful suggestions. The illustrations were done by my wife, Mrs. Hillary Boyle Cressey. This paper is contribution number 71 of the Investigations of Marine Shallow Water Ecosystems Project, partly supported by the Exxon Corporation.

Holobomolochus Vervoort

Holobomolochus glyphisodontis (Krøyer)

FIGURES 1-22

Bomolochus glyphisodontis Krøyer, 1863:297.

Bomolochus nothrus Wilson, 1913:195.

MATERIAL EXAMINED.—22♀, 2♂ from the gills of 14 *Abudefduf saxatilis* (Linnaeus) collected at Carrie Bow Cay, Belize, March, 1980, by the author.

FEMALE.—Body form as in Figure 1. Total length 1.97 mm, greatest width 1.16 mm (measured at widest part of cephalon). Cephalon short, comprising only about 20 percent of total body length and about twice as wide as long. Genital segment (Figure 2) slightly longer than wide (290 × 260 μm). Abdomen (Figure 2) 3-segmented, segments measure 236 × 224 μm, 118 × 212 μm, and 118 × 175 μm (length × width) respectively. Ventral surface of last abdominal segment (Fig-

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ure 3) with rows of fine spinules at outer distal corner as in the figure. Caudal rami (Figure 3) about as long as wide ($65 \times 65 \mu\text{m}$) with lateral seta, 1 dorsal subterminal seta near inner distal corner, and 4 terminal setae (inner 2 longest and about equal in diameter at bases). First antenna (Figure 4) 7-segmented, no modified setae on basal segment, plumose outer marginal setae of first 4 segments relatively short (compared to most bomolochids), second segment nearly forming right angle with basal segment (this attitude projects basal portion of antenna forward making it easily visible from dorsal aspect). Second antenna (Figure 5) last segment with ill-defined rows of hooklike spinules (rows more apparent distally), row of longer spinules near mid-inner margin, a subterminal inner process bearing row of similar long spinules, 4 recurved terminal to inner hooklike spines, and 2 outer naked setae.

Mandible with short terminal blade fringed on inner margin and a subterminal fringed seta. Paragnath a simple lobe, finely fringed distally. First maxilla (Figure 6) with 3 plumose setae, innermost longest; outermost shortest, about half length of innermost seta. Second maxilla (Figure 6) with 2 equal-length terminal processes, each with spinules as in the figure, and short naked subterminal seta. Maxilliped (Figure 7) with rugose area on outer margin of second segment; terminal claw with accessory process bent at about 90° angle. Legs 1-4 biramose. Leg 1 basipod with 2 large patches of spatulate spinules and thick hirsute seta at outer distal corner; exopod (Figure 8) first segment with fringed spine on outer distal corner and patch of hairs along inner edge, second segment partly fused with third, together they bear 3 prominent outer lateral spines, a more distal reduced spine (fringed at tip), and 6 plumose setae; endopod as in *H. centropristis*. Leg 2 as in *H. centropristis* except exopod (Figure 9) with first 4 sclerotized outer spines about equal in length, each with terminal flagellum, last 2 outer spines not heavily sclerotized, each bearing inner fringe, no terminal flagellum (compare Figures 9 and 31). Leg 3 as in *H. centropristis* except exopod (Figure 10) with relatively longer spines, first 3 without fringe; termi-

nalmost 4 setae with short fringelike plumosities on outer margin rather than usual long plumosities (same in *H. centropristis*). Leg 4 (Figure 11) exopod first segment with naked sclerotized spine on outer distal corner; second segment with outer naked sclerotized spine and inner seta; last segment with heavily sclerotized naked outer spine. 2 slightly sclerotized fringed spines and 5 setae with very short plumosities on inner margin; endopod first 2 segments with short inner seta at inner distal corner, last segment with short fringed spine on outer corner and 2 setae, terminalmost longest. Leg 5 (Figure 12) with well-developed lateral fringed seta and 3 terminal setae, innermost with fine fringe, all setae about equal in length.

MALE.—Body form as in Figure 13. Total length $900 \mu\text{m}$, greatest width $406 \mu\text{m}$ (measured at widest part of cephalon). Cephalon comprising about one-third total body length. Rostrum somewhat produced. Genital segment (Figure 14) longer than wide. Abdomen 2-segmented, last abdominal segment (Figure 15) with interrupted transverse row of spinules on ventroproximal surface and 2 short rows on each ventrodistal corner. Caudal rami (Figure 15) each with a small ventrodistal patch of spinules.

First antenna (Figure 16) 6-segmented with aesthete on each of last 2 segments. Maxilliped (Figure 17) with recurved claw; first segment with inner seta; second segment with 2 inner setae and prominent patch of stout spinules on inner margin; last segment with inner basal seta, modified as a claw, inner margin with row of spinules.

Leg 1 (Figure 18) exopod with patch of hairs on outer margin, long seta at inner corner and rows and patches of spinules as in the figure; basipod with stout, hirsute seta at outer corner and 2 patches of stout spinules; exopod first 2 segments each with spine on outer distal corner and a row of spinules at base of each, second segment with inner seta, last segment with outer spine and 5 setae, outer spines on all segments each with terminal fringed flagellum; endopod first 2 segments each with inner seta, last segment with a very short outer spine and 5 setae, each segment with spinules on distal margin. Leg 2

(Figure 19) basipod with outer naked seta; exopod first 2 segments each with outer spine with row of spinules at base of each, second segment with inner seta, last segment with 2 outer spines, long terminal spine, and 5 setae, all spines with terminal flagellum; endopod first segment with inner seta, second segment with 2 inner setae, last segment with 2 outer spines and 3 inner setae, each segment with spinules on distal margin. Leg 3 as in leg 2 except only 2 setae on last endopod segment. Leg 4 (Figure 20) basipod and exopod as in leg 2 except last exopod segment with only 4 setae; endopod first segment with inner seta, second and last segment occasionally incompletely divided (see Figures 20, 21), last segment with outer fringed spine, long terminal seta and shorter inner seta, both setae with short plumosities. Leg 5 (Figure 22) with 3 subequal terminal setae, innermost and outermost with spinules, middle seta naked, row of spinules near base of inner seta.

REMARKS.—Krøyer (1863:297) described *Bomolochus glyphisodontis* from *Glyphisodon saxatilis* (= *Abudefduf saxatilis*) from Nicaragua. In the same paper (p. 294) he described *Bomolochus ardeolae* from *Belone ardeola* (= *Platybelone argalus*) LeSueur from New Orleans. The illustrations of these two species appear together on plate 11 in Krøyer's 1863 paper.

Wilson (1908) described a collection of bomolochids from *Hypsypops rubicunda* (Girard) from California. He determined that his material was the same as Krøyer's *Bomolochus ardeolae*, and he created the genus *Artacolax* to include it.

I have collected, and describe here, specimens from *Abudefduf saxatilis* from Belize and have also examined specimens of bomolochids from *Hypsypops rubicunda* from California. The recent collections from *Abudefduf* are unquestionably the same as Krøyer's *Bomolochus glyphisodontis* (= *Holobomolochus glyphisodontis*). The material from *Hypsypops* represents a new, but closely related, species of *Holobomolochus*. Both species are characterized by a prominent first antenna, clearly visible in dorsal aspect. Krøyer's figure of *Bomolochus glyphisodontis* shows this feature clearly; the figure of *Bomolochus ardeolae*, with which Wilson synonymized his *Hyp-*

sypops parasites, does not. Dr. Torben Wolff kindly lent me the type-specimen of *B. ardeolae*, and examination of it reveals that it is the same as *Bomolochus belones* Burmeister and hence should be considered a synonym of *B. belones*. Apparently Wilson confused the illustrations and mistook the figures of *glyphisodontis* for those of *ardeolae*. The genus *Artacolax*, based on *B. ardeolae*, has been correctly synonymized with *Bomolochus*. (Vervoort, 1962:18.)

In conclusion, Wilson apparently erroneously based *Artacolax* on Krøyer's *B. ardeolae*. It is difficult to imagine how he could have compared his California *Hypsypops* parasite with the two Krøyer 1863 species on plate 11 and conclude that they were the same as *B. ardeolae*. The prominent first antenna, clearly shown in Krøyer's figure of *glyphisodontis* and obvious in the *Hypsypops* parasites, could not have been overlooked. Wilson must have misread the legend for plate 11.

Holobomolochus centropristis, new species

FIGURES 23-34

MATERIAL EXAMINED.—Holotype ♀ (USNM 181721) and 15 paratype ♀ (USNM 181722) collected from the gill chambers of 27 *Centropristis melana* Ginsburg at Charlotte Harbor, Florida, by the author July, 1972. Additional material (49 ♀) collected from 169 specimens of the same host and same locality at various times by the author between 1970 and 1975.

FEMALE.—Body form as in Figure 23. Total length 1.27 mm, greatest width 0.75 mm (measured at widest part of cephalon). Cephalon about one-third total body length (0.43 mm), nearly twice as wide as long. Rostrum with ventral hooks. Genital segment (Figure 24) wider than long (153.4 × 112.1 μm). Abdomen 3-segmented; segments measure 47.2 × 106.2 μm, 35.4 × 82.6 μm, and 53.1 × 64.9 μm (length × width) respectively. Ventral surface of last abdominal segment unarmed (Figure 25). Caudal rami (Figure 25) about 2.5 times longer than wide (59.0 × 23.6 μm) each bearing outer lateral seta, 2 subterminal setae (1 dorsal, 1 ventral), and 1

short and 2 long terminal setae (longest 171 μm), ventral surface of rami without surface ornamentation.

First antenna (Figure 26) 6-segmented, first 3 segments with 15 plumose outer setae and an aesthete on each of last 2 segments (first 3 segments held in a relatively straight line, not bent as in *H. glyphisodontis*). Second antenna (Figure 27) first segment with 1 distal seta, second segment inner part bearing hooklike spinules not arranged in distinct rows, lateral palp with row of prominent spinules along inner margin, second segment with 1 subterminal hook, 3 terminal articulated hooks, and 3 naked setae. Mouthparts (Figure 28) of usual type, labrum with small patch of spinules at distal corners, first maxilla with 3 prominent setae each with lateral row of spinules and 1 short naked seta. Maxilliped (Figure 29) with terminal claw recurved nearly at a right angle and bearing a prominent accessory process.

Legs 1-4 biramose. Leg 1 (Figure 30) basipod with 2 large patches of scalelike spinules and outer, sparsely plumose seta; exopod first segment with spine at outer distal corner, second and third segments partly fused, second bearing outer distal spine, third with 3 outer spines (middle longest) and 6 setae; endopod first and second segments each with outer seta, third segment with short outer spine and 5 setae. Leg 2 (Figure 31) exopod with row of spines at outer distal corner and inner plumose seta; basipod with small patch of scalelike spinules and plumose seta near outer distal corner; exopod first segment with heavily sclerotized spine bearing subterminal flagellum on outer distal corner, second segment with similar spine on outer distal corner and inner seta, third segment with 4 outer spines, first short and weakly sclerotized, next 2 similar to those of first 2 segments, last spine with membranous fringe on outer margin and long subterminal flagellum, 5 setae on terminal to inner margin (first 4 with short plumosities on outer margin); endopod first segment with inner seta, second segment with 3 inner setae, last segment with 2 short outer spines (weakly sclerotized with short plumosities) and 3 terminal setae. Leg 3 (Figure 32) armed as in leg

2 except exopod last segment lacking first short outer spine, endopod last segment with only 2 setae. Leg 4 (Figure 33) exopod without inner seta, basipod with seta near outer distal corner, exopod as in leg 3 except fringe on outer spine with smooth edge (not serrate), endopod first 2 segments each with short inner seta, last segment with inner and outer spine and terminal seta with short plumosities. Leg 5 (Figure 34) second segment with a row of 10-12 stout spinules on inner edge, subterminal inner seta with short plumosities and 3 naked terminal setae, all setae of about equal length. Leg 6 represented by 3 long setae at area of egg sac attachment (Figure 24).

MALE.—Unknown.

ETYMOLOGY.—The specific epithet *centropristis* alludes to the genus of the host *Centropristis melana*.

REMARKS.—This species can be separated from all known *Holobomolochus* by the lack of ornamentation on the ventral surface of the last abdominal segment and caudal rami. All previously known members of the genus are ornamented on both or either sites. The unusual nature of leg 5 with only a short row of 10-12 spinules on the inner edge and the four nearly equal setae make this species easy to recognize.

Holobomolochus crevalleus, new species

FIGURES 35-46

MATERIAL EXAMINED.—Holotype ♀ (USNM 181723) and 4 ♀ paratypes (USNM 181724) from the gill chamber and nasal sinuses of 4 *Caranx hippos* (Linnaeus) collected by the author in Charlotte Harbor, Florida, 5 Jun 1972. Other specimens (14 ♀) from the same host and area at various times from 1970 to 1972.

FEMALE.—Body form as in Figure 35. Total length 1.53 mm, greatest width 0.65 mm (measured at widest part of cephalon). Cephalon comprising about one-fourth total body length (0.38 mm), nearly twice as wide as long. Genital segment (Figure 36) wider than long (206 \times 182 μm). Abdomen 3-segmented, segments measure 100 \times 129 μm , 59 \times 123 μm , and 82 \times 118 μm (length \times width) respectively; last abdominal

segment with 2 ventral patches of spinules (Figure 37). Caudal rami (Figure 37) about twice as long as wide ($76 \times 35 \mu\text{m}$), each armed with 2 naked lateral setae and 4 naked terminal setae (longest seta $590 \mu\text{m}$); ventral surface of each ramus with patch of spinules (heavier than those on abdomen).

First antenna (Figure 38) with 5 distinct segments, 15 plumose setae on basal part and aesthete on each of last 2 segments. Rostrum with ventral hooks. Second antenna (Figure 39) last segment with fine hooklike spinules not in distinct rows, palp with row of longer hooklike spinules along margin, 3 setae, and 4 articulated terminal and subterminal spines. Labrum (see Figure 40) with 2 patches of stout spinules. Oral area (Figure 40) similar to *H. divaricatus* Cressey and Cressey; paragnath with long hairs on distal third, first maxilla with 3 long plumose setae and 1 short naked seta, labium represented by a row of stout spinules and 2 lateral hirsute palps posterior to oral region. Maxilliped (Figure 41) claw with small accessory process (not easily seen in some specimens).

Legs 1–4 biramous. Leg 1 (Figure 42) basipod with 2 large patches of spinules and short, thick seta at outer distal corner; exopod 2-segmented, first segment with thumblike spinulose spine on outer distal corner, second segment with 2 small outer spines and 6 setae; endopod 3-segmented, first 2 segments each with patch of spinules on outer half and an inner seta, last segment with 5 setae. Leg 2 (Figure 43) basipod with plumose seta on outer margin; exopod first segment with patch of bristles on outer margin and on outer distal corner a fringed spine bearing terminal flagellum, second segment with similar outer spine and inner seta, last segment with 3 outer, equally long, similar spines and 6 setae, 5 outermost setae with pectinate outer borders and short plumosities on inner border; endopod first segment with patch of spinules on outer half and inner seta, second segment with patch of spinules on outer half and 2 inner setae, third segment with small patch of spinules on outer margin, 2 short plumose outer spines and 3 setae. Leg 3 (Figure 44) basipod as in leg 2, exopod first

segment with heavily sclerotized spine on outer distal corner, second segment with prominent heavily sclerotized spine on outer distal corner and inner seta, last segment with 2 prominent heavily sclerotized outer spines and 6 setae (outermost with pectinate outer margin); endopod as in leg 2 except last segment with only 2 setae. Leg 4 (Figure 45) basipod similar to that of legs 2 and 3; exopod first segment with spines on outer distal corner, second segment with outer spine and inner seta, last segment with outer short spine, longer weakly sclerotized outer terminal spines and 6 setae (outermost seta with pectinate outer margin); endopod first and second segments each with distal patch of spinules and inner spinulose seta, last segment with short row of stout spinules at each distal corner, outer and inner spines, and long median seta (spines and setae with spinulose margins). Leg 5 (Figure 46) basal segment with small patch of spinules and naked seta on outer distal corner; free segment with inner and outer patches of spinules, outer lateral spine, 2 terminal spines and inner subterminal spine, innermost terminal spine about twice length of other 3 spines, innermost 2 spines with more prominently spinulose margins than outer 2 spines. Leg 6 represented by 3 well-developed setae at area of egg sac attachment (see Figure 36).

MALE.—Unknown.

ETYMOLOGY.—The specific epithet *crevalleus* refers to the common name of the host, "Crevalle Jack."

REMARKS.—This new species can be separated from all known species of *Holobomolochus* except *H. asperatus* Cressey and Cressey, *H. divaricatus* Cressey and Cressey, and *H. nudiusculus* Cressey and Cressey by the prominent, heavily sclerotized spines on the exopod of leg 3. It can be separated from *H. nudiusculus* and *H. divaricatus* in that the caudal rami of those species are without ventral surface ornamentation. It can be further separated from *H. divaricatus* because the distalmost exopod spine of leg 3 of *H. divaricatus* is shorter than the preceding two. The new species can be separated from *H. asperatus* by the large patches of spinules on the endopod segments of legs 2 and 3 of the new species, the fewer hooklike spinules

on the second antenna of *H. asperatus*, and by the spinulose surface of the paragnath of *H. asperatus* (hirsute in *H. crevalleus*). Together these four species of *Holobomolochus* comprise a group characterized by the heavily sclerotized long spines on the exopod of leg 3 and so far known only from the western Atlantic and eastern Pacific. The previously described three species of this group are parasitic in the nasal sinuses of the New World species of *Scorberomorus*.

Holobomolochus serratus, new species

FIGURES 47-58

MATERIAL EXAMINED.—Holotype ♀ (USNM 181725) and 25 paratype ♀ (USNM 181726) collected from the gill chambers of 1 *Scorpaena brasiliensis* Cuvier (220 mm FL) at Charlotte Harbor, Florida, by the author 27 Aug 1973. Additional material (12 ♀) collected from 81 specimens of the same host and locality at various times by the author between 1972 and 1975.

FEMALE.—Body form as in Figure 47. Total length 1.27 mm, greatest width 0.61 mm (measured at widest part of cephalon). Cephalon comprises about one-third total body length (413 μ m). Rostrum with ventral hooks. Genital segment (Figure 48) wider than long (171 \times 141 μ m). Abdomen 3-segmented, segments with patch of fine spinules near origin of each caudal ramus (Figure 49). Caudal rami (Figure 49) nearly 3 times longer than wide (82 \times 30 μ m), each with 1 lateral seta, 1 subterminal dorsal seta, and 4 terminal setae, innermost sparsely plumose.

First antenna (Figure 50) 6-segmented, first 3 segments with 15 plumose outer setae, 1 aesthete on each of last 2 segments (first 3 segments held in a relatively straight line). Second antenna (Figure 51) second segment with hooklike spinules not in rows, lateral palp with row of finer spinules along outer edge, second segment with subterminal heavily sclerotized recurved spine, 3 weaker distal spines, and 2 naked setae (usual third seta not seen). Mouthparts as in Figure 52; the 3 plumose setae on first maxilla not as long as in most other species of genus, paragnath with only

fringe of small spinules distally. Maxilliped (Figure 53) hook with prominent accessory spine, hook recurved at about a right angle, 2 lateral plumose setae shorter than in most other species.

Legs 1-4 biramose. Leg 1 (Figure 54) basipod with 2 small patches of spatulate spinules; exopod first segment with 2 spines on outer distal corner, segments 2-3 partly fused, bearing 2 outer spines and 6 setae; endopod first 2 segments, each with inner seta and patch or row of spinules along distal margin, last segment with small outer spine, 5 setae, and small group of spinules near base of small spine. Leg 2 (Figure 55) basipod with patch of spatulate spinules near inner margin; exopod first segment with spinulose spine at outer distal corner, second segment with outer spinulose spine and inner seta, last segment with 4 outer spines (first 2 spinulose, last 2 prominently serrate on outer margin) and 5 setae; endopod first segment with inner seta and row of spinules along distal margin, second segment with 2 inner setae and distal row of spinules, last segment with 2 spinulose outer spines and 3 setae. Leg 3 (Figure 56) basipod armed as in leg 2 except with row of fine spinules near middle; exopod first segment with long plumose outer spine and inner seta, third segment with 3 long plumose outer spines and 5 setae, outermost seta with short plumosities on outer edge; endopod as in leg 2 except last segment with only 2 setae. Leg 4 (Figure 57) basipod unarmed except for usual seta at outer distal corner; exopod first segments with outer naked spine, second segment with similar outer spine and inner seta, last segment with 2 outer spines (first naked, second with short spinules on inner margin) and 6 setae, outermost seta with short plumosities along outer edge; endopod first 2 segments each with short plumose inner seta and hairs, and row of conspicuous spinules along outer distal margin, last segment with 3 setae with short plumosities, middle seta 3 times length of other 2, and patch of conspicuous spinules distally. Leg 5 (Figure 58) first segment with large patch of spinules on distal half and a naked seta at outer distal corner; free segment with 2 patches of prominent spinules (1 at mid-outer margin and other distal) and short lateral seta and 3 terminal

setae, setae with short plumosities except midterminal seta naked. Leg 6 represented by 6 long setae at area of egg sac attachment.

MALE.—Unknown.

ETYMOLOGY.—The Latin *serratus* (toothed like a saw) alludes to the ornamentation on the spines on the exopod of leg 2.

REMARKS.—This new species can be separated from all known species of *Holobomolochus* except *H. spinulus* (Cressey) and *H. attenuatus* (Wilson) by the prominent lateral spine on the second antenna. It should be noted that *H. spinulus* was described from *Scorpaena guttata* Giard from California, and *H. attenuatus* described from *Scorpaena plumieri* Bloch from Jamaica. The new species can be separated from both of these species by the arrangement of the spinules in discrete rows on the second antennae of each of these previously known species. It can be further separated from *H. spinulus* because the caudal rami of *H. spinulus* each bear a ventral patch of spinules (naked in *H. serratus*). It can be separated from *H. attenuatus* as well as *H. spinulus* by the heavy serrations on the last two spines of the last exopod segment of leg 2 of the new species.

As in *H. crevalleus* this new species may be a member of a subgroup of *Holobomolochus*, in this case characterized by the presence of the prominent lateral spine on the second antenna. Although *H. spinulus* has been reported from hosts other than scorpaenids, scorpion fishes may be the preferred hosts.

Neobomolochus, new genus

DIAGNOSIS.—Bomolochidae. Body form typical of family. Thoracic segments bearing legs 2–5 free. Abdomen indistinctly 3-segmented. Caudal rami with 5 minor setae and one major terminal seta. Rostrum without hooks. First antenna 5-segmented; first segment with sclerotized process bearing 3 modified setae. Other cephalic appendages typical of family. Maxilliped hook without prominent accessory process. Legs 1–4 biramous. Leg 2 middle endopod segment with 2 inner setae. Leg 3 middle endopod segment with 1 inner seta. Leg 4 middle endopod segment with

out setae. Leg 5 free segment with 4 lateral to terminal setae.

Diagnosis based on female. Male known only from immature specimens.

ETYMOLOGY.—The Greek *neo* (new) plus the generic name *bomolochus* refers to the taxon as representing a new bomolochid genus.

TYPE-SPECIES.—*Neobomolochus elongatus*, new species.

REMARKS.—*Neobomolochus* is separated from *Holobomolochus*, *Acanthocolax*, *Ceratocolax*, *Bomolochus*, *Boylea*, *Unicolax*, and *Tegobomolochus* by having only one major terminal seta on the caudal ramus, whereas the aforementioned genera all have two major terminal setae on each caudal ramus. From the remaining genera with one major seta, the new species can be separated by its lacking an inner seta on the mid-endopod segment of leg 4; all others with a 3-segmented endopod of leg 4 bear a single seta on the middle segment. (The endopods of legs 2–4 are 2-segmented in *Pumiliopes* and *Pumiliopsis*.)

Superficially the new genus resembles *Pseudoeucanthus* Brian. The two species described in that genus (*P. alosae* Brian and *P. uniseriatus* Wilson) are poorly known. Both authors show a seta on the mid-endopod segment of leg 4. Neither author mentions any modified setae on the first antenna, which should be easily seen if present (I examined the holotype of *P. uniseriatus* and did not see any modified setae). The modified setae on the first antenna of *Neobomolochus* are similar to those found in *Nothobomolochus*, but the new genus differs from *Nothobomolochus* by presence of two inner setae on the mid-endopod segment of leg 3 and one seta on the same segment of leg 4 of *Nothobomolochus*.

The diagnosis is based on the female. Two immature males are present in the collections, but I do not feel it appropriate to base a generic diagnosis on immature features.

Neobomolochus elongatus, new species

FIGURES 59–72

MATERIAL EXAMINED.—Holotype ♀ (USNM 181727) and 5 paratype ♀ (USNM 181728) col-

lected from the eyes of 9 *Opisthonema oglinum* (Lesueur) (USNM 108355) from "West Indies" collected by the author (1 fish negative). Additional material (7 ♀, 1 immature ♂) collected from 5 specimens of the same host from Charlotte Harbor, Florida, and 1 immature ♂ from *Epinephalus morio* (Valenciennes).

FEMALE.—Body form as in Figure 59. Total length 4.20 mm, greatest width 1.16 mm (measured at widest part of cephalon). Cephalon comprises about 20 percent of total length (0.84 mm). Thoracic segment bearing leg 1 fused with cephalon. Thoracic segments bearing legs 2–5 narrow and together about twice length of cephalon. Rostrum without hooks. Genital segment (Figures 60, 61) longer than wide ($472 \times 265 \mu\text{m}$), posterior corners inflated laterally. Abdomen indistinctly 3-segmented, segments measure $324 \times 342 \mu\text{m}$, $295 \times 306 \mu\text{m}$, and $365 \times 253 \mu\text{m}$ (length \times width) respectively; last abdominal segment with 2 patches of spatulate spinules (see Figure 62). Caudal rami (Figure 62) longer than wide ($141 \times 100 \mu\text{m}$), each bearing 1 lateral seta, 1 dorsal subterminal seta and 4 terminal setae (3 short, 1 long), longest seta $413 \mu\text{m}$ bearing short plumosities; each ramus with ventral patch of spatulate spinules.

First antenna (Figure 63) 5-segmented; first segment bearing 2 plumose setae and 3 short sclerotized spines at outer distal corner (Figure 64); 1 aesthete on each of last 2 segments. Second antenna (Figure 65) last segment with hooklike spinules arranged in rows (rows more discrete distally), outer edge with 2 short rows of hooklike spinules and 4 weak hooks and 2 setae distally. Labrum with 2 patches of spinules and short row of spinules on outer posterior corner. Mouthparts (Figure 60) typically bomolochid. Mandible bladlike; paragnath with distal fringe; first maxilla with 4 setae, inner 2 with short spinules; second maxilla with 2 terminal bladlike

processes, each bearing spinules on margins. Maxilliped (Figure 67) hook recurved nearly at right angle and bearing 3 very small accessory spines on outer margin. Legs 1–4 biramose. Leg 1 (Figure 68) basipod with 2 patches of spinules; exopod first segment with thumblike spine on outer distal corner, second and third segments fused, bearing 9 setae; endopod first segment with large patch of spinules and inner seta, second segment with inner seta, last segment with 5 setae. Leg 2 (Figure 69) basipod with small patch of setules and large patch of spinules between bases of rami; exopod first segment with rows of scalelike spinules along outer margin and a long spine with hyaline tip on outer distal corner; second segment with stout spine on outer distal corner and an inner seta, last segment with 4 outer spines and 4 setae (terminalmost spine longest); endopod first segment with patch of scalelike spinules on outer distal corner and inner seta, second segment as in first except with 2 inner setae, last segment with 2 short, finely plumose outer spines and 3 setae, outer margins of setae finely plumose. Leg 3 (Figure 70) as in leg 2 except no patch of pointed setules on basipod, endopod with only 3 spines on last segment, only 1 inner seta on middle endopod segment, and only 2 setae on last endopod segment. Leg 4 (Figure 71) as in leg 3 except middle endopod segment without setae and last segment with outer, finely plumose spine, long spinulose midseta, and short, naked, inner seta. Leg 5 (Figure 72) free segment with scalelike spinules distally and 4 lateral to terminal setae, terminalmost longest and sparsely plumose, others finely plumose. Leg 6 represented by 3 setae at area of egg sac attachment (see Figures 60, 61).

Egg sacs long, extending well beyond caudal rami, about as long as body.

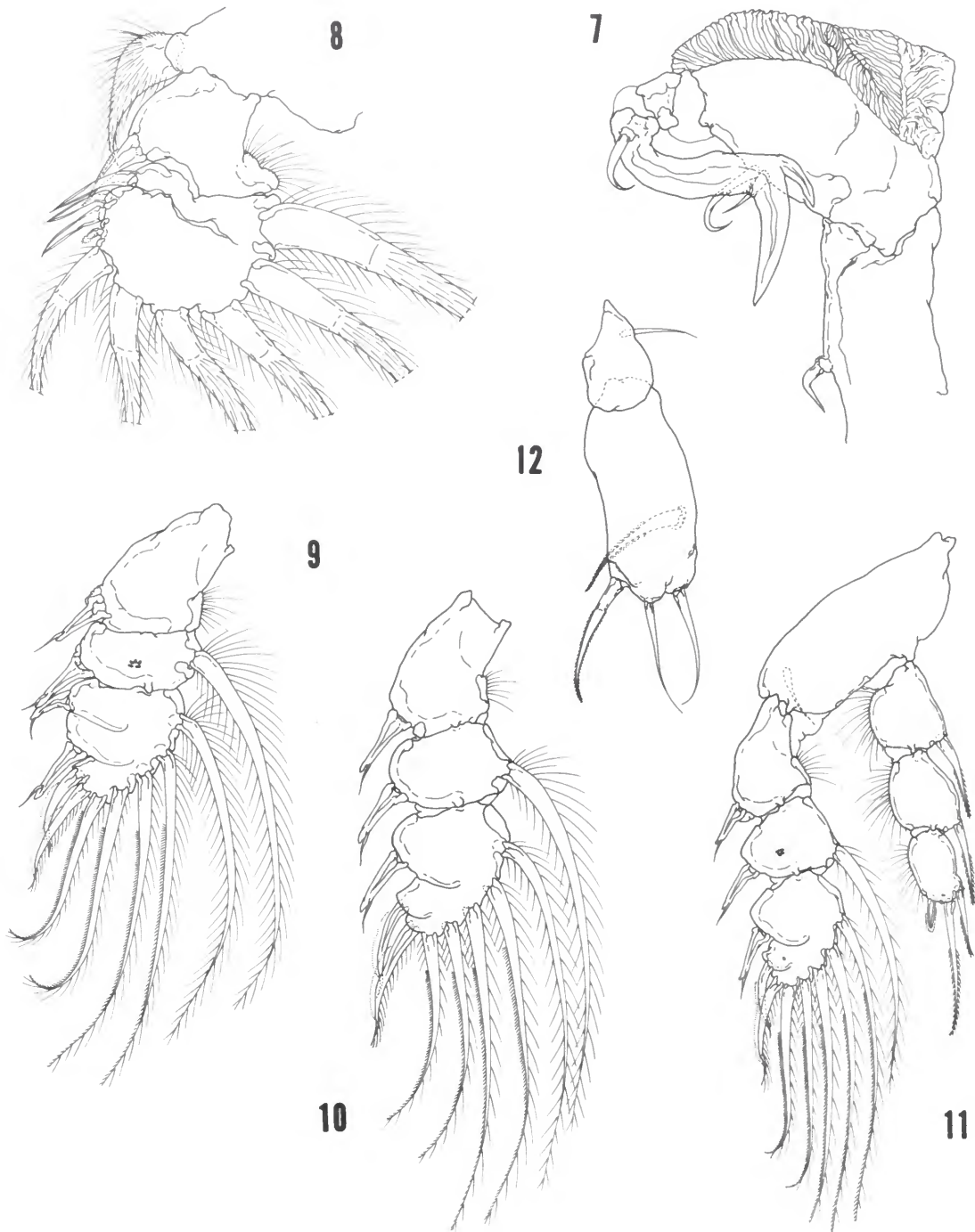
MALE.—Known only from two immature specimens, not described.

ETYMOLOGY.—The Latin *elongatus* (prolonged) alludes to the elongate body of the female.

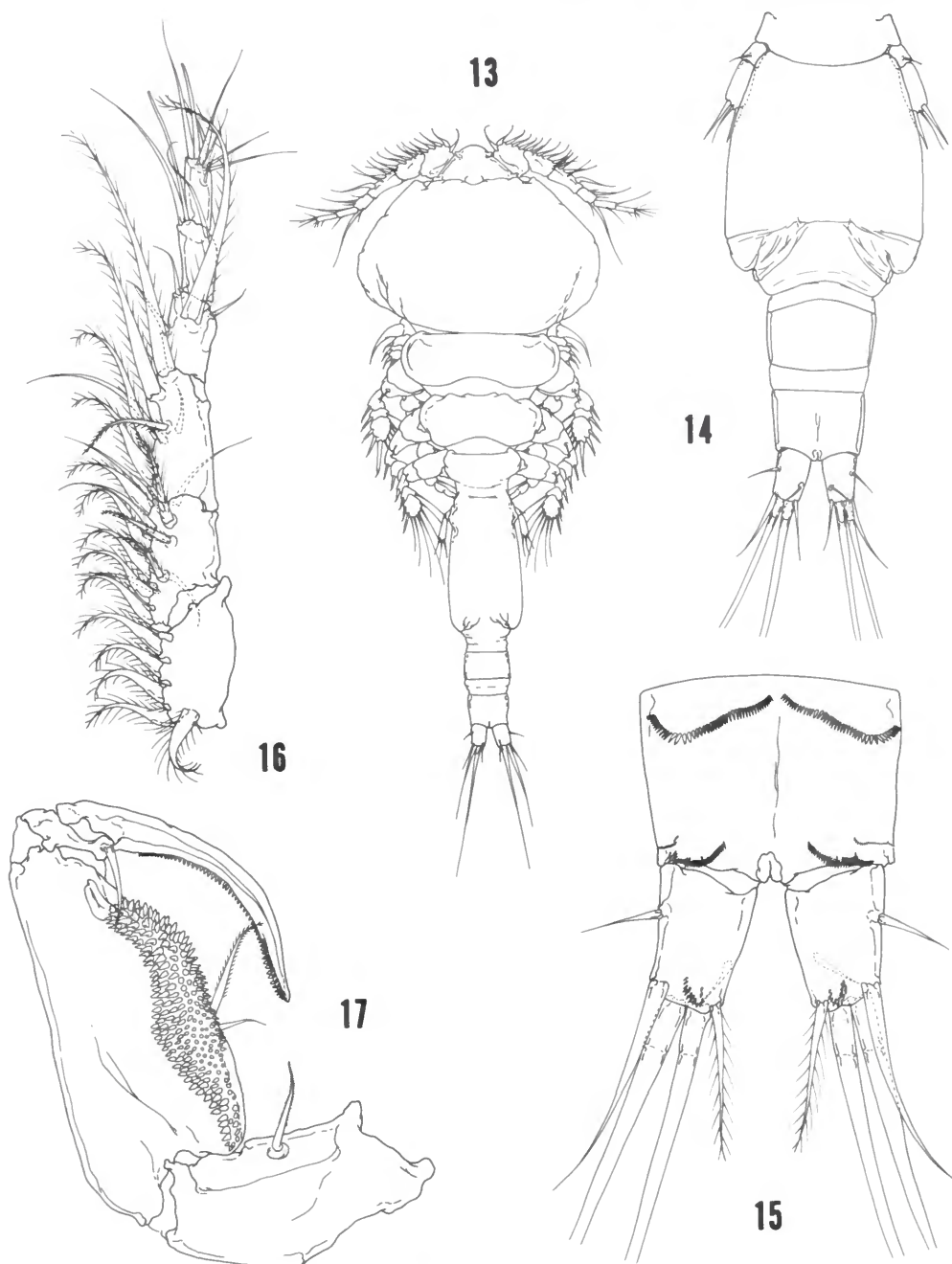
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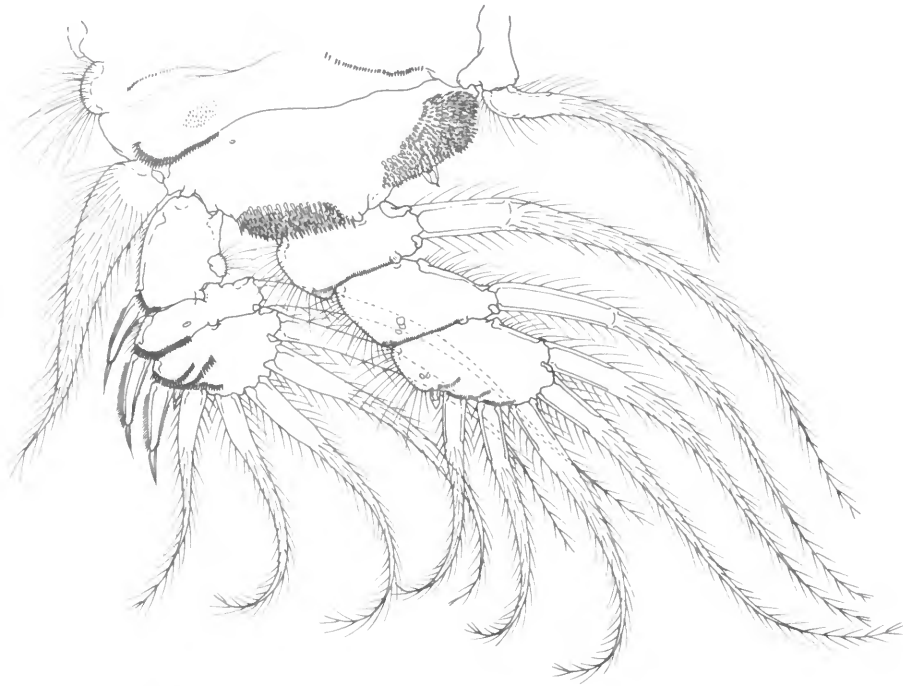
FIGURES 1-6.—*Holobomolochus glyphisodontis* (Krøyer), female: 1, dorsal; 2, genital segment and abdomen, dorsal; 3, last abdominal segment and caudal rami, ventral; 4, first antenna; 5, second antenna; 6, first and second maxillae.



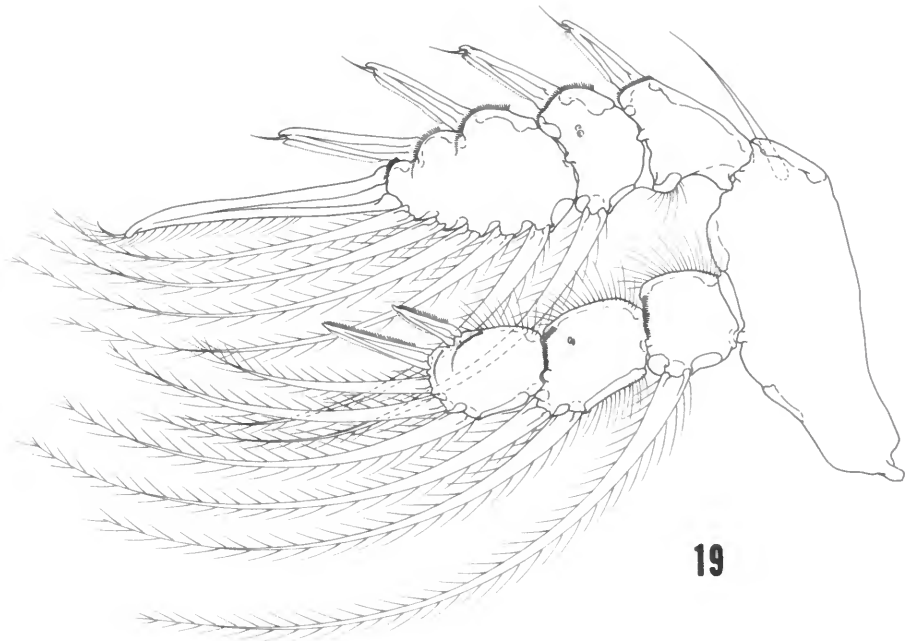
FIGURES 7-12.—*Holobomolochus glyphisodontis* (Krøyer), female: 7, maxilliped; 8, leg 1 exopod; 9, leg 2 exopod; 10, leg 3 exopod; 11, leg 4; 12, leg 5.



FIGURES 13-17.—*Holobomolochus glyphisodontis* (Krøyer), male: 13, dorsal; 14, genital segment and abdomen, dorsal; 15, last abdominal segment and caudal rami, ventral; 16, first antenna; 17, maxilliped.

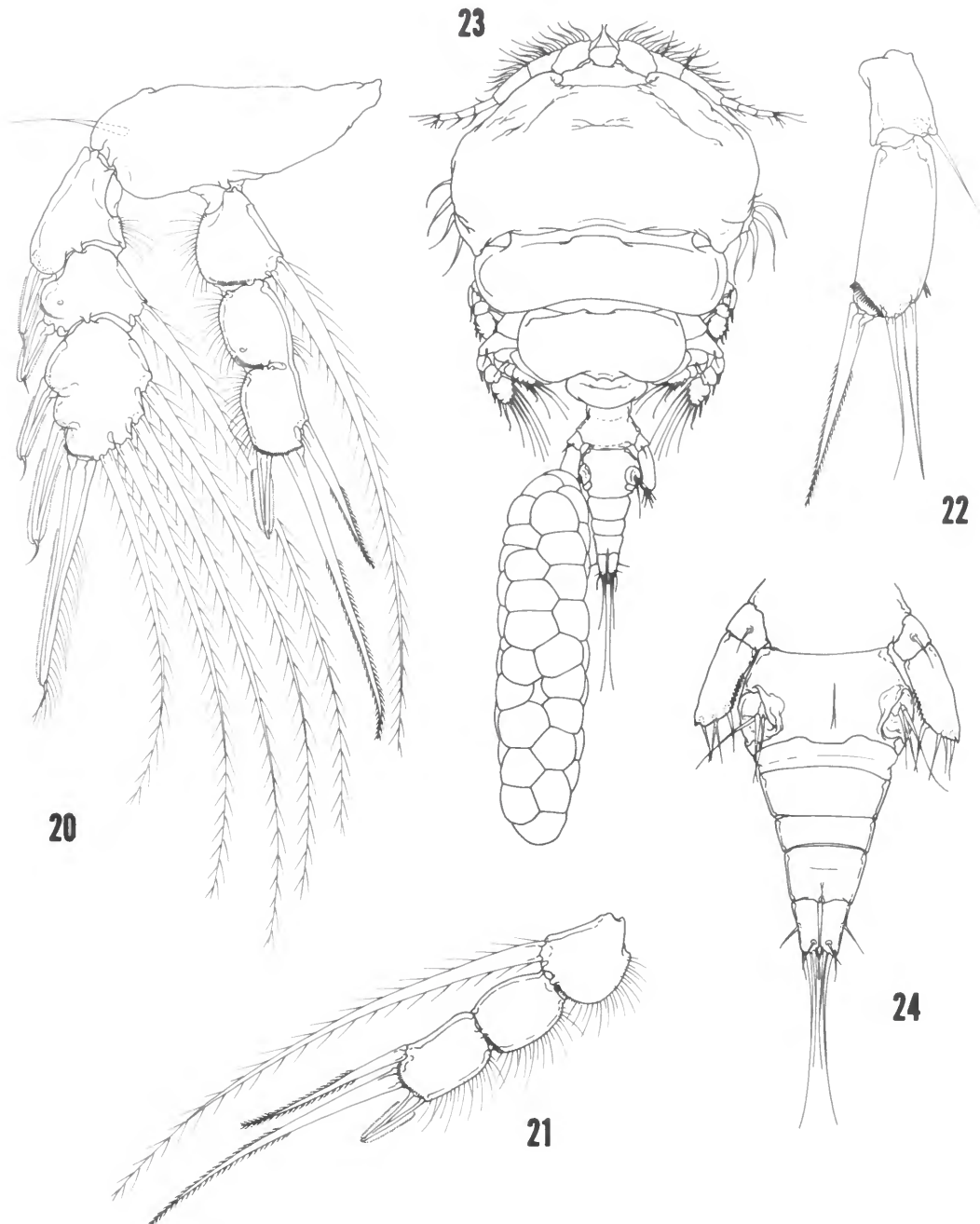


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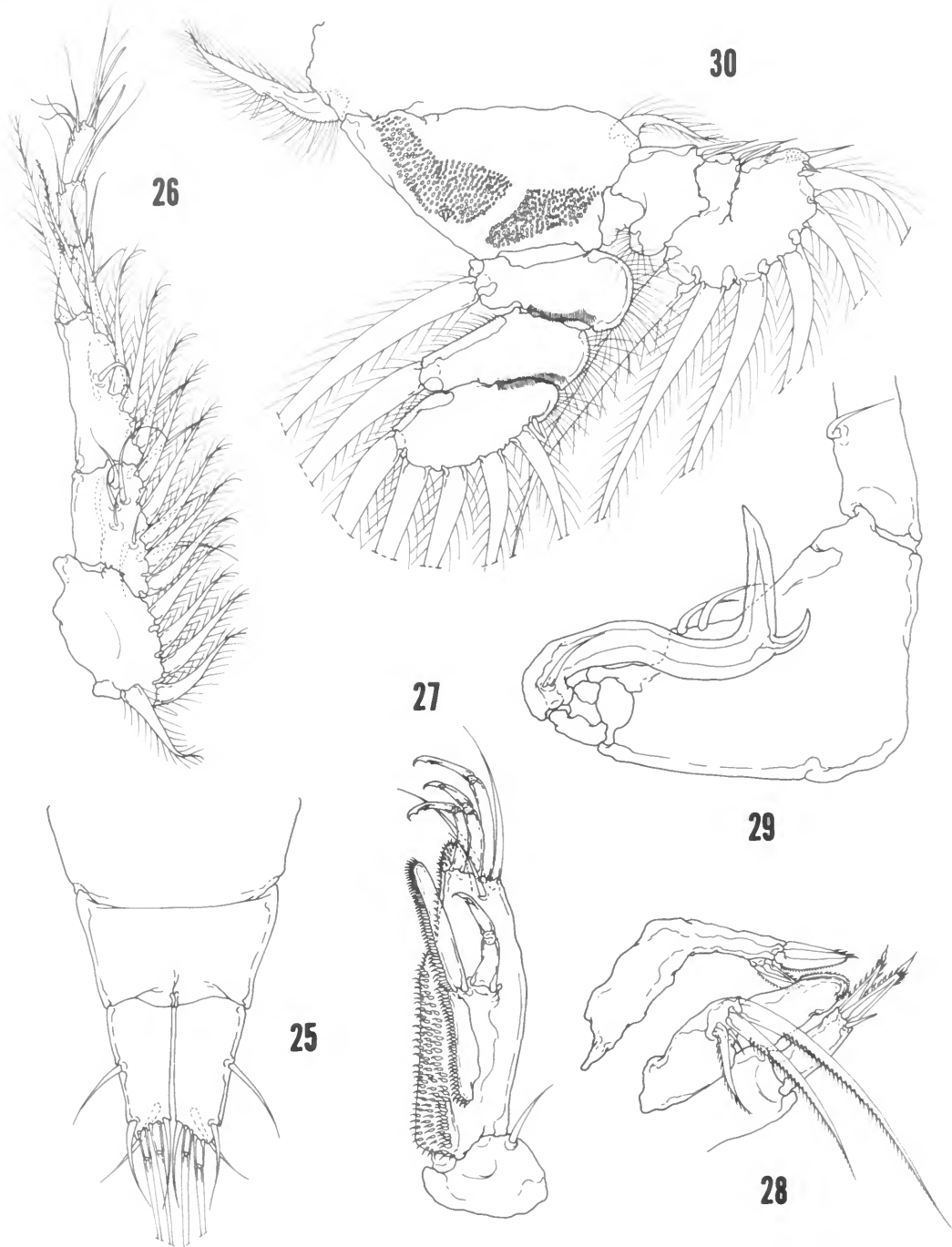


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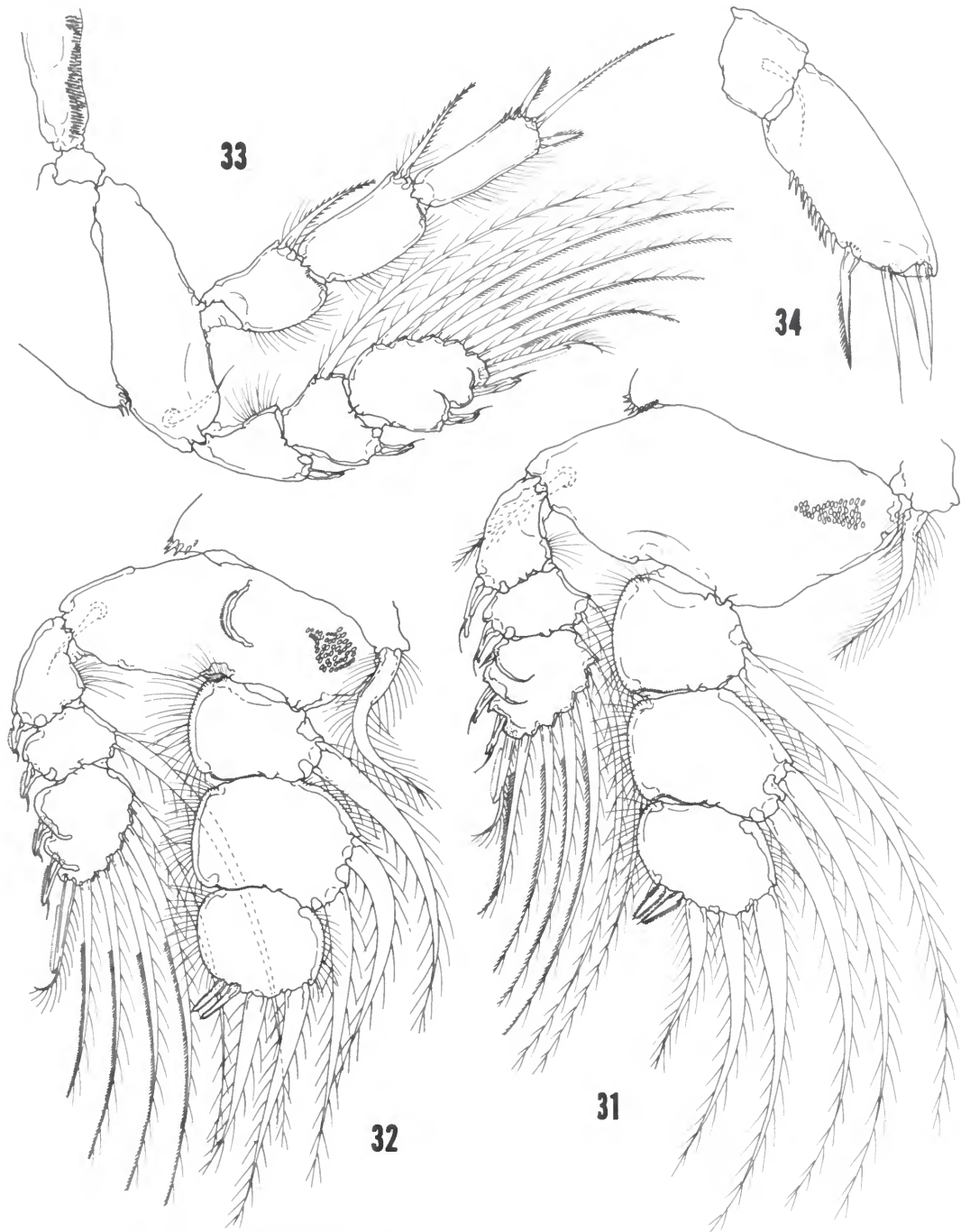
FIGURES 18, 19.—*Holobomolochus glyphisodontis* (Krøyer), male: 18, leg 2; 19, leg 3.



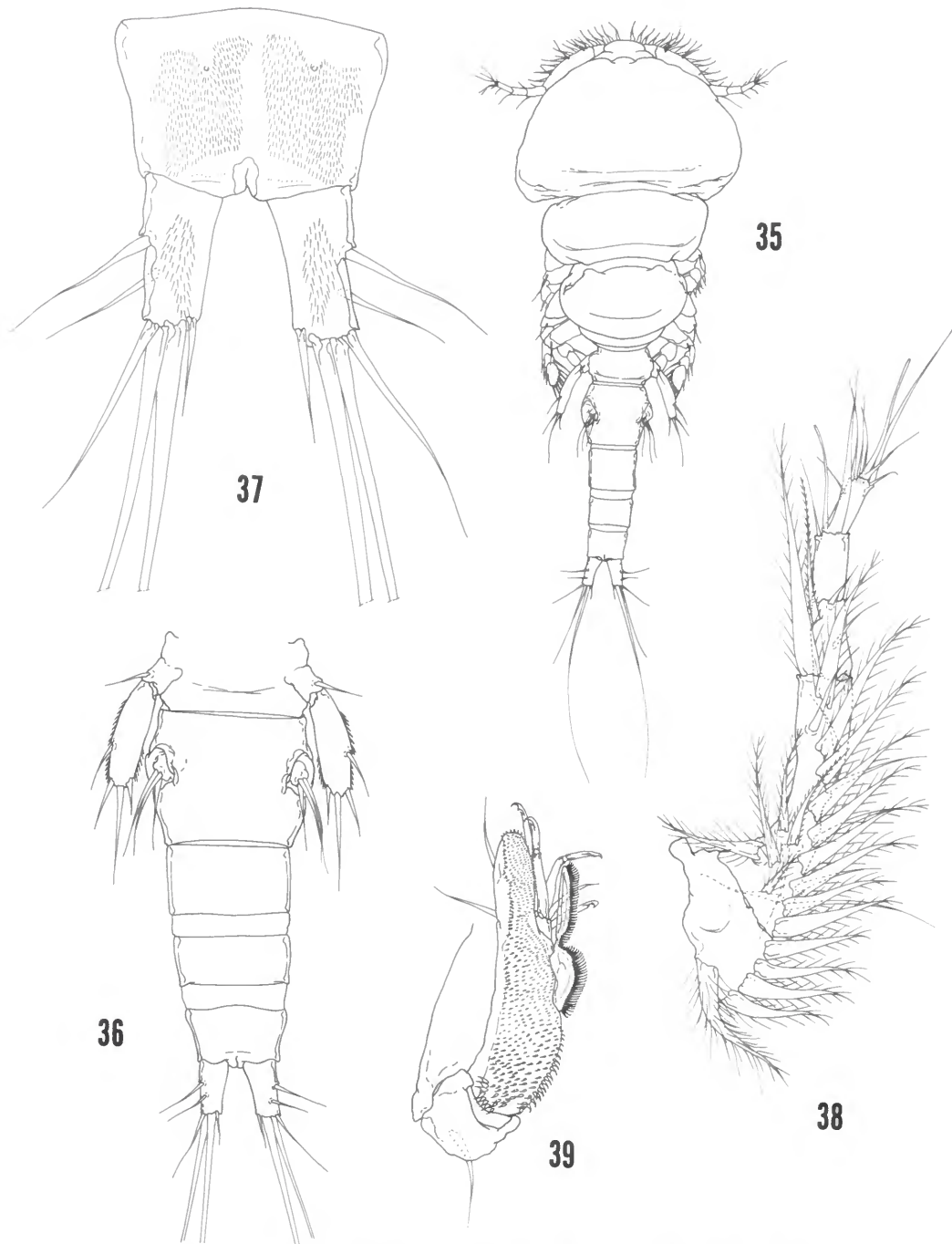
FIGURES 20-24.—*Holobomolochus glyphisodontis* (Krøyer), male: 20, leg 4; 21, leg 4 endopod; 22, leg 5. *Holobomolochus centropristis*, new species, female: 23, dorsal; 24, genital segment and abdomen, dorsal.



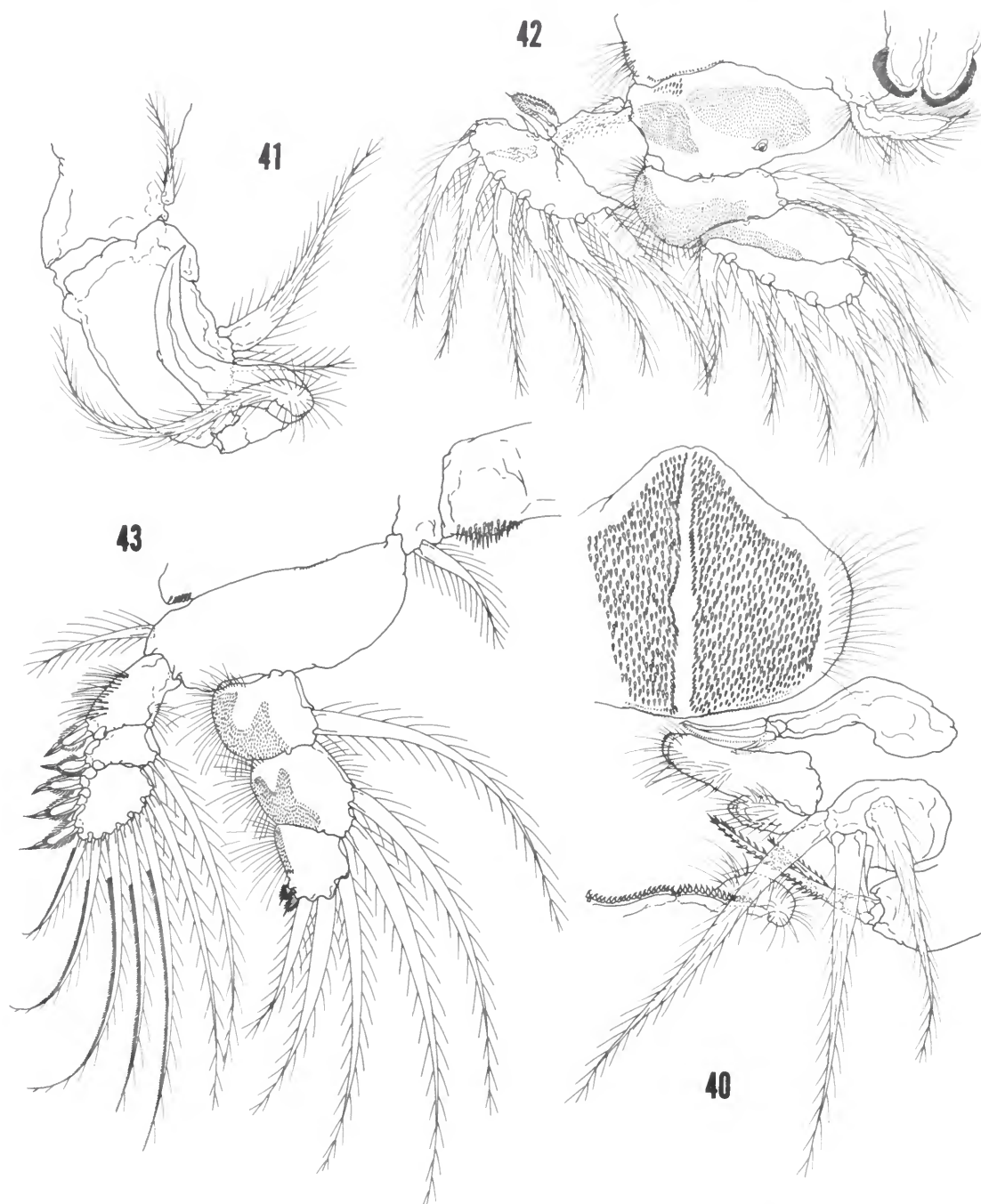
FIGURES 25-30.—*Holobomolochus centropristis*, new species, female: 25, last abdominal segment and caudal rami, ventral; 26, first antenna; 27, second antenna; 28, mandible, paragnath, first and second maxillae; 29, maxilliped; 30, leg 1.



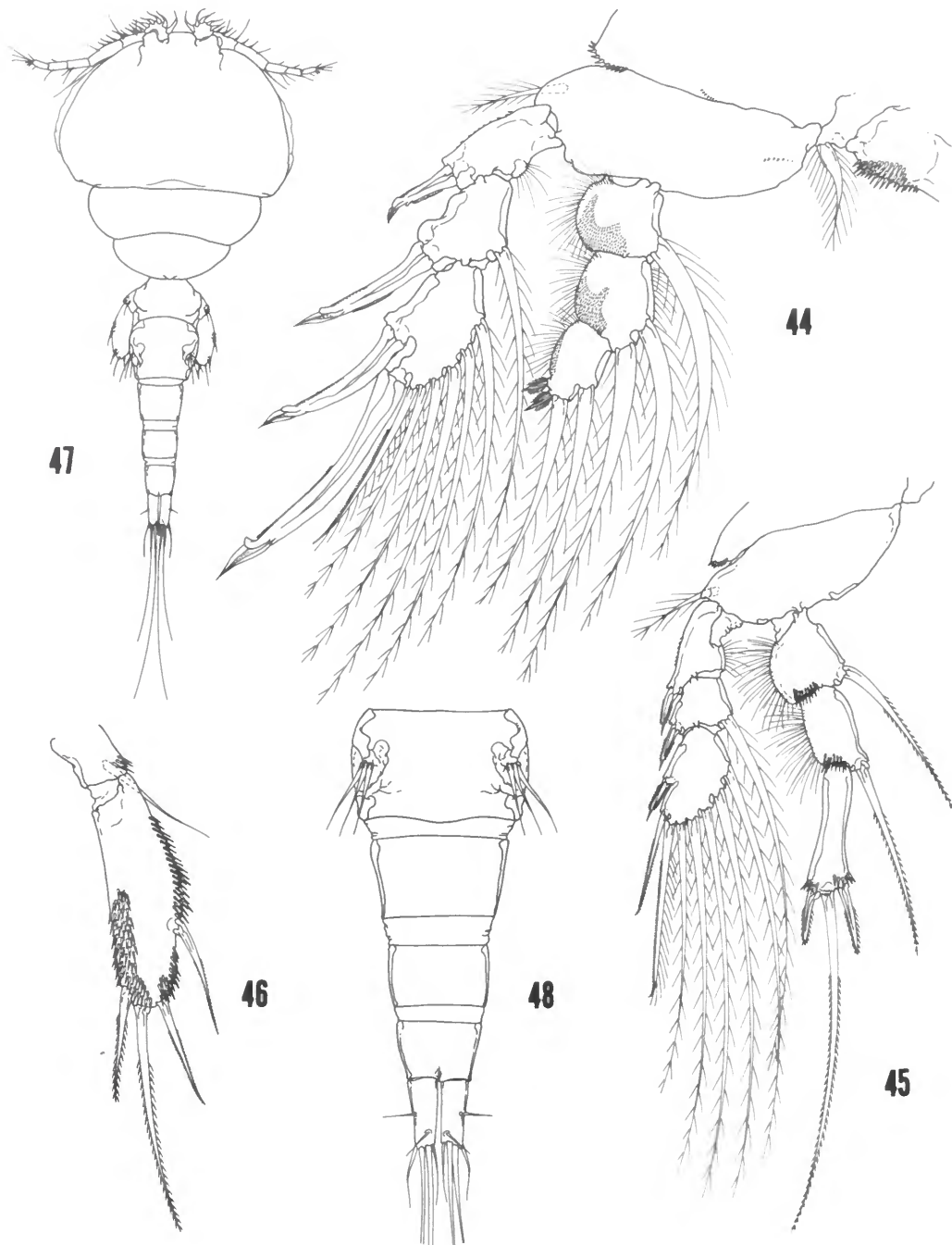
FIGURES 31-34.—*Holobomolochus centropristis*, new species, female: 31, leg 2; 32, leg 3; 33, leg 4; 34, leg 5.



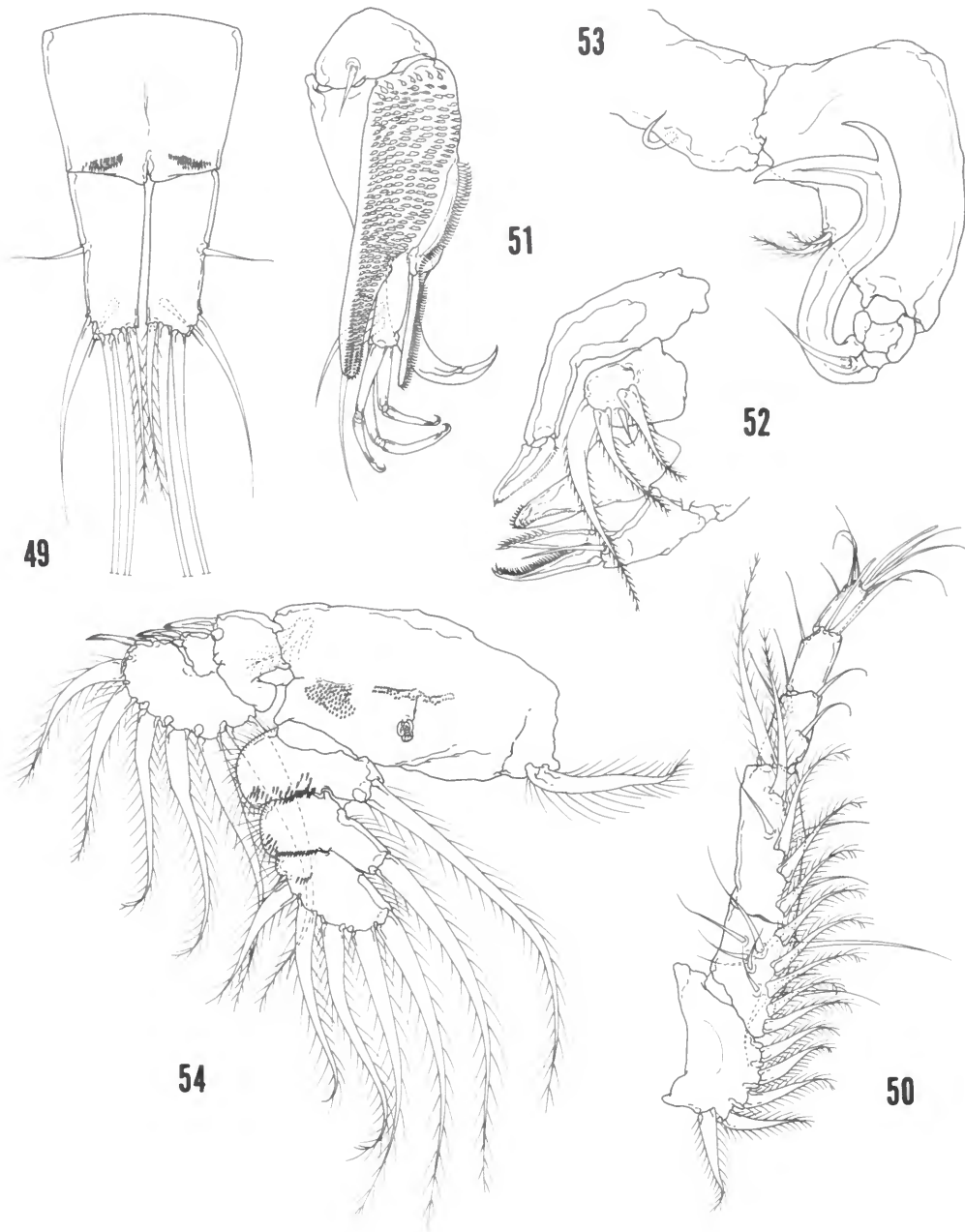
FIGURES 35-39.—*Holobomolochus crevalleus*, new species, female: 35, dorsal; 36, genital segment and abdomen, dorsal; 37, last abdominal segment and caudal rami, ventral; 38, first antenna; 39, second antenna.



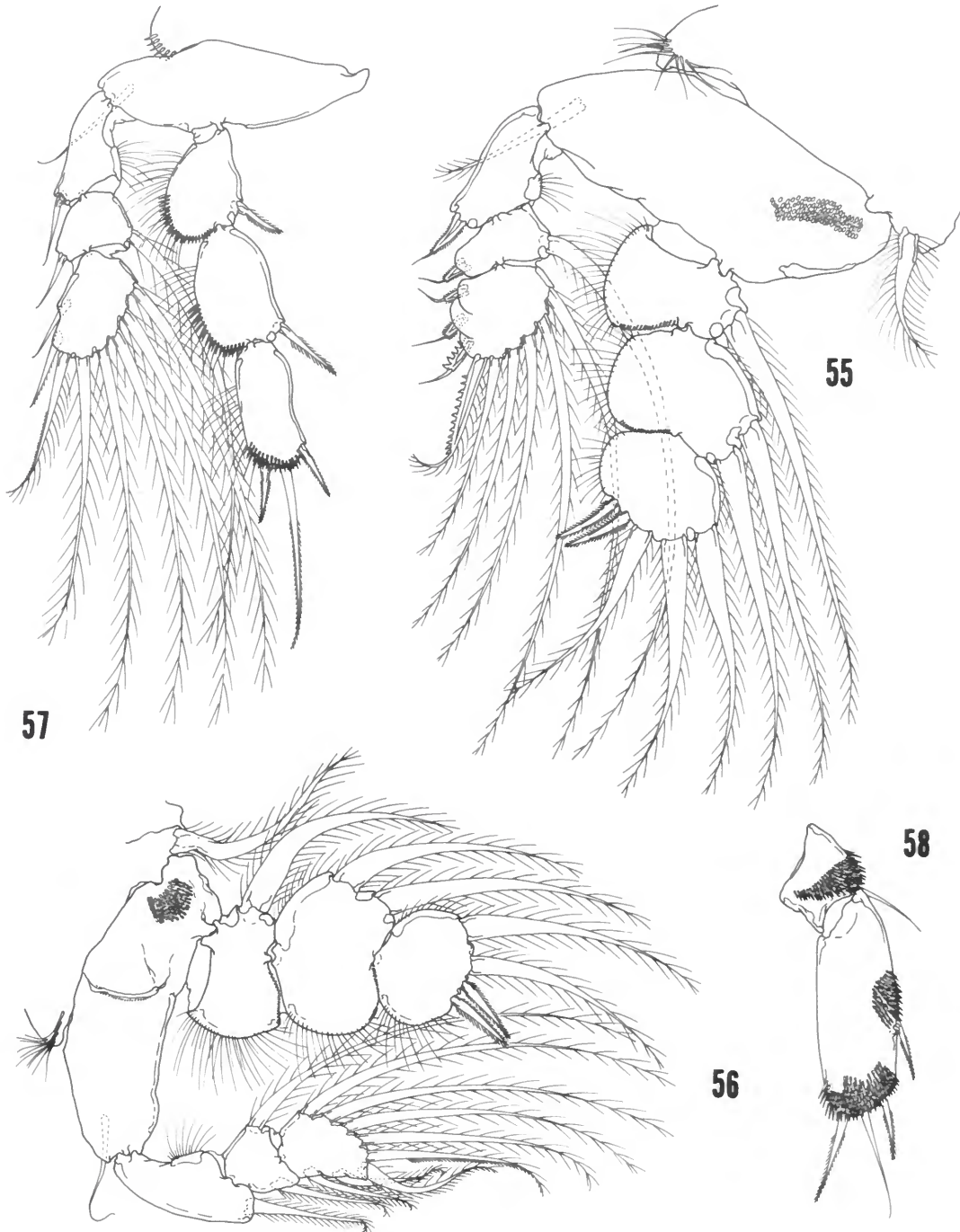
FIGURES 40-43.—*Holobomolochus crevalleus*, new species, female: 40, oral area; 41, maxilliped; 42, leg 1; 43, leg 2.



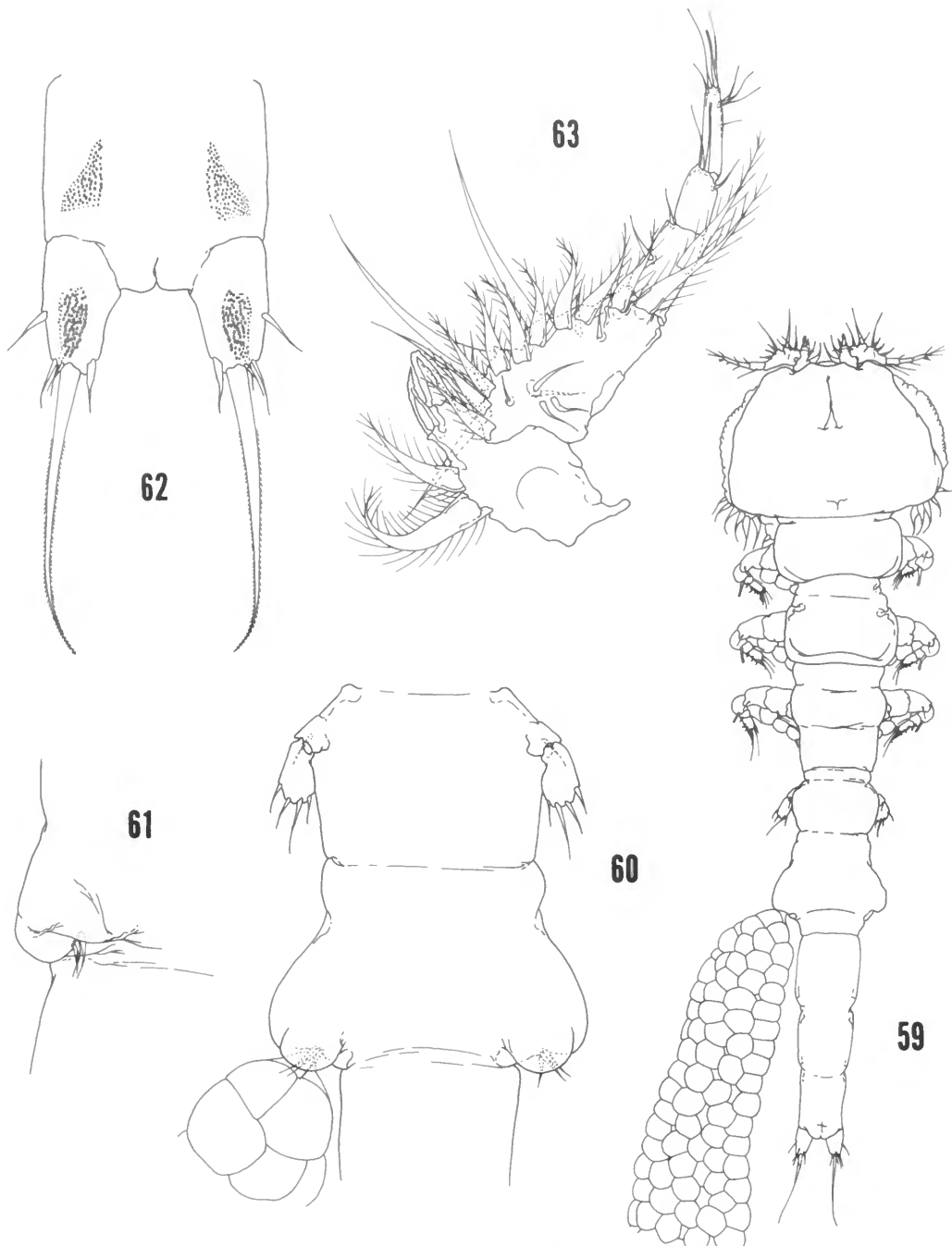
FIGURES 44-48.—*Holobomolochus crevalleus*, new species, female: 44, leg 3; 45, leg 4; 46, leg 5. *Holobomolochus serratus*, new species, female: 47, dorsal; 48, genital segment and abdomen, dorsal.



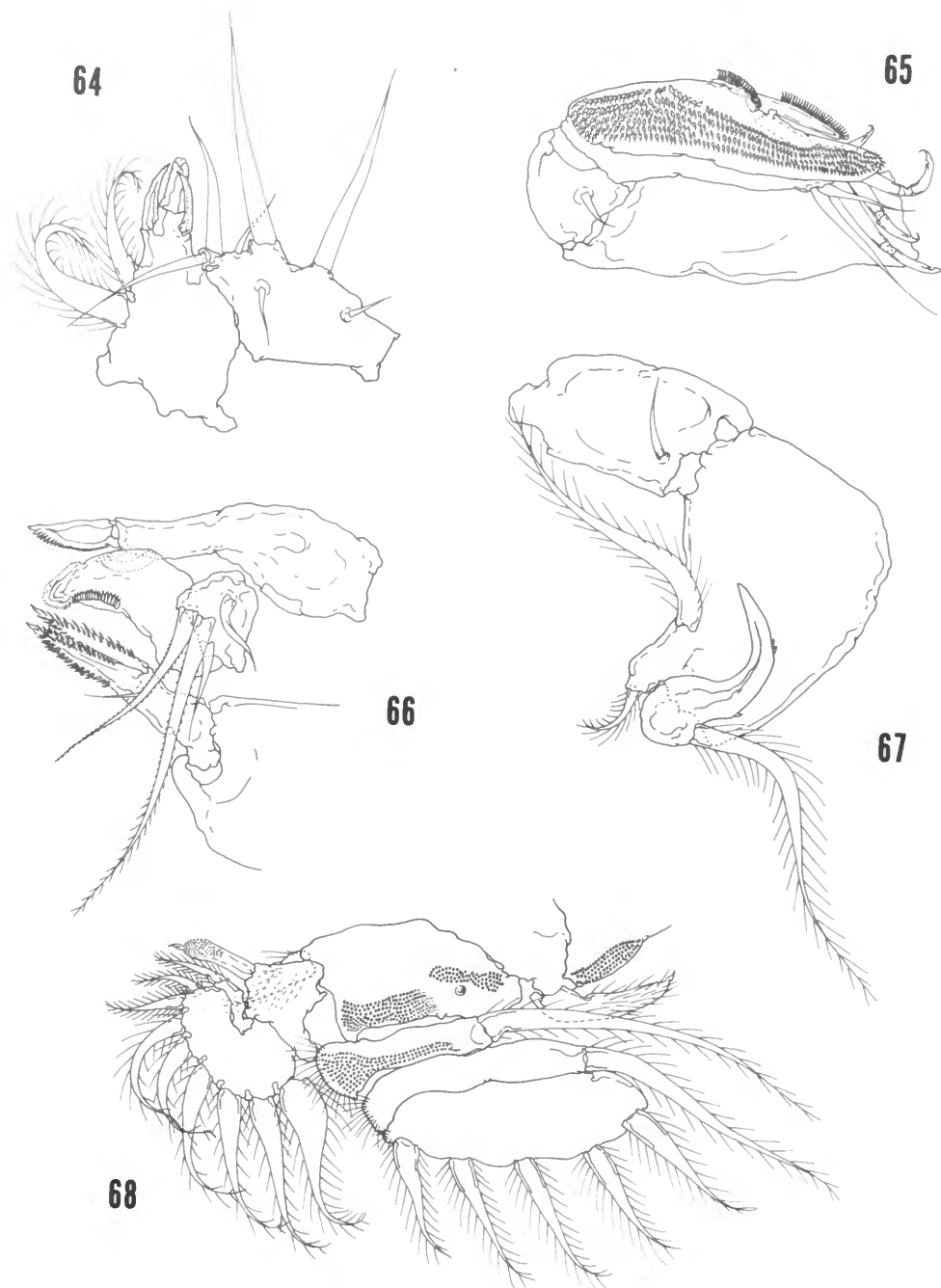
FIGURES 49-54.—*Holobomolochus serratus*, new species, female: 49, last abdominal segment and caudal rami, ventral; 50, first antenna; 51, second antenna; 52, mandible, paragnath, first and second maxillae; 53, maxilliped; 54, leg 1.



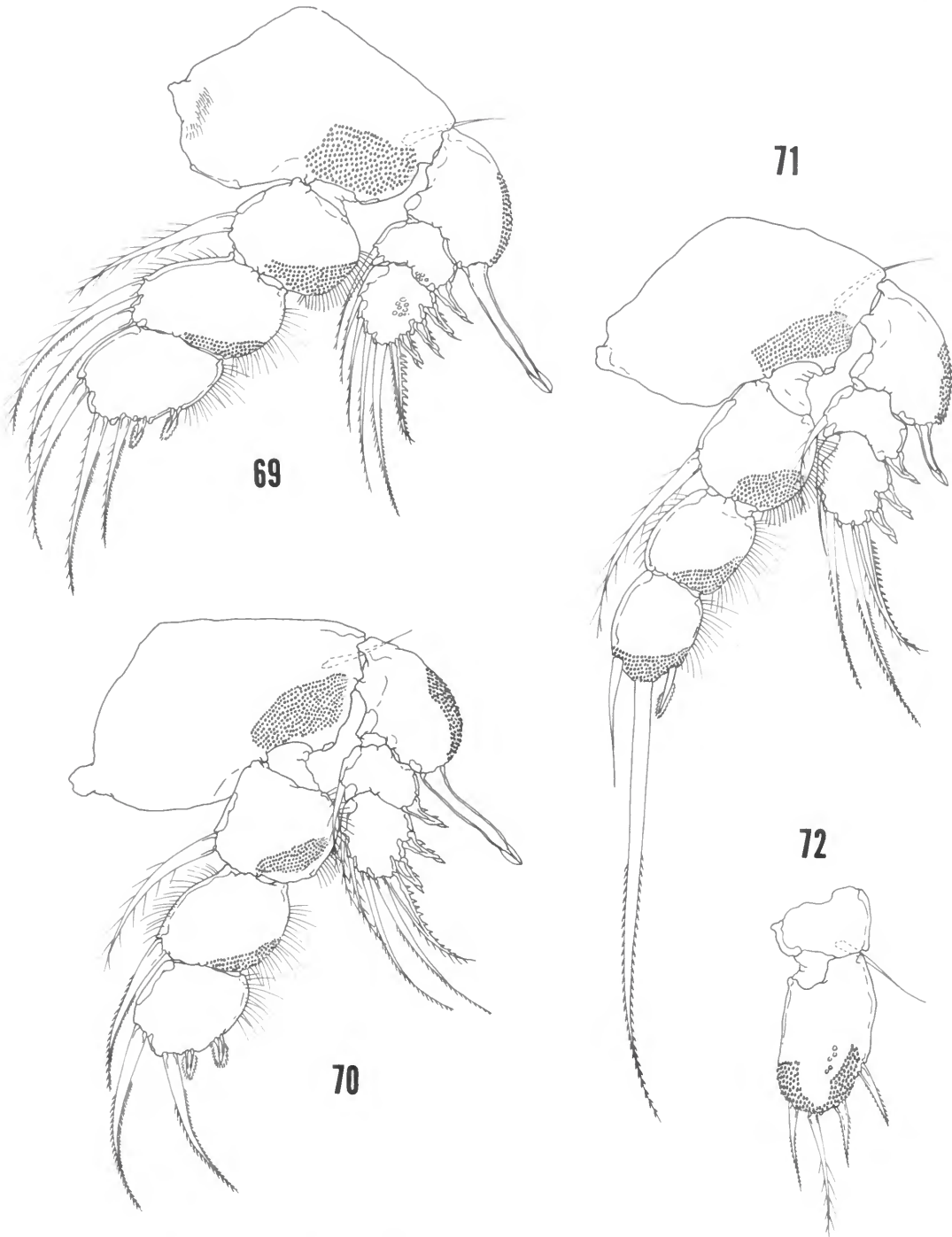
FIGURES 55-58.—*Holobomolochus serratus*, new species, female: 55, leg 2; 56, leg 3; 57, leg 4; 58, leg 5.



FIGURES 59-63.—*Neobomolochus elongatus*, new species, female: 59, dorsal; 60, genital segment, ventral; 61, area of egg sac attachment, dorsal; 62, last abdominal segment and caudal rami, ventral; 63, first antenna.



FIGURES 64-68.—*Neobomolochus elongatus*, new species, female: 64, base of first antenna; 65, second antenna; 66, mandible, paragnath, first and second maxillae; 67, maxilliped; 68, leg 1.



FIGURES 69-72.—*Neobomolochus elongatus*, new species, female: 69, leg 2; 70, leg 3; 71, leg 4; 72, leg 5.

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