

Cypridinidae of the Continental
Shelves of Southeastern North
America, the Northern Gulf of
Mexico, and the West Indies
(Ostracoda: Myodocopina)

LOUIS S. KORNICKER

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Cypridinidae of the Continental Shelves
of Southeastern North America,
the Northern Gulf of Mexico, and
the West Indies (Ostracoda: Myodocopina)

Louis S. Kornicker



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ABSTRACT

Kornicker, Louis S. Cypridinidae of the Continental Shelves of Southeastern North America, the Northern Gulf of Mexico, and the West Indies (Ostracoda: Myodocopina). *Smithsonian Contributions to Zoology*, number 401, 37 pages, 17 figures, 2 maps, 1 table, 1984.—Study of the Cypridinidae, comprising the genera *Vargula* with 4 species (1 new), *Skogsbergia* with 1 species, *Pterocypridina* with 1 species, and *Paracypridina* with 1 species (new), on the continental shelves of southeastern North America, the northern Gulf of Mexico, and the West Indies. The new species and the previously known species are described and illustrated. Keys are given for genera of Cypridinidae and for species of *Vargula* in the study area. Distribution is discussed, shown on 2 maps, and listed in 1 table.

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Cypridinidae of the Continental Shelves of Southeastern North America, the Northern Gulf of Mexico, and the West Indies (Ostracoda: Myodocopina)

Louis S. Kornicker

Introduction

This work concerns the Cypridinidae living on the continental shelves of southeastern North America, the northern half of the Gulf of Mexico, and the West Indies. It also includes a few localities in Central America in order to show the range of one of the species (*Skogsbergia lernerii*), but does not describe new species from that region. A few specimens collected off southwest Greenland are identified at the generic level.

The study includes discussions of species of Cypridinidae previously reported from the study area, as well as those contained in new collections. Four genera and 7 species (2 new) are known from the study area. Keys are constructed for the genera in the study area and for the species of the genus *Vargula*.

DISPOSITION OF SPECIMENS.—Most of the specimens have been deposited at the National Museum of Natural History, Smithsonian Institution; some have been given USNM numbers in the text. The disposition of other specimens is given in the text in "Station Data and Specimens Examined."

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ACKNOWLEDGMENTS.—Credits are given in the "Station Data and Specimens Examined" to the individuals and institutions who have contributed specimens used in this study. Many collections were made possible by funds granted to the various institutions by the U.S. Bureau of Land Management. Specimens obtained from the Mote Marine Laboratory were collected mostly under Bureau of Land Management Contract No. AA851-CTO-50. I deeply appreciate the opportunity to examine the collections.

I thank the following people for their help: Carolyn Gast for rendering the shaded drawings of the carapace; Kathryn Schroeder Brown for assisting in preparation and inking of appendage drawings; I.G. Sohn for reviewing the manuscript; and Joan Horn for final editing and preparation of the manuscript for publication.

Station Data and Specimens Examined

(Listed in geographic order from north to south, east to west.)

GREENLAND UPPER SLOPE

R/V *Vema*; Collected by personnel of the Lamont-Doherty Geological Observatory of Columbia University, Palisades, New York. All sam-

ples collected with small bottom trawl on Cruise 16.

- Sta V-16-48; Aug 1960; 60°10'N, 47°08'W; 300 m.
Vargula species indeterminate: 1 instar I (USNM 193093).
- Sta V-16-50; Aug 1960; 60°47'30"N, 45°37'36"W; 412 m.
Vargula species: 1 A-I male (USNM 193092A), 1 A-I ♀female (USNM 193092B).

NORTH CAROLINA CONTINENTAL SHELF

Beaufort Shelf Transect (BST); collected off Beaufort by Dr. John H. Day.

- BST 115; 28 Jun 1965; 34°23'30"N, 75°52'30"W; 160 m; shelly sand; sediment temperature 14°C; 10 minute trawl 30 inches (76 cm) wide.
Vargula magna: 1 adult female (USNM 156795, holotype).
- BST 121; 28 June 1965; 34°24'N, 75°49'W; 200 m; sediment temperature 15.5°C; 10 minute trawl 30 inches (76 cm) wide.
Vargula magna: 1 specimen (either adult or A-I female) (USNM 156794).
- BST 289; 8 Jan 1966; 34°20'N, 75°54'30"W; 202 m; sediment median grain size 0.350 mm; 10 minute trawl 30 inches (76 cm) wide.
Vargula magna: 3 juveniles (USNM 156787).

DRY TORTUGAS, FLORIDA

Specimens collected by W. L. Schmitt.

- Beach, Tortugas; 21 Jul 1924; depth unknown.
Vargula species indeterminate: 2 juveniles (USNM 158395A,B) (intense blue-green luminescence according to collector).
- Sta 33-30; 26 Jul 1930; west side of Loggerhead Key; 3 or 4 m; broken up *Porites* clump.
Skogsbergia lernerii: 1 female (USNM 88855), 1 male (USNM 88860).
- Sta 47-30; 8 Aug 1930; channel east and south of Loggerhead Key; 18-20 m; 30 foot (9 m) otter trawl.
Skogsbergia lernerii: 1 female (USNM 88862).
- No station number; 26 Jun 1931; west side of Loggerhead Key; specimen from cracked up rock.
Skogsbergia lernerii: 1 specimen (USNM 88861).

WEST FLORIDA CONTINENTAL SHELF

Bureau of Land Management Continental Shelf Study in Gulf of Mexico; collections from the

Gulf Coast Research Laboratory, Ocean Springs, Mississippi; received from Dr. Richard W. Heard.

- Transect II, west of middle part of Florida peninsula.
 Sta 2207; Nov 1977; 27°57'00.4"N, 83°09'00.3"W; 17 m.
Pterocypridina sex: 1 ovigerous female (USNM 193073).
- Transect VI, south of west end of Florida.
 Sta 2645; 2 Feb 1978; 29°35'00.5"N, 87°20'02.2"W; 106 m.
Vargula magna: 1 ovigerous female (USNM 193071).
- Transect VIII, west of middle part of Florida peninsula.
 Sta 2748; 9 Aug 1977; 27°37'12"N, 83°53'30"W; 50 m.
Paracypridina floridaensis: 1 ovigerous female (USNM 193074).
- Transect IX, west of southern tip of Florida peninsula.
 Sta 2959; 1977 or 1978; 25°40'N, 83°05'W; 60 m.
Vargula species indeterminate: 1 juvenile (USNM 193072).
Paracypridina floridaensis: 2 juveniles (USNM 193075).

Bureau of Land Management Southwest Florida Continental Shelf Study. Specimens collected by, and returned to, James K. Cutler, Mote Marine Laboratory, Sarasota, Florida, except those given USNM collection numbers, which are retained at the National Museum of Natural History, Smithsonian Institution. All samples collected from a soft substrate with unseld spade corer.

- Sta 5; 1 May 1981; 26°45'42"N, 84°00'08"W; depth 90.8 m.
Skogsbergia lernerii: 1 specimen.
Vargula species indeterminate: 1 instar I (USNM 193030).
Paracypridina floridaensis: 1 ovigerous female (USNM 193015).
- Sta 16; ? May 1981; 25°45'42"N, 83°11'04"W; depth 53.9 m.
Paracypridina floridaensis: 1 adult female (USNM 193016); plus 5 specimens.
- Sta 18; 15 Nov 1980; 25°45'37"N, 83°42'13"W; depth 86.6 m.
Paracypridina floridaensis: 1 ovigerous female (USNM 15860).
- Sta 18; ? May 1981.
Paracypridina floridaensis: 3 specimens.
Vargula species: 1 adult male (USNM 193023); 1 instar III (USNM 193019).
- Sta 20; 27 May 1980; 25°17'20"N, 82°09'44"W; depth 22.5 m.
Pterocypridina sex: 1 ovigerous female (USNM 193017); plus 3 specimens.

Sta 22; 17 Nov 1980; 25°17'11"N, 83°02'04"W; depth 52.7 m.

Paracypridina floridaensis: 1 specimen.

Sta 24; 25 Apr 1981; 25°16'54"N, 83°43'11"W; depth 88.4 m.

Skogsbergia leneri: 1 ovigerous female (USNM 193021); 1 adult female plus 2 juveniles.

LOUISIANA CONTINENTAL SHELF

Sonnier Bank vicinity (previously known as Three Hickey Rock); 28°21'N, 92°27'W; collected by Walter B. Sikora, Texas A&M University.

Sta THR-3; 20 Jun 1977; 61 m.

Skogsbergia leneri: 1 ovigerous female (USNM 158302).

Vargula species indeterminate: 1 juvenile (USNM 193018).

TEXAS CONTINENTAL SHELF

East Flower Garden vicinity; off Galveston; 27°53'N, 93°38'W; collected by Walker B. Sikora, Texas A&M University.

Sta EFG-2; 16 Jun 1977; ½ mile (0.8 km) upstream of East Flower Garden; 119 m.

Skogsbergia leneri: 1 ovigerous female (USNM 158303); 1 ovigerous female and 1 juvenile returned to Dr. Linda Pequegnat, Texas A&M University.

Sta EFG-4; 15 Mar 1978; 1 mile (1.6 km) downstream of East Flower Garden; 103 m.

Vargula species indeterminate: 1 juvenile (lost).

Shelf off Galveston, R/V *Gyre* (Texas A&M University); 1974; collected by David Gettleston.

Cruise 10.

Sta 16; 18 June 1974; 28°10'N, 94°18'W; 53.5 m.

Skogsbergia leneri: 1 adult male (USNM 158243), 2 juveniles (USNM 158299, 158300).

Cruise 11.

Sta 11; 30 June 1974; 28°22'12"N, 93°49'30"W; 52 m.

Skogsbergia leneri: 1 ovigerous female (USNM 158181).

Bureau of Land Management South Texas Outer Continental Shelf Study; University of Texas Marine Science Institute's benthic ecology group; collected aboard R/V *Loughorn* by University of Texas Marine Science Institute personnel. Received from Richard D. Kalke. Six replicates of each sample were collected using a

Smith-McIntyre bottom grab (0.1 m²); replicates have been lumped together in list below. See Flint (1981, fig. 1) for map showing station localities.

Transect I, south of Port O'Connor.

Sta 5; 14 Feb 1977; 27°39'N, 96°12'W; depth 82 m.

Skogsbergia leneri: 1 specimen.

Transect II, off Port Aransas.

Sta 2; 9 Dec 1976; 27°30'N, 96°45'W; depth 49 m.

Skogsbergia leneri: 1 specimen.

Sta 5; 9 Oct 1976; 27°24'N, 96°36'W; depth 78 m.

Skogsbergia leneri: 1 specimen.

Sta 5; 10 Feb 1977.

Skogsbergia leneri: 1 juvenile.

Sta 6; 27 Mar 1976; 27°24'N, 96°29'W; depth 98 m.

Skogsbergia leneri: 1 A-1 instar with larval chonistomatid in marsupium.

Sta 6; 17 Jul 1976.

Skogsbergia leneri: 1 ovigerous female with female chonistomatid in marsupium.

Sta 6; 28 Aug 1976.

Skogsbergia leneri: 2 specimens.

Sta 6; 2 Jun 1977.

Skogsbergia leneri: 5 specimens (1 with female chonistomatid in marsupium).

Transect III, off middle part of Padre Island.

Sta 2; 27 Jun 1976; 26°58'N, 96°48'W; depth 65 m.

Skogsbergia leneri: 1 specimen.

Transect IV, off Port Isabel.

Sta 3; 24 May 1977; 26°10'N, 96°24'W; depth 91 m.

Skogsbergia leneri: 1 juvenile.

Sta 6; 19 Sep 1976; 26°10'N, 96°31'W; depth 65 m.

Skogsbergia leneri: 2 specimens.

Sta 6; ? Feb 1976.

Skogsbergia leneri: 1 specimen.

Sta 7; 24 May 1977; 26°10'N, 96°20'W; depth 130 m.

Vargula species: 1 adult male (USNM 193022).

Transect HR, on soft bottom adjacent to Hospital Rock (hard bottom).

Sta 3; 5 Sep 1976; 27°32'05"N, 96°27'35"W; depth 81 m.

Skogsbergia leneri: 2 specimens.

Sta 4; 12 1976; 27°33'02"N, 96°29'03"W; depth 76 m.

Skogsbergia leneri: 1 specimen.

Sta 4; 27 Aug 1976.

Skogsbergia leneri: 1 specimen.

Sta 4; 10 Dec 1976.

Skogsbergia leneri: 1 ovigerous female + 1 adult female (USNM 193028).

Transect SB, on soft bottom adjacent to Southern Bank (hard bottom).

Sta 1; 18 Jul 1976; 27°26'49"N, 96°31'18"W; depth 81 m.

- Skogsbergia lernerii*: 1 A-1 male, 1 juvenile
Sta 1; 9 Oct 1976.
Skogsbergia lernerii: 1 specimen.
Sta 2; 25 Mar 1976; 27°26'14"N, 96°31'02"W; depth
82 m.
Skogsbergia lernerii: 1 ovigerous female (USNM 193027).
Sta 2; 14 Feb 1977.
Skogsbergia lernerii: 2 specimens.

BAHAMA ISLANDS

San Salvador Island, dump reef, 22 Dec 1979;
about 4 m; small net drawn along bottom *Thal-*
assia bed; collected by Anne C. Cohen.

Skogsbergia lernerii: 1 juvenile (USNM 158404).

Bimini Islands, shallow water, 1956–1957; col-
lected by Louis S. Kornicker.

Skogsbergia lernerii: 1 juvenile (holotype).

JAMAICA

Montego Bay, 7 Jan 1950, off Fletcher Co. Lt'd
Pier; collected by E.N. Lund.

Skogsbergia lernerii: 8 specimens (USNM 90588).

Montego Bay, summer of 1910; collected by C.B.
Wilson (1913:268–270, pl. 53).

17 Jun, from the nasal tubes of a hammerhead shark
(*Sphyrna zygaena*).

Vargula parasitica: 12 specimens (USNM 43603) (not
types).

9 Jul, from the gills of 2 hammerhead sharks (*Sphyrna*
zygaena).

Vargula parasitica: 10+ specimens (USNM 43581); 30+
specimens (USNM 43586); 1 adult female (USNM
43508) (holotype); 2 males, 1 female (USNM 112672)
removed from USNM 43586 (see Harding,
1966:370). All types.

1 Aug, from the gills of a jack (*Caranx crysos*).

Vargula parasitica: 3 specimens (USNM 43604) (not
types).

9 Aug (publication), 10 Aug (label in vial), from the gills
of *Epinephelus adscensionis*.

Vargula parasitica: 1 specimen (USNM 43599) (not
type).

Montego Bay, 1910; collected by E. J. Lund
(1911:431, 449).

Vargula parasitica: 11 specimens (USNM 43872). These
specimens were reported by Lund (1911) as *Cypridina*

squamosa. According to label in vial identification was
by R.W. Sharpe.

Montego Bay, 27 Dec 1923; collected by E.N.
Harvey.

Vargula parasitica: 100+ specimens, most in alcohol
(USNM 78656). These are probably the specimens
referred to as "*Cypridina* (?)" by Harvey (1924:620;
1926, table 1).

PUERTO RICO

San Juan, May 1977; on beach; collected by Dr.
Beatrice M. Sweeney, who reported specimens
to be luminescent (received through Dr. Fred-
erick I. Tsuji, University of Southern California).

Vargula harveyi: 3 specimens (USNM 158360A,B).

ST. CROIX, U.S. VIRGIN ISLANDS

Buck Island Lagoon, 28 Nov 1980; plankton net
drawn through water over coral reefs; collected
by J.G. Morin.

Vial 1; 0–3 m depth; 1830–1930 hours.

Vargula bullae: 1 adult male (USNM 157887); 15 adult
males (USNM 157888).

Vial 2; 0–3 m depth; 1830–1930 hours.

Vargula bullae: 16 adult males (USNM 157889).

Vial 3; 2 m depth; 1830–1845 hours.

Vargula bullae: 1 adult male (USNM 157884); 4 adult
males (USNM 157885A–D); 1 late juvenile (USNM
157886A); 4 adult males, 3 juveniles (USNM
157886B); 1 late juvenile (USNM 157886C).

Buck Island, winter 1980–1981; plankton net
towed over an area of dead *Acropora cervicornis*
overgrown by algae and gorgonians; between 1
and 1½ hours after sunset; water depth 2 m;
collected by Eldredge Bermingham.

Vargula bullae: 1 adult female (USNM 157955A); 11
adult females (USNM 157955B); 1 adult male (USNM
157956A); 40 adult males (USNM 157956B); 2 A-1
females (USNM 157960); 13 juveniles (USNM
157958).

Skogsbergia lernerii: 1 adult male (USNM 157957).

Salt River Canyon, winter 1980–1981; 750-mi-
cron plankton net at sand-coral interface; water
depth 16.7 m; at 2015 hours collected by El-
dredge Bermingham.

Vargula bullae: 3 adult males (USNM 15794A-C), 16 adult males (USNM 157954D).

Tague Bay, 3-8 Jun 1981; fore reef or outer face of barrier reef enclosing Tague Bay on St. Croix; collected by pushing a 78 cm², 0.333 mm mesh net throughout the water column for 10 minutes (sampling about 102 m³ of water) over sand/cobble substratum adjacent to the reef face; bottom depths 7-10 m; collected by James R. Chess.

Ser. 10; 3 Jun 1981; 2005 hours.

Vargula bullae: 7 adult males (USNM 158878).

Outer reef; 8 Jun 1981; 0053 hours, bottom at 9 m.

Vargula bullae: 1 adult male (USNM 158883)

Ser. 15; 8 Jun 1981; 2005 hours.

Vargula bullae: 1 juvenile (USNM 158881).

PANAMA

San Blas Islands, 5 Feb 1983; near Porvenir using small net above reef (mostly mixed *Agaricia*); water depth 2-3 m; just after 8:00 p.m.; collected by James G. Morin.

Skogsbergia lernerii: 1 adult female (USNM 193024); 1 specimen (USNM 193025).

Distribution

Vargula magna and *Pterocypridina sex* live on the shelf of North Carolina. The latter species also

lives on the South Carolina, and eastern and western Florida shelves. *Paracypridina floridaensis* and *V. magna* live on the West Florida shelf. *Skogsbergia lernerii* is widespread in the Gulf of Mexico and the West Indies and has been reported from Belize (Cohen, 1983:235). *Vargula harveyi* lives in the vicinity of Little Inagua Island, Bahamas (Felder, 1982:222), Jamaica, and Puerto Rico. *Vargula bullae* lives in the vicinity of St. Thomas and St. John (Poulsen, 1962:186) and St. Croix, all in the Virgin Islands. *Vargula parasitica* has been reported only from Montego Bay, Jamaica, where it was collected free living as well as in the gills of sharks (Lund, 1911:431, 449; Wilson, 1913:269). Except those species south of 24°S, the distribution of species discussed herein are shown in Maps 1 and 2, and in Table 1. These include previously reported localities, as well as new localities.

CYPRIDINIDAE Baird, 1850

This family is comprised of 23 genera, of which 4 are represented in the study area: *Paracypridina* Poulsen (1962:245), *Pterocypridina* Poulsen (1962:234), *Skogsbergia* Poulsen (1962:162), and *Vargula* Skogsberg (1920:245). Another genus, *Metavargula* Kornicker (1970:2), has been reported from bathyal depth (1000-1200 m) in the Gulf of Mexico (Kornicker, 1968:442).

Key to Genera of Cypridinidae in the Study Area

- 1. No furcal claws fused to lamella *Paracypridina*
 Furcal claws 2 or 2 and 4 fused to lamella 2
- 2. Upper lip with long tusks *Vargula*
 Upper lip without long tusks 3
- 3. Furcal claw 2 fused to lamella *Skogsbergia*
 Furcal claws 2 and 4 fused to lamella *Pterocypridina*

Paracypridina Poulsen, 1962

TYPE-SPECIES.—*Paracypridina aberrata* Poulsen, 1962:245. Monotypy.

This genus was proposed by Poulsen (1962:245) for a single species *P. aberrata* col-

lected off New Zealand at a depth of about 130 m. A new species, *P. floridaensis*, collected in the Gulf of Mexico is referred to the genus herein. Poulsen proposed the new genus for *P. aberrata* because of the unusual sensory bristle on the 5th joint of the 1st antenna. The new species *P.*

floridaensis has a sensory bristle that differs somewhat from that of *P. aberrata* in not having marginal spines on the short proximal filaments, and in the 3 distal filaments being much longer. Because the relative position of long and short filaments on the sensory bristle are similar in both species, I refer the new species to *Paracypridina*.

DISTRIBUTION.—New Zealand and Gulf of Mexico. Depth range 50–130 m.

***Paracypridina floridaensis*, new species**

FIGURES 1–3

ETYMOLOGY.—The specific name from Flor-

ida on whose continental shelf the holotype was collected.

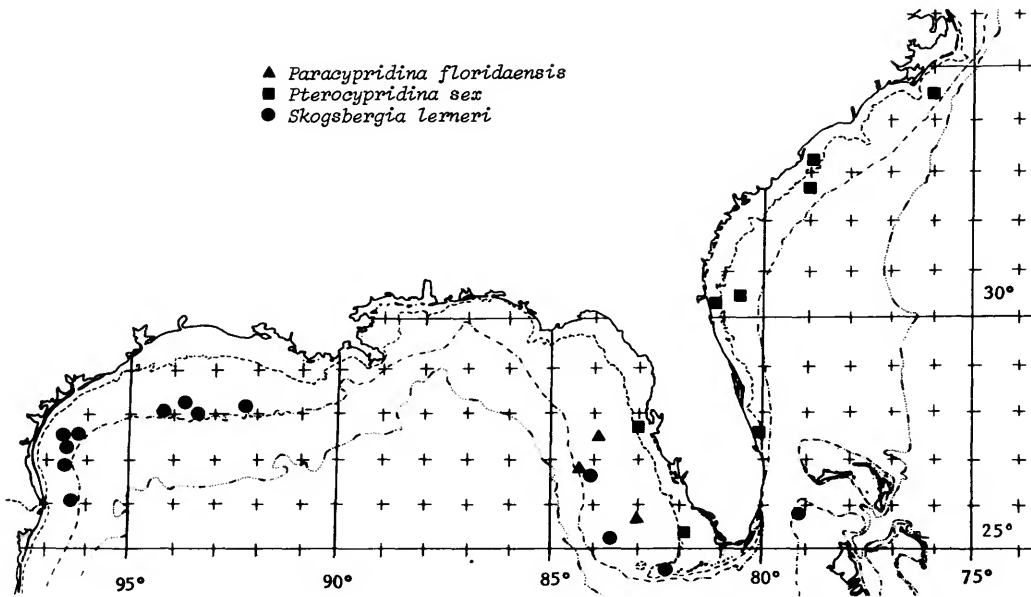
HOLOTYPE.—USNM 158600, adult female on slides and in alcohol.

TYPE-LOCALITY.—Sta 18, continental shelf off western Florida; 25°45'37"N, 80°42'13"W; depth 86.6 m.

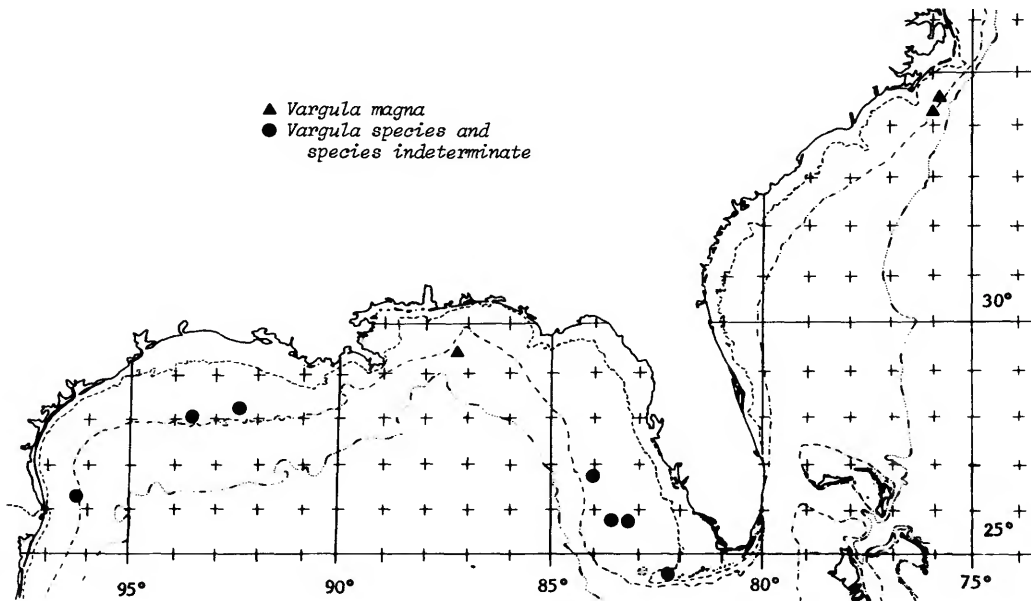
PARATYPES.—West Florida shelf: sta 5, USNM 193015, 1 ovigerous female; sta 16, 5 juveniles returned to Mote Marine Laboratory and USNM 193016, 1 adult female; sta 18, 2 juveniles and 1 ovigerous female returned to Mote Marine Laboratory, and USNM 158600, 1 ovigerous female; sta 22, 1 juvenile returned to Mote Marine Laboratory; Transect VIII, sta 2748, USNM 193074, 1 ovigerous female; Transect

TABLE 1.—Distribution and known depth range (m) of the Cypridinidae on the continental shelves of southeastern North America, the Gulf of Mexico, the West Indies, and Central America (dash indicates not collected; question mark indicates collected but depth unknown).

Locality	<i>Paracypridina floridaensis</i>	<i>Pterocypridina sex</i>	<i>Skogsbergia lernerii</i>	<i>Vargula</i>			
				<i>parasitica</i>	<i>bullae</i>	<i>harveyi</i>	<i>magna</i>
NORTH ATLANTIC							
North Carolina	—	40	—	—	—	—	160–202
South Carolina	—	22	—	—	—	—	—
Florida	—	5.5–39	—	—	—	—	—
GULF OF MEXICO							
Dry Tortugas	—	—	intertidal to 20	—	—	—	—
West Florida	50–90.8	17–22.5	88.4–90.8	—	—	—	106
Louisiana							
Sonnier Bank vicinity	—	—	61	—	—	—	—
Texas							
East Flower Garden vicinity	—	—	119	—	—	—	—
Off Galveston	—	—	52–53.5	—	—	—	—
South Texas	—	—	49–125	—	—	—	—
WEST INDIES							
Bahama Islands	—	—	shallow to 4	—	—	beach	—
Jamaica	—	—	?	?	—	beach	—
Puerto Rico	—	—	—	—	—	beach	—
Virgin Islands	—	—	2–38	—	0–45	—	—
CENTRAL AMERICA							
Belize	—	—	2–3	—	—	—	—
Panama	—	—	2–3	—	—	—	—



MAPS 1 AND 2.—Distribution of Cypridinidae on the continental shelves of southeastern North America and the Gulf of Mexico: 1 (above), *Paracypridina floridaensis*, *Pterocypridina sex*, and *Skogsbergia lemeri*; 2 (below), species of *Vargula*. (See Station Data and Table 1 for distribution in West Indies and Central America. Some closely spaced stations are represented by a single symbol. Depth contours represent 10, 100, and 1000 fathoms.)



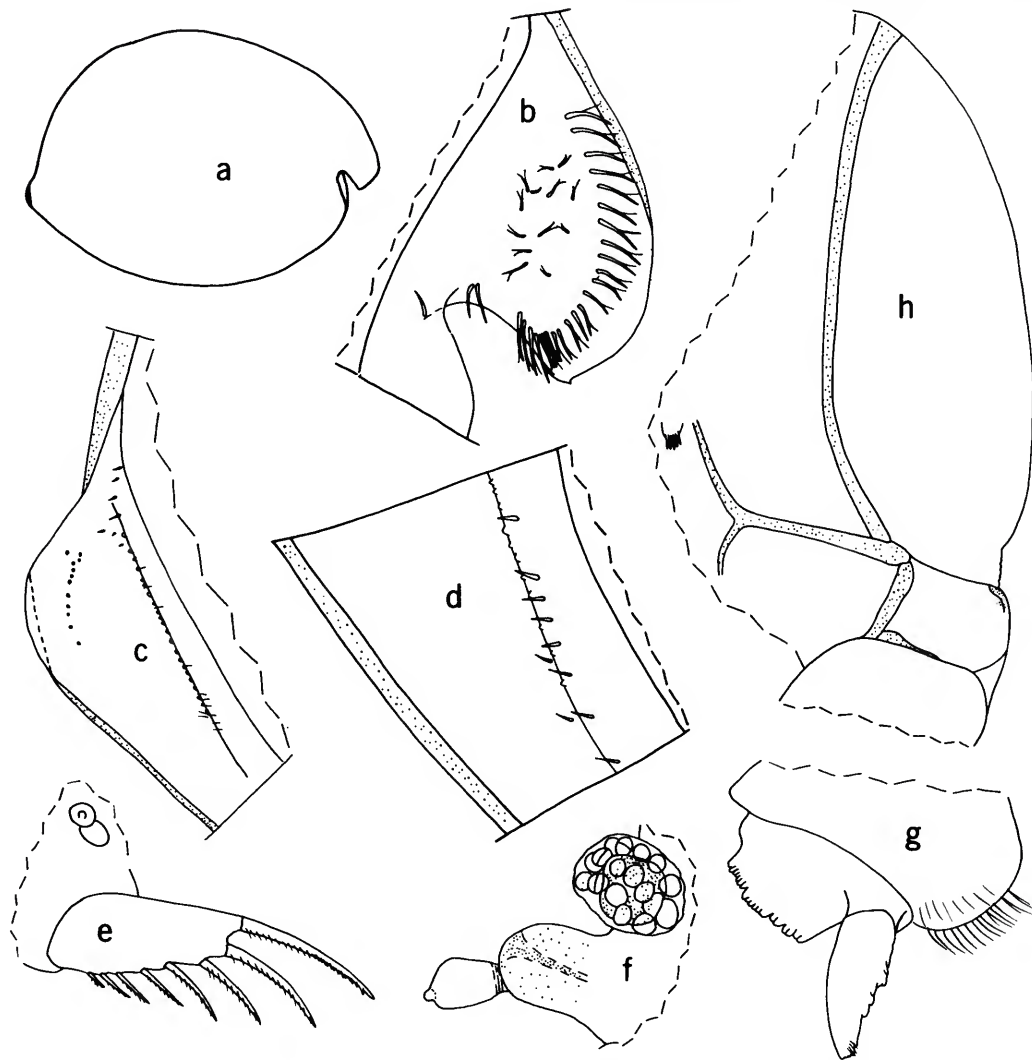


FIGURE 1.—*Paracypridina floridaensis*, new species, USNM 158600, holotype, ovigerous female, length 3.07 mm; *a*, lateral outline of complete specimen; *b*, inside view of rostrum and incisor, left valve; *c*, inside view of caudal process, left valve; *d*, detail from *c* of lower part of caudal process showing minute bristles in vicinity of list; *e*, right side of body showing right lamella of furca and right genitalia with attached spermatophore; *f*, left lateral eye, medial eye, and bellonci organ; *g*, upper lip, anterior to left; *h*, posterior of body showing brush-like organ, Y-sclerite, girdle, and sclerites leading to furca.

1X, sta 2959, USNM 193075, 2 juveniles.

DISTRIBUTION.—West Florida continental shelf (Map 1). Known depth range 50–91 m.

DIAGNOSIS (Female).—Carapace ovoid in lateral view and with small caudal process (Figure

1*a*). Length of carapace 2.87–3.27 mm.

First Antenna (Figure 2*a*): Sensory bristle of 5th joint with 7 short bare proximal filaments followed by 3 long stout filaments, 2 short filaments, and bifurcate tip.

Second Antenna: Endopodite 2-jointed (Figure 2*b*): 1st joint with 4 anterior bristles (1 long, 3 short) and 1 ventral bristle; 2nd joint minute, with long filament.

Seventh Limb (Figure 3*c-e*): With about 23 bristles; terminus complex with dorsal jaw and curved process inside comb.

Furca (Figure 1*e*): Each lamella with 8 claws, all separated from lamella by suture.

Eyes: Lateral eye well developed, with black pigment and about 17 ommatidia.

Upper Lip (Figure 1*g*): With anterior unpaired part fairly large; long tusks with step-like posterior margins.

DESCRIPTION OF ADULT FEMALE (Figures 1–3).—Carapace oval in lateral view, with small but distinct caudal process (Figure 1*a*); surface with faint imbricate structure especially visible when viewed with transmitted light; anterior edge of rostrum rounded and with minute projection at ventral corner (Figure 1*b*); outer surface of caudal process with linear edge slightly anterior to tip (Figure 1*a,c*); imbricate surface ornamentation not present on caudal process posterior to linear edge. Rostrum without lateral projection as on *Paracypridina aberrata*.

Pores: Surface of valve with scattered pores, each bearing bristle.

Infold: Rostral infold with about 25 divided bristles forming row paralleling edge of rostrum (Figure 1*b*); about 13–16 divide bristles, some smaller than those forming outer row, present near middle of rostral infold; 2 bristles present on rostral infold near inner edge of incisur (Figure 1*b*). Anteroventral infold with 1 small bristle just below inner end of incisur followed by space and then row of divided bristles along narrow list; ventral infold with small bristles along narrow list (total of about 100 bristles along anteroventral and ventral list); about 6 bristles present on anteroventral infold proximal to list; about 10 bristles present proximal to ventral list; 2 bristles present between list and shell edge in posterior part of ventral infold just ventral to caudal process. List of caudal process similar on both valves, with minute processes and small

bristles (Figure 1*c,d*). Pores present between list and posterior edge of caudal process (Figure 1*c*).

Selvae: Broad striated lamella prolongation with smooth outer edge present along ventral margin of incisur; narrow lamella prolongation along anteroventral and ventral margins of valve; selvae along anterior margin of rostrum about $\frac{1}{3}$ width of prolongation along ventral margin of incisur; selvae becoming narrower along anterodorsal margin of valve.

Calcareous Nodules: USNM 158600 with numerous calcareous nodules in shells.

Size: USNM 158600 (holotype), length 3.07 mm, height 2.19 mm; USNM 193015, length 3.27 mm, height 2.24 mm; USNM 193016, length 3.00 mm, height 2.17 mm; paratype from station 18, length 2.90 mm, height 2.19 mm; USNM 193074, length 2.87 mm, height 2.10 mm.

First Antenna (Figure 2*a*): 1st joint bare, 2nd joint with abundant short medial spines forming rows, 3rd joint with few, minute, medial spines and 2 spinous bristles (1 ventral, 1 dorsal). 4th joint with spines along ventral margin and 2 short spinous terminal bristles (1 ventral, 1 dorsal). Sensory bristle of 5th joint with 7 short bare proximal filaments followed by 3 long stout filaments, 2 short filaments, and bifurcate tip; tips of stems and short filaments with minute spine, tips of long filaments with blunt tips. 6th joint with short medial bristles with faint marginal spines. 7th joint: a-bristle longer than bristle of 6th joint, with marginal spines; b-bristle about $\frac{1}{3}$ longer than bristle of 6th joint, with 3 short marginal filaments; c-bristle about 4 times length of b-bristle, with 8 marginal filaments and bifurcate tip (some filaments with marginal spines; distal filaments longer than proximal filaments). 8th joint: d- and e-bristles about same length as sensory bristle of 5th joint, bare with blunt tips; f-bristle longer than d-bristle, about same length as c-bristle, with 10 marginal filaments and bifurcate tip (some filaments with marginal spines); g-bristle longer than f-bristle, with 10 or 11 marginal filaments and bifurcate tip, some filaments with marginal spines.





FIGURE 3.—*Paracypridina floridaensis*, new species, USNM 158600, holotype, ovigerous female, length 3.07 mm: *a*, left mandible, medial view; *b*, left 6th limb, medial view; *c*, tip of 7th limb; *d*, tip of 7th limb with some comb teeth left out; *e*, comb of 7th limb.

Second Antenna (Figure 2*b*): Protopodite with short medial bristle. Endopodite 2-jointed: 1st joint with 4 anterior bristles (1 long, 3 short) and 1 ventral bristle about same length as longest of

FIGURE 2.—*Paracypridina floridaensis*, new species, USNM 158600, holotype, ovigerous female, length 3.07 mm: *a*, left 1st antenna, medial view; *b*, right 2nd antenna showing distal part of propodite, endopodite, and part of 1st joint of exopodite, medial view; *c*, left maxilla, not all bristles of end joint shown, lateral view; *d*, tip of right maxilla, medial view; *e*, part of right 5th limb and detail of process between 4th and 5th joints, anterior view; *f*, part of left 5th limb, posterior view.

anterior bristles; 2nd joint minute, with long filament with blunt tip. Exopodite: bristle of 2nd joint reaching well past 9th joint, with numerous ventral spines; bristles of joints 3–8 with natatory hairs, no spines; 9th joint with 3 bristles (1 long, 1 medium, 1 short), all with natatory hairs; joints 3–8 with basal spines increasing in size distally; spine of 8th joint about same length as 9th joint; 9th joint with short lateral spine.

Mandible (Figure 3*a*): Coxale endite spinous, terminating in 2 stout spines and short peg; small ringed bristle near base of endite. Basale: dorsal margin with 3 spinous bristles (1 distal to middle,

2 terminal); ventral margin with 2 a-bristles (1 long, 1 short), 1 short b-bristle close to a-bristle, 2 c-bristles (1 long, 1 short), and 2 spinous d-bristles (1 extremely long, other about $\frac{1}{4}$ length of long bristle); medial surface with long faint hairs. Exopodite about same length as dorsal margin of 1st endopodial joint, hirsute distally, with 2 subterminal bristles (distal of these almost $\frac{1}{2}$ length of other). 1st endopodial joint with 4 ventral bristles (2 long, 1 short, 1 minute). 2nd endopodial joint: ventral margin with distal bristles forming 3 or 4 groups (distal of these terminal, with 2 bristles; other groups with 1 bristle; medial bristle of terminal group unringed, finger-like); dorsal margin with 5 long spinous bristles, 3 distal medium spinous bristles, and 11 short, proximal, spinous bristles (distal 3 of these with longer and stouter spines than others). End joint with 3 short claws (2 pectinate) and 4 bristles.

Maxilla (Figure 2*c,d*): Coxale with fringe of long dorsal hairs and stout, hirsute, dorsal bristle. 1st endite with about 10 bristles, 2nd and 3rd endite each with about 6 bristles. Basale with 2 bristles near base of exopodite. Exopodite with 3 hirsute bristles (1 proximal, 2 terminal; inner terminal bristle with shorter marginal hairs than others). Endopodite: 1st joint with inner terminal tooth having 2 or 3 projections, dorsal margin with hairs forming rows, and with 2 alpha-bristles and 3 beta-bristles (outer beta-bristle pectinate); end joint with 4 spinous a-bristles (inner 2 with stout marginal spines, others with slender spines), 3 pectinate b-bristles, 1 small and 2 stout c-bristles, and 3 stout d-bristles.

Fifth Limb (Figure 2*e,f*): Prodopodite with long slender tooth with rounded tip. Endite I with 6 spinous bristles; endite II with 4 spinous bristles and 1 pectinate claw; endite III with total of 7 pectinate claws and spinous bristles. 1st exopodial joint with main tooth consisting of stout triangular peg and 6 pectinate teeth (Figure 2*f*); a spinous bristle proximal to peg; anterior side of joint with spinous proximal bristle near tooth of protopodite and 3 spinous bristles (all with long proximal hairs; inner bristle pectinate

distally). 2nd exopodial joint with proximal, spinous, anterior d-bristle, spinous posterior c-bristle, 4 strongly pectinate a-bristles, 2 pectinate b'-bristles, and 4 pectinate b''-bristles. 3rd exopodial joint: inner lobe with 3 bristles (proximal bristle hirsute, middle bristle with faint short hairs, distal bristle unringed, bare); outer lobe with 2 bristles bearing long proximal and short distal hairs. 4th and 5th exopodial joints fused, hirsute, with 5th joint projecting farther ventrally than 4th joint; 4th joint with 3 bristles; 5th joint with 2 bristles and small process bearing spines (Figure 2*e*).

Sixth Limb (Figure 3*b*): 4 or 5 bristles (2 or 3 short, bare, 2 long with long proximal hairs) in place of epipodial appendage. Endite I with 2 or 3 short, medial, hirsute bristles and 1 longer, terminal spinous bristle; endite II with 3 short, medial hirsute bristles and 2 longer, terminal, spinous bristles; endite III with 3 spinous terminal bristles. End joint with 4 spinous anterior bristles followed by a space and then 3 stout hirsute bristles; medial side hirsute; lateral side with stout spines along ventral margin.

Seventh Limb (Figure 3*c-e*): 6 distal bristles (with 1-6 distal bells) on ventral margin of comb; 5 or 6 bristles (with 3 bells) on ventral margin proximal to comb; 3 bristles (with 3-5 bells) projecting dorsally between base of comb and jaw; 7-9 bristles (with 3 bells) on dorsal side proximal to jaw. Comb consisting of 13 or 14 long, slightly curved teeth having 5 short, square-tipped teeth on each side. Jaw opposite comb sclerotized and with curved tip, transparent "vellum" with serrate edge extending inward from outer edge of distal curved part of jaw (in Figure 3*d* teeth have been omitted from comb to expose jaw and vellum). A second jaw-like process present within comb (Figure 3*d*) (process curved, forming hook); serrated transparent vellum extending inward from process.

Furca (Figure 1*e*): Each lamella with 8 claws, all separated from lamella by suture; each claw of right lamella anterior to same numbered claw of left lamella; claws decreasing in length and width posteriorly; all claws with teeth along pos-

terior margin; claws 1–4 with minute spines along anterior distal margin (not shown on illustrated lamella).

Bellonci Organ (Figure 1f): Ovoid with small terminal peg.

Eyes (Figure 1f): Medial eye bare with small distal area of brown pigment. Lateral eye similar in size to medial eye, with black pigment and about 17 ommatidia.

Upper Lip (Figure 1g): Anterior unpaired part with glandular openings on fairly large projecting processes; paired posterior part with long tusks with glandular openings at tip and on step-like posterior margin; posterior end of lip rounded, hirsute.

Genitalia (Figure 1e): Small round disc with attached spermatophore on each side of body anterior to furca.

Brush-like Organ (Figure 1h): Cluster of about 5 minute bristles on each side of body adjacent to tip of dorsal branch of Y-sclerite.

Y-Sclerite (Figure 1h): Typical for subfamily.

Posterior of Body (Figure 1h): Smoothly rounded, bare.

Eggs: USNM 158600 with 20 eggs in marsupium, eggs well developed and having lateral eyes containing about 8 black pigment spots.

COMPARISONS.—The new species is larger than *Paracypridina aberrata* (~3 mm in length compared to 1.91 mm), does not have lateral processes on the rostrum, and does not have furcal claw 2 fused to the lamella.

Pterocypridina Poulsen, 1962

TYPE-SPECIES.—*Pterocypridina excreta* Poulsen, 1962 (subsequent designation, Kornicker, 1975: 142).

COMPOSITION.—The genus contains 5 species, of which *P. sex* Kornicker, 1983, is in the study area.

DISTRIBUTION.—The genus has previously been reported from Thailand, Singapore, SE Australia, and the SE coast of North America (Poulsen, 1962, fig. 118; Kornicker, 1983:5).

The range is extended to the Gulf of Mexico herein (Map 1). Known depth range 5.5–90 m.

Pterocypridina sex Kornicker, 1983

FIGURE 4

Pterocypridina sex Kornicker, 1983:11, figs. 5–9.

HOLOTYPE.—USNM 157760, ovigerous female.

TYPE-LOCALITY.—North Atlantic off Jacksonville, Florida, 30°23'N, 80°26'W, depth 39 m.

MATERIAL.—See "Station Data and Specimens Examined."

DISTRIBUTION.—North Atlantic: continental shelf off North Carolina, South Carolina, and Florida. Gulf of Mexico: continental shelf off western Florida (Map 1). Known depth range 5.5–39 m.

DIAGNOSIS.—Carapace surface with well-developed punctae; caudal process small, triangular (Figure 4). Length of females 1.52–1.71 mm; of male 1.41 mm.

First Antenna: Sensory bristle of 5th joint with 5 long proximal filaments (a minute filament adjacent to each of 2 long proximal filaments), 2 short filaments with bases just distal to 5th proximal filament, and 1 small filament near tip.

Second Antenna: Endopodite with minute 2nd joint fused to 1st joint; 1st joint with 4 bristles (2

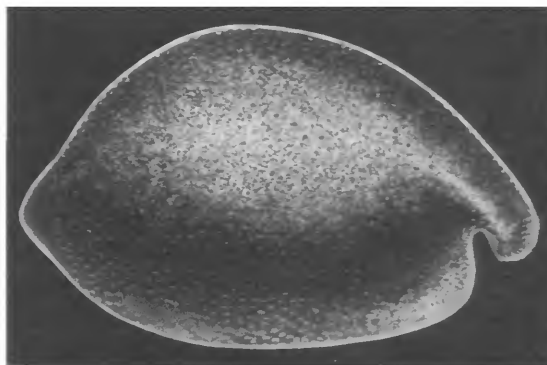


FIGURE 4.—*Pterocypridina sex* Kornicker, holotype, USNM 157760, ovigerous female, lateral view of complete specimen, length 1.66 mm (from Kornicker, 1983, fig. 5).

shorter than others); minute 2nd joint with 1 long filament.

Seventh Limb: With 10 bristles; surface opposite comb with curved ridge bearing 5 or 6 minute teeth along edge.

Furca: Each lamella with 6 or 7 claws; claws 2 and 4 fused to lamella; claw 3 weaker than claw 4.

Upper Lip: With narrow anterior unpaired part and broader posterior paired part; short proximal and lateral tusk near posterior edge of paired part.

Eyes: Lateral eye well developed, with black pigment and about 19 ommatidia.

SUPPLEMENTARY DESCRIPTION OF ADULT FEMALE.—Carapace size: USNM 193017, length 1.71 mm, height 1.19 mm, 8 eggs in marsupium; USNM 193073, length 1.71 mm, height 1.07 mm, 5 eggs in marsupium.

Skogsbergia Poulsen, 1962

TYPE-SPECIES.—*Skogsbergia minuta* Poulsen, 1962 (subsequent designation, Kornicker, 1974: 3).

Kornicker (1958:229) described *Skogsbergia lernerii* from collections made in the vicinity of Bimini, Bahamas. Later, Poulsen (1962:170) described a second species, *S. crenulata*, from the U.S. Virgin Islands. Poulsen's species is referred to *S. lernerii* herein.

DISTRIBUTION.—Species of *Skogsbergia* are widespread between latitudes of 60°N and 34°S (Poulsen, 1962, fig. 81). The range of the genus is extended herein to include the Gulf of Mexico (Table 1).

Skogsbergia lernerii (Kornicker, 1958)

FIGURES 5-7

Cypridina squamosa.—Tressler, 1949:335, fig. 21 [in part; not *Cypridina squamosa* Müller].

Asterope elliptica Philippi.—Tressler, 1949:338 [part, only USNM 88860].

Cypridina squamosa lernerii Kornicker, 1958:229, figs. 47: 1a,b, 48a-d, 49a-e.

Skogsbergia crenulata Poulsen, 1962:170, figs. 86, 87.

Skogsbergia lernerii (Kornicker).—Kornicker, 1974:4.—Cohen, 1983:235, figs. 2-10.

HOLOTYPE.—USNM 122903, whole dry juvenile on slide.

TYPE-LOCALITY.—Bimini, Bahamas.

MATERIAL.—See "Station Data and Specimens Examined."

DISTRIBUTION.—Gulf of Mexico: Dry Tortugas, Florida; West Florida continental shelf; Louisiana, in vicinity of Sonnier Bank; Texas, in vicinity of East Flower Garden, continental shelf off Galveston, and South Texas shelf (Map 1). West Indies: Montego Bay, Jamaica; Virgin Islands; Bahamas: San Salvador Island, Bimini. Central America: Belize, Panama (Table 1). Known depth range 1-130 m.

DIAGNOSIS (Female).—Carapace oval in lateral view with very narrow caudal process; surface of valve with scale-like markings. Length of female 1.40-2.11 mm.

First Antenna (Figure 6a): Sensory bristle of 5th joint with 9 long proximal filaments and 4 short distal filaments.

Second Antenna (Figure 6b): Endopodite 2-jointed, 1st joint short with 1 long and 3 short, bare proximal bristles and 1 long, spinous distal bristle; 2nd joint small with long terminal filament.

Seventh Limb (Figure 7d,e): With 22-29 bristles; surface opposite comb with about 4 small teeth, 2 on each side.

Furca: Each lamella with 7-9 (average 8) claws; claw 2 fused to lamella; claw 4 narrower at base than claw 5 and slightly shorter.

Upper Lip (Figure 7i): Anterior part undivided and with glandular openings along both anterior and ventral margins; posterior part paired and with ventral glandular openings; 2 small lobes present lateral to posterior end of each paired part.

Eyes (Figure 7h): Lateral eyes well developed, with black pigment and about 27 ommatidia.

SUPPLEMENTAL DESCRIPTION OF ADULT FEMALE (Figures 5a,b,d-h, 6, 7).—Based mainly on a specimen from the Gulf of Mexico (USNM 158181). Carapace oval in lateral view with deep

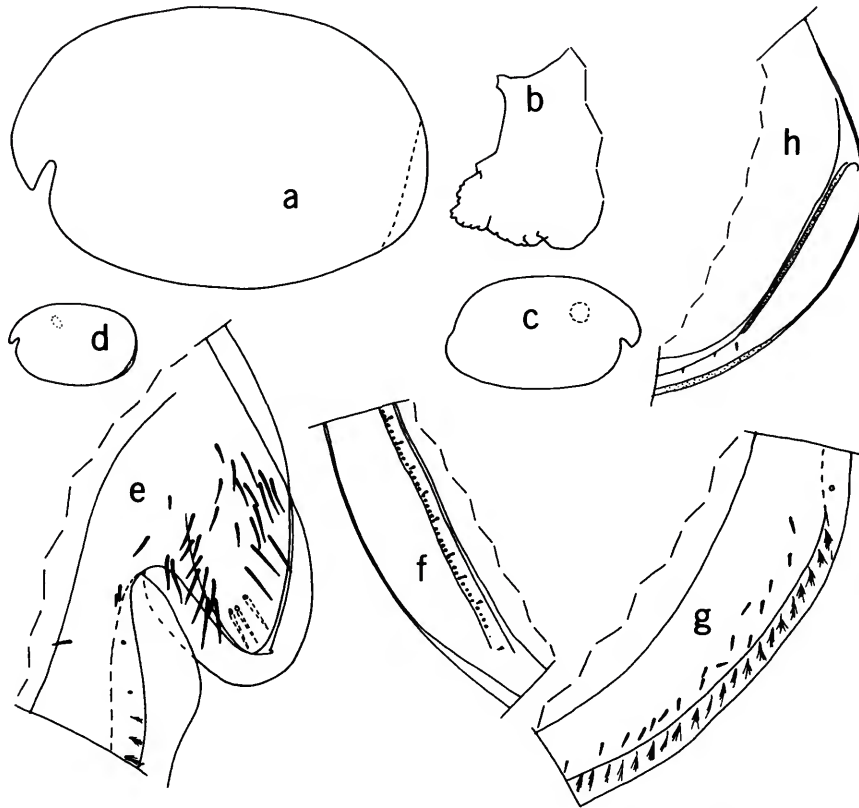


FIGURE 5.—*Skogsbergia lemeri* (Kornicker). USNM 158243, adult female, length 1.58 mm: *a*, lateral view of complete specimen; *b*, upper lip, anterior to left. USNM 88860, adult male: *c*, lateral view of complete specimen, length 1.76 mm (dashed oval indicates lateral eye). USNM 158181, ovigerous female: *d*, lateral view of complete specimen, length 1.60 mm (dashed oval indicates lateral eye); *e*, inside view of rostrum and incisur of left valve; *f*, inside view of posterodorsal corner of left valve showing list; *g*, inside view of anteroventral corner of left valve; *h*, inside view of posterodorsal corner of right valve showing list.

incisur; posterior projecting slightly along posteroventral margin but without break in curvature between dorsal end of narrow caudal process and posterodorsal valve margin (Figure 5*a,d,h*). Caudal process slightly wider on right valve than on left. Tip of rostrum with minute protuberance on both valves.

Ornamentation: Surface smooth.

Infold (Figure 5*e-h*): Rostral infold with 30–40 bristles between list and outer edge of rostrum; 2 fairly long bristles present near inner edge of incisur; 2 smaller bristles present be-

tween list of rostrum and incisur; infold ventral to incisur with few small bristles; anteroventral infold with about 30 spinous bristles forming row outside list, and 15–20 more slender and less spinous bristles inside list; list of ventral infold with 4 fairly long, widely spaced bristles; posterior end of ventral infold anterior to broad posteroventral list with 7 small bristles along list; short bristle present on infold just ventral to broad posteroventral list; broad posteroventral list with about 13 minute bristles forming row near middle and numerous minute pores and



FIGURE 6.—*Shogsbergia lernerii* (Kornicker), USNM 158181, ovigerous female, length 1.60 mm: a, right 1st antenna, medial view; b, distal part of protopodite and endopodite of right 2nd antenna, medial view; c, joints 7-9 of exopodite of 2nd antenna showing basal spines of joints 7 and 8 and lateral spine of joint 9; d, left mandible, medial view; e, left maxilla, lateral view.



FIGURE 7.—*Skogsbergia lernerii* (Kornicker), USNM 158181 ovigerous female, length 1.60 mm: *a*, left 5th limb, posterior view; *b*, right 5th limb, anterior view; *c*, right 6th limb, medial view; *d*, 7th limb; *e*, detail of tip of limb shown in *d*; *f*, right lamella of furca; *g*, medial eye and bellonci organ; *h*, lateral eye; *i*, upper lip and anterior process, anterior to right; *j*, left and right genitalia with attached spermatophores.

pustules near outer edge of list (4 or 5 between each pair of bristles); about 16 minute pores or processes present on posteroventral infold forming row just within outer edge of valve (pores not shown on illustration).

Selvae: Broad narrowly striate lamella pro-

longation present in vicinity of incisur (Figure 5*e*), narrower and without striations elsewhere; outer edge smooth. (Striations of lamella prolongation not shown in illustration.)

Size: USNM 158181, length 1.60 mm, height 1.07 mm; USNM 158243, length 1.58 mm,

height 1.05 mm; USNM 193021, length 2.03 mm, height 1.31 mm; USNM 193024, length 1.92 mm, height 1.21 mm; USNM 193025, length 1.59 mm, height 0.99 mm; USNM 193027, length 1.57 mm, height 1.00 mm; USNM 193028, length 1.40 mm, height 0.94 mm. USNM 88855, length 2.11 mm, height 1.32 mm; USNM 88862, length 1.78 mm, height 1.08 mm; ovigerous female returned to Dr. Walter B. Sikora, length 1.58 mm, height 1.08 mm; adult female from station 5 returned to the Mote Marine Laboratory, length 2.11 mm, height 1.41 mm.

First Antenna (Figure 6a): 1st joint bare, 2nd joint with spines on medial surface, fewer spines on lateral surface. 3rd and 4th joints each with 2 spinous bristles, 1 ventral, 1 dorsal. Sensory bristle of fifth joint with 9 long proximal filaments and 4 slender, short distal filaments. 6th joint with short medial bristle. 7th joint: a-bristle about same length as bristle of 6th joint; b-bristle about twice length of a-bristle, with about 6 short marginal filaments; c-bristle long with about 10 short marginal filaments. 8th joint: d- and e-bristles bare, tips broken off on illustrated limb; f-bristle long, with 7 or 8 marginal filaments preceding bare distal part (tips broken off bristle of both limbs of USNM 158181); g-bristle about same length as c-bristle, with about 10 marginal filaments; some filaments of f- and g-bristles with few minute spines.

Second Antenna (Figure 6b,c): Protopodite with short bare distal medial bristle, otherwise bare. Endopodite 2-jointed: 1st joint short with 1 long and 3 short bare proximal bristles and 1 long spinous distal bristle; 2nd joint small with long terminal filament. Exopodite: 1st joint elongate, bare, without terminal medial bristle; bristle of 2nd joint just reaching 9th joint, with few long proximal ventral and dorsal hairs followed by 6 to 10 long stout ventral spines, dorsal margin with few short slender spines; bristles of joints 3 and 4 long, with slender ventral spines proximal to middle, and natatory hairs proximal and distal to spines along ventral margin and all along dorsal margin; bristles of joints 5–8 long with natatory hairs; 9th joint with 4 bristles (2 long

and 1 medium, all with natatory hairs; 1 short, bare); joints 2–8 with basal spines (spines increasing in size distally; spine of 8th joint slightly longer than twice length of 9th joint); 9th joint with lateral spine slightly longer than joint; joints 2–8 with minute spines along distal margins.

Mandible (Figure 6d): Coxale endite spinous, with 2 stout spines at tip; small bristle present near base. Basale: ventral margin with 3 a-bristles, 1 b-bristle, 2 c-bristles, 1 long spinous d-bristle, and small blunt medial peg between b- and c-bristles; dorsal margin with 1 long spinous midbristle and 2 long spinous terminal bristles. Exopodite spinous, about $\frac{3}{4}$ length of dorsal margin of 1st endopodial joint, with 2 bristles (outer bristle spinous and about $\frac{1}{2}$ length of inner, proximal, bare bristle). 1st endopodial joint with 4 ventral bristles (2 long, 1 short, 1 minute). 2nd endopodial joint: ventral margin with bristles forming 3 groups consisting of 1, 1, and 2 short bristles; dorsal margin and medial and dorsal sides near dorsal margin with numerous long and short bristles; medial surface with long spines forming rows. 3rd endopodial joint with 3 claws (some with few proximal ventral spines) and 4 bristles.

Maxilla (Figure 6e): Endite I with about 11 bristles, endites II and III with fewer bristles (not all shown on illustrated limb), endite III with 1 proximal bristle in addition to terminal bristles. Dorsal margin of coxale with fringe of long hairs and hirsute terminal bristle. Exopodite well developed, with 1 proximal and 2 terminal bristles (outer of these hirsute). Basale with 3 distal bristles (the middle of these short; inner bristle not shown on illustrated limb). 1st endopodial joint with 2 bare alpha-bristles, 2 beta-bristles (outer of these pectinate), and evenly rounded terminal tooth on ventral margin. 2nd endopodial joint with 4 bare a-bristles, 3 pectinate b-bristles, 2 c-bristles pectinate along dorsal margin, and 3 pectinate d-bristles.

Fifth Limb (Figure 7a,b): All bristles not shown on illustrated limbs. Epipodial appendage with 50 bristles. Sclerotized anterior process of protopodite elongate with smoothly rounded tip. Endite I with 7 bristles; endites II and III each

with 6 bristles. 1st exopodial joint: anterior side with 1 proximal bristle with long hairs, and 3 distal bristles forming group, all with long hairs (largest of these finely pectinate distally); main tooth consisting of proximal triangular peg followed by 6 pectinate teeth; bristle with long proximal hairs present proximal to peg of main tooth. 2nd exopodial joint with 4 stout pectinate a-bristles, 3 pectinate b'-bristles and 3 pectinate b''-bristles; outer edge of joint with 2 bristles with long hairs (1 visible from anterior side, 1 visible from posterior side). 3rd exopodial joint with 3 bristles on inner lobe and 2 on outer lobe. Combined 4th and 5th joints with 4 distal bristles.

Sixth Limb (Figure 7c): Endites I and II with 4 bristles (2 medial, 2 distal); endite III with 5 bristles (1 medial, 4 distal); endite IV with 7 bristles (1 medial, 6 distal). End joint with 15 or 16 bristles (posterior 2 of these with long hairs to tip, others with either short spines, or long proximal hairs followed by short spines near tip). 4 short bristles present in place of epipodial appendage.

Seventh Limb (Figure 7d,e): Each limb with 22 bristles (13 in terminal group, 6 or 7 on each side, and 9 in proximal group, 4 or 5 on each side). Terminal comb with 3 long teeth in middle, and on each side 3 short teeth with rounded tips and 2 short teeth with square tips. Surface opposite comb with about 4 small teeth, 2 on each side. Kornicker (1958:229) described the adult 7th limb as having 23 to 29 lateral bristles.

Furca (Figure 7f): Each lamella with 8 claws; claw 2 fused to lamella without suture at base, remaining claws with suture; claw 2 about same width at base as claw 1 or slightly wider, and about same length; claw 4 narrower at base than claw 5 and slightly shorter; claw 5 with base slightly wider at base than claw 3 but shorter; claw 1 with teeth forming medial and lateral rows (lateral row with small teeth of more-or-less same length; medial row with large distal teeth); remaining claws with small teeth along posterior margins.

Bellonci Organ (Figure 7g): Short, with protruding tip.

Eyes: Medial eye small, bare, unpigmented (Figure 7g). Lateral eyes well developed, about twice size of medial eye, with black pigment and about 27 ommatidia (not all ommatidia shown in Figure 7h).

Upper Lip (Figures 5b, 7i): Anterior part undivided and with glandular openings along both anterior and ventral margins; posterior part paired and with ventral glandular openings; small lobe with 3 glandular openings present lateral to posterior end of each paired part; 2nd small lobe (with 1 large glandular opening) present lateral and proximal to 1st small lobe; 5 glandular openings observed on side of lip dorsal to 2nd small lobe; posterior of lip rounded, hirsute.

Genitalia (Figure 7i): Consisting of ring on each side of body with attached spermatophore.

Anterior of Body (Figure 7i): Single sclerotized process with blunt or rounded tip present between upper lip and medial eye.

Posterior of Body: Bare, without dorsal process.

Eggs: USNM 158181 with about 16 large eggs forming cluster; USNM 193021 with 13 eggs; USNM 193028, with 5 well-developed eggs bearing lateral eyes.

SUPPLEMENTARY DESCRIPTION OF ADULT MALE.—Carapace with caudal process more prominent than on female (Figure 5c). Size: USNM 157957, length 1.67 mm, height 1.00 mm; USNM 88860, length 1.76 mm, height 1.08 mm.

INTRASPECIFIC VARIATION.—The range of carapace length (1.40–2.11 mm) in adult females suggests that more than one species may be present. Also variable is the size of the lateral eye relative to carapace size and the number and distribution of bristles on the rostral infold. I have interpreted these differences to be the result of intraspecific variation. Poulsen (1962:170) described as a new species, *S. crenulata*, from the West Indies. The carapace of that species has minute pustules along the posterior edge of the caudal process. A specimen from St. Croix in the present collection has a similar list, but in other areas this character is variable. The pustules are present on all specimens but on some specimens

they are on the medial surface of the list rather than on the posterior edge. The specimens examined in the present collection have 6–10 strong spines on the bristle of the 2nd exopodial joint of the 2nd antenna; Poulsen (1962:171) reported 5–6 spines on the specimens he examined from the West Indies. Specimens from St. Croix and the San Blas Islands, Panama, have small areas of reddish brown pigmentation on the carapace and some appendages. Absence of pigmentation on specimens from other areas may be in part the result of fading caused by the preserving agent and time, but the lack of pigmentation in some recently collected specimens, such as those from the West Florida shelf, is probably real and not the result of fading. *S. crenulata* is referred to *S. lernerii* herein. Further work is needed to resolve whether or not more than one species has been included in *S. lernerii* herein.

Of the 5 specimens from Tortugas that were identified as *Cypridina squamosa* Müller by Tressler (1949:335), only 3 of them are in the collection of the National Museum of Natural History (USNM 88855, 88861, 88862). Nevertheless, I refer all five of Tressler's specimens to *Skogsbergia lernerii* herein. Another specimen (USNM 88860), which had been identified as *Asterope*

elliptica by Tressler (1949:338), is also referred to *Skogsbergia lernerii* herein.

Vargula Skogsberg, 1920

TYPE-SPECIES.—*Cypridina norvegica* Baird, 1860.

This genus is represented in the study area by *V. parasitica* (Wilson, 1913), *V. bullae* Poulsen (1962:182), *V. harveyi* Kornicker and King (1965:106), a new species, *V. magna* (Table 1), and additional species designated *Vargula* species or *Vargula* species indeterminate herein (Map 2).

DISTRIBUTION.—Species of *Vargula* are widespread between latitudes of 80°N and 74°S and depths of 0–3431 m. Two species, *V. parasitica* and *V. harveyi*, have been reported from Jamaica. The latter species also lives in the southern Bahamas and Puerto Rico. The species *V. bullae* is widespread in the U. S. Virgin Islands at depths of 0–45 m. In the present paper *V. magna* is reported from the North Carolina shelf at depths of 160–202 m and from the West Florida shelf at a depth of 106 m. Additional species of *Vargula* (unnamed) are reported herein from a beach at Dry Tortugas, Florida, in the Gulf of Mexico (Map 2) at depths of 61–130 m, and from the vicinity of southern Greenland at depths of 300–412 m.

Key to Species of *Vargula* in the Study Area

1. Carapace of adult longer than 3.5 mm *V. magna*, new species¹
Carapace of adult shorter than 3.0 mm 2
2. Interval between c- and d-bristles of mandibular basale not considerably larger than width of larger d-bristle *V. bullae*
Interval between c- and d-bristles of mandibular basale several times larger than width of larger d-bristle 3
3. Seventh limb with dorsal jaw opposite terminal comb; carapace of adult female longer than 2.19 mm *V. harveyi*²
Seventh limb without dorsal jaw opposite terminal comb; carapace of adult female shorter than 2.19 mm *V. parasitica*³

¹ The caudal process of *V. magna* is more prominent than that of *V. norvegica*, which may be present in the North Atlantic off Canada and Greenland.

² Some specimens without dorsal claw on either or both 7th limbs.

³ The writer is aware of several undescribed species in the study area that will key out as *V. parasitica*.

Vargula bullae Poulsen, 1962

FIGURES 8-11

Vargula bullae Poulsen, 1962:182, fig. 92.—Kornicker and Baker, 1977:219 [key].—Felder, 1982:222.

Vargula harveyi?—Morin and Bermingham, 1980:851.—Felder, 1982:222.

SYNTYPES.—1 female and 2 juveniles in the Zoological Museum of the University of Copenhagen, Denmark.

TYPE-LOCALITY.—West Indies, between St. Thomas and St. John, 27–45 m.

MATERIAL.—See “Station Data and Specimens Examined.”

DISTRIBUTION.—West Indies, in the vicinities of St. Thomas, St. John, and St. Croix, ~1–45 m, in plankton and substrate.

REMARKS.—Morphological differences between specimens from St. Croix referred herein to *V. bullae* and the types from the vicinity of St. Thomas and St. Jan [John] described by Poulsen (1962:182) may be sufficient to warrant proposal of a new species for the St. Croix specimens. The specimens from St. Croix differ in having no unringed medial bristles on the end joint of the mandible, a smaller unpaired anterior part on the upper lip, a long proximal bristle on the 1st endopodial joint of the 2nd antenna, and more bristles on the rostral infold. I assume that the differences are intraspecific. The adult male has not been described previously.

DIAGNOSIS.—Carapace with distinct caudal process higher in female than in male (Figures 8a, 11a). Length of female 1.94–2.12 mm; of male 1.48–1.74 mm.

First Antenna (Figure 9a): Sensory bristle of 5th joint with 10 long stout proximal filaments, 2 long slender distal filaments, and bifurcate tip.

Second Antenna: Endopodite 3-jointed (Figure 9c): 1st joint with 4 proximal bristles (3 short, 1 longer) and 1 fairly long distal bristle; 2nd joint with short terminal bristle; 3rd joint with long terminal filament.

Mandible (Figure 10a): c- and d-bristles on ventral margin of basale closely spaced.

Seventh Limb (Figure 9f,g): Each limb with

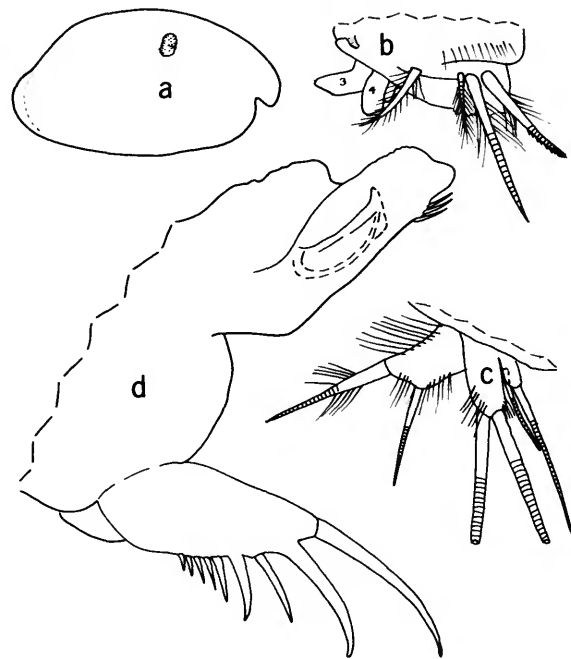


FIGURE 8.—*Vargula bullae* Poulsen, USNM 157884 adult male, length 1.74 mm: a, lateral view of complete specimen; b, anterior bristles of 1st exopodial joint of right 5th limb; c, exopodial joints 3–5 of right 5th limb; d, right lamella of furca and right copulatory limb.

12–14 bristles; surface opposite comb with single peg.

Furca (Figure 8d): Each lamella with 8 or 9 claws; claws 2 and 4 fused to lamella; claw 4 broader than claw 3.

Eyes: Lateral eye well developed, with brown or black pigment and 16 ommatidia (Figure 9h).

Upper Lip (Figures 9h, 11d): 3 or 4 narrow processes, 1 broader process, and 1 elongate hirsute tusk on each side of median groove.

DESCRIPTION OF ADULT MALE (Figures 8–10).—Carapace oval in lateral view (Figure 8a); caudal process broad, high; anterodorsal curvature of valve forming slightly steeper angle than anteroventral curvature, which continues smoothly to form posteroventral valve margin; anterior of rostrum evenly rounded; inferior corner of rostrum rounded but forming right angle in lateral view (Figure 8a).

Infold: Rostral infold with 8 or 9 divided bris-



FIGURE 9.—*Vargula bullae* Poulsen, USNM 157884, adult male, length 1.74 mm: *a*, right 1st antenna (d- and e-bristles not shown), medial view; *b*, distal bristle of protopodite of 2nd antenna, medial view; *c*, endopodite of left 2nd antenna, medial view; *d*, exopodite of left 2nd antenna showing spines, and bristle of 2nd joint; *e*, left 6th limb, medial view; *f*, 7th limb; *g*, detail of tip of 7th limb shown in *f*; *h*, anterior of body, lateral eye, median eye, bellonci organ, and upper lip.



FIGURE 10.—*Vargula bullae* Poulsen, USNM 157884, adult male, length 1.74 mm: *a*, left mandible and detail of lateral claw, medial view; *b*, right maxilla, medial view; *c*, left maxilla, lateral view.

tles forming vertical row, 2 or 3 bristles along ventral margin, a pair of bristles near inner end of incisur, and 1 longer bristle near middle of rostrum posterior to bristles forming vertical row. Infold of caudal process with narrow list bearing minute medial bristles; outer edge of caudal process with about 10 minute processes or bristles lying just within valve margin. Anteroventral infold with small bristle near inner end of incisur followed by short space and then about 30 divided bristles forming row extending to middle of ventral margin of valve.

Selvage: Narrow selvage with smooth edge present along anterior and ventral margins, becoming broader and striated along ventral margin of incisur.

Central Adductor Muscle-Attachment Scars: Consisting of about 14 oval scars.

Size: USNM 157385A, length 1.48 mm, height 0.83 mm; USNM 157385B, length 1.70 mm, height 0.92 mm; USNM 157385C, length 1.55 mm, height 0.87 mm; USNM 157385D, length 1.52 mm, height 0.87 mm; USNM 157818A, length 1.54 mm, height 0.89 mm; USNM 157818B, length 1.49 mm, height 0.75 mm; USNM 157818C, length 1.73 mm, height 0.92 mm; USNM 157884, length 1.74 mm, height 0.96 mm; USNM 157955A, length 1.73 mm, height 0.92 mm.

First Antenna (Figure 9a): 1st joint bare. 2nd joint with medial spines, 3rd and 4th joints each with 1 dorsal and 1 ventral bristle. Sensory bristle of 5th joint with 10 long stout proximal filaments, 2 long slender distal filaments, and bifurcate tip. 6th joint with short medial bristle near dorsal margin. 7th joint: a-bristle about same length as bristle of 6th joint; b-bristle with stout proximal filament with bulbous base followed by large sucker at midlength and small distal process, and 2 distal slender filaments each with 2 small suckers; c-bristle with proximal filament having sucker about $\frac{1}{3}$ larger than that of proximal filament of b-bristle, 2 proximal slender filaments each with 2 small suckers, 1 short slender filament between the filaments with 2 small suckers, 3 long slender distal filaments and bifur-

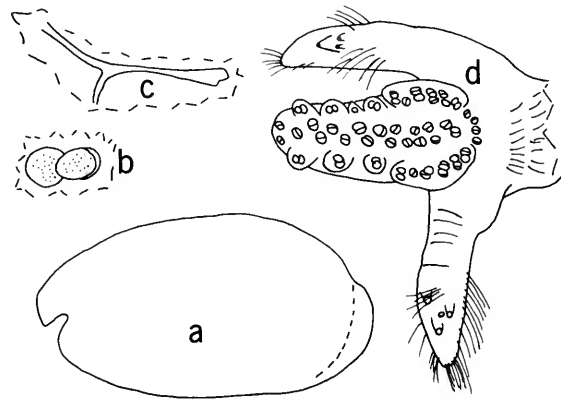


FIGURE 11.—*Vargula bullae* Poulsen. USNM 157955, adult female, length 2.12 mm: a, lateral view of complete specimen; b, left genital organ with spermatophore; c, left Y-sclerite, anterior towards left. USNM 157886A, late juvenile, length 1.38 mm: d, ventral view of upper lip flattened under cover slip.

cate tip. 8th joint: d- and e-bristles about same length as b-bristle, bare with blunt tips (d- and e-bristles not shown on illustrated limb); f-bristle with about 6 short proximal filaments (some with marginal spines), 1 longer distal filament and bifurcate tip; g-bristle longer than sensory bristle of 5th joint, with about 6 short proximal filaments (some with marginal spines), 3 long slender distal filaments and bifurcate tip.

Second Antenna (Figure 9b-d): Protopodite with small medial distal bristle (Figure 9b). Endopodite 3 jointed (Figure 9c): 1st joint with 4 proximal bristles (3 short, 1 longer) and 1 fairly long distal bristle; 2nd joint with short terminal bristle; 3rd joint with long terminal filament. Exopodite (Figure 9d): bristle of 2nd joint with about 13 spines (8 stout followed by about 5 slender) on ventral margin; joints 3–8 with basal spines becoming longer distally; lateral spine of 9th joint about same length as basal spine of 8th joint; 9th joint with 3 bristles (2 long and 1 medium) with natatory hairs and 1 short bare bristle.

Mandible (Figure 10a): Coxale endite spinous and with bifurcate tip; small bristle near base. Basale: ventral margin with 2 a-bristles, 1 small

b-bristle, 2 c-bristles and 2 d-bristles; c- and d-bristles forming group; dorsal margin with 3 distal bristles; proximal of these fairly close to terminal pair; medial surface with few small spines forming rows. Exopodite almost reaching distal margin of 1st endopodial joint, hirsute distally, and with 2 subterminal bristles. 1st endopodial joint with 4 ventral bristles (2 long, 2 short). 2nd endopodial joint with curvature: dorsal margin with 5 long bristles, 2 shorter distal bristles, and 10–12 cleaning bristles; ventral margin with bristles forming 3 distal groups (1 bristle in each of proximal 2 groups, 2 in distal group; medial bristle of distal group unringed, strongly sclerotized, recurved, with rounded tip). End joint with 3 claws, 1 bristle near dorsal margin, 2 slender medial bristles near ventral margin, and 1 ventral bristle with stout proximal part; lateral claw of end joint with stout proximal part being evenly rounded distally on some specimens (detail in Figure 10a) and strongly angular on others (similar to that illustrated by Poulsen, 1962, fig. 92k, for *V. bullae*).

Maxilla (Figure 10b,c): Endite I with 9 bristles, endite II with 5 bristles, endite III with 4 or 5 bristles. Coxale with dorsal hirsute fringe and hirsute dorsal bristle. Basale with 2 or 3 distal bristles. Exopodite with 3 bristles (outer 2 hirsute). 1st endopodial joint hirsute, with undulating ventral tooth, 1 hirsute alpha-bristle, and 2 beta-bristles with very closely spaced extremely slender marginal teeth. End joint: 4 a-bristles with closely spaced slender teeth similar to those of beta-bristles; most b-, c-, and d-bristles also with similar marginal teeth.

Fifth Limb (Figure 8b,c): Differs from 5th limb of female described by Poulsen (1962:184) in having 2 bristles on inner lobe of 3rd exopodial joint.

Sixth Limb (Figure 9e): 4 short bare bristles in place of epipodial bristle. Endite I with 3 spinous bristles (2 short, medial, 1 longer, terminal); endite II with 4 spinous bristles (2 short, medial, 2 longer, terminal); endite III with 4 spinous bristles (1 short, medial, 2 long and 1 short, terminal). End joint with 4 spinous anterior bristles

followed by wide gap and then 3 bristles (anterior with long proximal and short distal spines, others hirsute); dorsal hirsute bristle of end joint about 150 percent length of ventral hirsute bristle (only proximal end of dorsal bristle shown on illustration). Endite IV with 3 bristles.

Seventh Limb (Figure 9f,g): 4–6 proximal bristles (1 or 2 ventral, 3 or 4 dorsal), each with 3 bells; terminus with 5 ventral bristles (comb side) and 3 dorsal bristles (peg side), each with 2–5 bells. Comb with 3 long curved teeth with 2 shorter curved teeth and 1 or 2 short flat-tipped teeth on each side (Figure 9g). Single peg present opposite comb (Figure 9g).

Furca (Figure 8d): each lamella with 8 or 9 claws; claws 2 and 4 fused to lamella, remaining claws separated from lamella by suture; claw 4 broader than claw 3; teeth along posterior margins of claws (not shown on illustrated limb); right lamella slightly anterior to left.

Bellonci Organ (Figure 9h): Pear-shaped with slight protuberance at tip.

Eyes: Lateral eye with brown or black pigment and 16 ommatidia (Figure 9h). Medial eye smaller than lateral eye, slightly pigmented, bare (Figure 9h).

Upper Lip (Figure 9h): With median groove bearing glandular openings forming 2 rows; on each side of groove 3 or 4 narrow processes (each bearing 2 glandular openings) followed by broad process bearing many glandular openings; an elongate hirsute tusk present lateral to posterior half of each broad process. Also see illustration of juvenile upper lip (Figure 11d).

Genitalia (Figure 8d): Lobate copulatory limb on each side of body.

Posterior of Body: Smoothly rounded without hairs.

Y-Sclerite: Typical for family.

Supplementary Description of Adult Female (Figure 11a–c): Carapace similar to that of adult male but larger and with higher caudal process and more broadly rounded posterodorsal curvature (Figure 11a).

Size: USNM 157955A, length 2.12 mm, height 1.22 mm.

First Antenna: Joints 1–6 similar to those of adult male. 7th joint: a-bristle about same length as bristle of 6th joint; b-bristle about 3 times length of a-bristle, bare; c-bristle about 3 times length of b-bristle, with about 7 bare marginal filaments and bifurcate tip. 8th joint: d- and e-bristles about same length as b-bristle, bare with blunt tips; f-bristle about same length as sensory bristle, with about 8 marginal filaments, some pectinate, and bifurcate tip; g-bristle about a 3rd longer than f-bristle, with about 10 marginal filaments and bifurcate tip. Distribution of short and long filaments on f- and g-bristles similar to those of adult male.

Second Antenna: Bristle of 2nd endopodial joint reaching 8th joint; ventral margin of bristle with 1 small proximal spine followed by 4 stout spines and 3 distal slender spines; dorsal margin with slender spine between distal stout spine and proximal of distal slender spines of ventral margin. Limb otherwise similar to that of adult male.

Mandible: Dorsal margin of 2nd exopodial joint with 5 long bristles, 1 shorter distal bristle, and 6–8 cleaning bristles. Limb otherwise similar to that of adult male.

Maxilla: Similar to that of adult male.

Fifth Limb: Epipodite with 45 bristles. Appendage similar to that of adult male.

Sixth Limb: 3 short bare bristles in place of epipodial appendage. Endite I with 1 or 2 spinous medial bristles and 1 longer spinous terminal bristle; endite II with 3 short spinous medial bristles and 2 longer terminal bristles; endite III with 1 spinous medial bristle and 3 terminal bristles (middle bristle short); endite IV with 1 spinous medial bristle and 2 longer spinous terminal bristles; end joint with 5 spinous anterior bristles followed by wide gap and then 1 short bristle (with long proximal and short distal spines) and 2 longer hirsute bristles (distal hirsute bristle longer).

Seventh Limb: 6 to 9 proximal bristles (3 or 4 ventral, 3–5 dorsal), each with 3 bells, terminus with 4 or 5 ventral and 3 dorsal bristles, each with 1–5 bells; comb and peg similar to those of adult male.

Furca, Bellonci Organ, Eyes, Upper Lip, Posterior of Body, Y-Sclerite (Figure 11c): Similar to those of adult male.

Genitalia (Figure 11b): Consisting of oval ring with attached spermatophore.

DESCRIPTION OF LATE JUVENILE (Figure 11d).—Carapace of USNM 157886C similar in shape to that of adult female; caudal process of USNM 157886A more like that of male.

Size: USNM 157886A length 1.38 mm, height 0.78 mm; USNM 157886C, length 1.54 mm, height 0.89 mm.

Mandible: 2nd endopodial joint with only 3 or 4 cleaning bristles; limb otherwise similar to that of adult female.

Seventh Limb: Some bristles tapering distally.

Furca, Lateral Eye, Upper Lip (Figure 11d): Similar to those of adult.

Vargula parasitica (Wilson, 1913)

FIGURE 12

Cypridina.—Wilson, 1911:22 [page 7 in reprint].

Cypridina squamosa.—Lund, 1911:431, 449 [in part; not *Cypridina squamosa* Müller].

Cypridina parasitica Wilson, 1913:269, pl. 53: figs. 303–311.—Skogsberg, 1920:264.

Cypridina(?).—Harvey, 1924:620; 1926, table 1 [see discussion in "Station Data and Specimens Examined" under "Jamaica"].

Cypridina.—Harvey, 1924:622 [see discussion in "Station Data and Specimens Examined" under "Jamaica"].

Vargula parasitica.—Harding, 1966:370, figs. 1–7.

HOLOTYPE.—USNM 43508, 1 complete female with bristles of end joints of 1st antenna and some bristles of exopodite of 2nd antenna broken off. According to Wilson (1913:269) and the labels in the vial, the specimen is a male, but it is actually an adult female with well-developed genitalia.

TYPE-LOCALITY.—Hammerhead shark (gills) captured in Montego Bay, Jamaica.

MATERIAL.—See "Station Data and Specimens Examined."

DISTRIBUTION.—Montego Bay, Jamaica.

DIAGNOSIS.—Female carapace length 2.0–

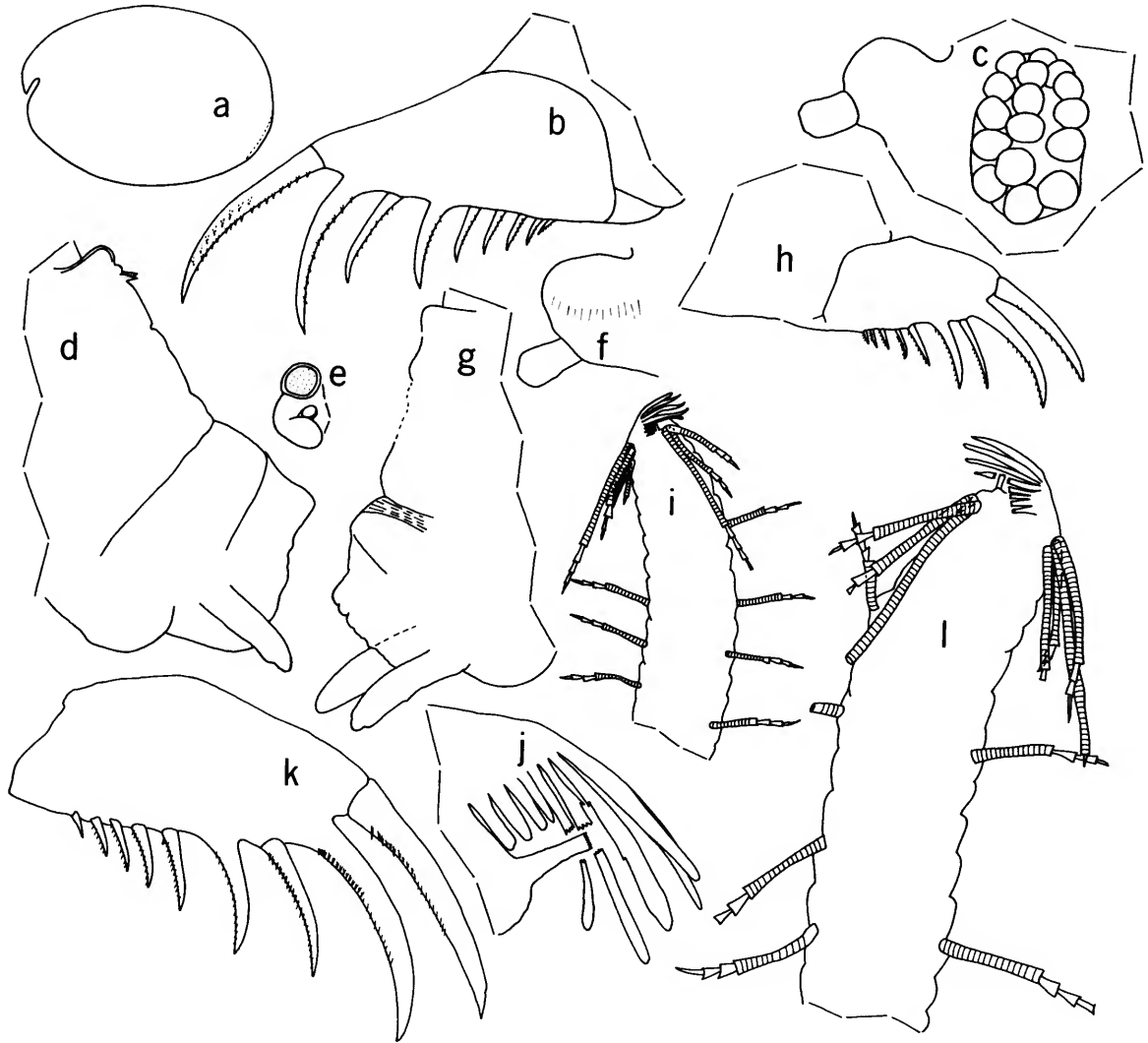


FIGURE 12.—*Vargula parasitica* (Wilson). USNM 78656A, adult female, length 2.12 mm: *a*, complete specimen, lateral view; *b*, left lamella of furca; *c*, lateral eye, medial eye, and bellonci organ; *d*, anterior of body and upper lip; *e*, left genital organ. USNM 78656B, adult female, length 2.17 mm: *f*, medial eye and bellonci organ; *g*, anterior of body and upper lip. USNM 112672B, paratype, adult female: *h*, right lamella of furca; *i*, distal part of 7th limb; *j*, detail of tip of 7th limb shown in *i*. USNM 112672A, paratype, adult male: *k*, right lamella of furca; *l*, distal end of 7th limb.

2.17 mm; male 1.75–1.9 mm. Posterior projection of caudal process very slight (Figure 12*a*).

Seventh Limb (Figure 12*i,j,l*): With total of 14 bristles. Without dorsal jaw.

Furca: Each lamella with 9 claws; claws 2 and 4 fused to lamella; claw 4 broader than claw 3 (Figure 12*b,h,k*).

SUPPLEMENTARY DESCRIPTION (Figure 12).—

Carapace oval in lateral view with very slight projection of caudal process (Figure 12a); anterior margin of rostrum evenly rounded. Rostral infold with about 11 divided bristles forming row along anterior and ventral margins.

Size: Females: USNM 78656A, length 2.12 mm, height 1.53 mm; USNM 78656B, length 2.17 mm, height 1.57 mm.

Seventh Limb (Figure 12i,j,l): Female (Figure 12i,j) with 7 proximal bristles (3 ventral, 4 dorsal) and 8 terminal bristles (5 ventral, 3 dorsal); proximal bristles with 3 bells, terminal bristles with 1–4 bells; comb with 7 or 8 recurved teeth having 4 short teeth on each side (Figure 12j); single cylindrical peg with digitate tip opposite comb (Figure 12j). Male (Figure 12l): with 6 proximal bristles (2 ventral, 4 dorsal) and 7 terminal bristles (4 ventral, 3 dorsal); limb otherwise similar to that of female.

Furca (Figure 12b,h,k): Similar on male and female; claws 2 and 4 fused to lamella; claw 4 slightly broader than claw 3; 9 claws on each lamella.

Bellonci Organ (Figure 12c): Short, cylindrical.

Eyes: Lateral eye with light amber pigment in preserved specimens and 16 ommatidia (Figure 12c). Medial eye smaller than lateral eye, bare, light amber in preserved specimens (Figure 12c).

Upper Lip (Figure 12d): Anterior part broad; posterior part consisting of 2 long tusks, 1 on each side.

Genitalia: Female genitalia consisting of sclerotized ring with attached spermatophore (Figure 12e).

Vargula harveyi Kornicker and King, 1965

FIGURE 13

Vargula harveyi Kornicker and King, 1965:160, figs. 1–31.—Felder, 1982:222.

Not *Vargula harveyi*?—Morin and Bermingham, 1980: 851 [= *V. bullae*].

HOLOTYPE.—USNM 111219, no. 4, ovigerous female.

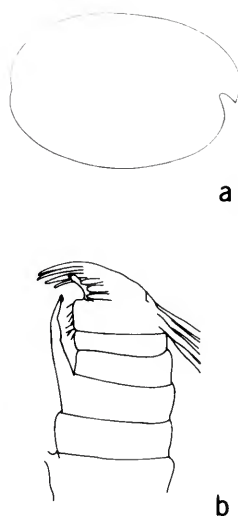


FIGURE 13.—*Vargula harveyi* Kornicker and King. USNM 111219, no. 3, paratype, ovigerous female, length 2.42 mm: a, outline of exterior of right valve. USNM 111219, no. 1, paratype, ovigerous female, length 2.50 mm: b, tip of 7th limb showing dorsal jaw. (From Kornicker and King, 1965, figs. 5, 28).

TYPE-LOCALITY.—Long Bay, Jamaica, West Indies.

MATERIAL.—See “Station Data and Specimens Examined”.

DISTRIBUTION.—Long Bay, Jamaica; Little Inagua Island, Bahamas; San Juan, Puerto Rico.

DIAGNOSIS.—Female carapace length 2.20–2.55 mm. Posterior projection of caudal process very slight (Figure 13a).

Seventh Limb: Total number of bristles on each limb 14–19. Dorsal claw on 3rd to 5th ring counted from distal end (Figure 13b), but absent on some.

Furca: Each lamella with 7–9 claws (average 8); claws 2 and 4 fused to lamella; claw 4 broader than claw 3.

SUPPLEMENTARY DESCRIPTION OF ADULT FEMALE.—Carapace size, USNM 158460A, length 2.26 mm, height 1.57 mm. Rostral infold with about 14 divided bristles forming row along anterior and ventral margins.

REMARKS.—Kornicker and King (1965:108) stated that the 7th limb was without a dorsal jaw in 2 of 9 specimens examined. The length of the carapace of one of the specimens without a dorsal jaw (specimen no. 3) was given as 2.42 mm (left valve) (Kornicker and King, 1965, table 1), which

is larger than the carapace of *V. parasitica*. It is tentatively concluded that some specimens of *V. harveyi* are without a dorsal claw on the 7th limb. These are distinguishable from *V. parasitica* only by size of carapace.

Vargula magna, new species

FIGURES 14–16

ETYMOLOGY.—The specific name is from the Latin *magnus* (large, great), in reference to the size of the carapace of the species.

HOLOTYPE.—USNM 156795, adult female in alcohol and on slides.

TYPE-LOCALITY.—Beaufort Shelf Transect, sta 115, North Carolina continental shelf.

PARATYPES.—North Carolina shelf: USNM 156794, 1 adult or A-1 female (shell distorted), BST sta 121; USNM 156787, 3 juveniles, BST sta 289. Gulf of Mexico: West Florida shelf, USNM 193071, 1 ovigerous female, Transect VI, sta 2645.

DISTRIBUTION.—Continental shelves of North Carolina and West Florida. Known depth range 160–202 m.

DIAGNOSIS (Female).—Carapace with triangular caudal process at posteroventral corner of valve (Figure 14a); carapace length 3.52–4.06 mm.

First Antenna (Figure 15a): Sensory bristle of 5th joint with 10 long proximal filaments (only 9 shown on illustrated limb), 2 shorter and more slender distal filaments, and bifurcate tip.

Seventh Limb (Figure 16d): With about 24 bristles; surface opposite comb with single peg.

Furca (Figure 16e): Each lamella with 9 claws; claws 2 and 4 fused to lamella; claw 3 about same length and width as claw 4 or slightly thinner.

Eyes: Lateral eye well developed with brown pigment and about 16 ommatidia (Figure 15g).

Upper Lip (Figure 15h): Anterior unpaired part and both tusks with fairly small glandular openings.

DESCRIPTION OF ADULT FEMALE (Figures 14–16).—Carapace elongate with deep incisur and

protruding caudal process; anteroventral and posterodorsal margins broadly rounded; posterior margin tending to be truncate (Figure 14a). Dorsal edge of incisur slightly overlapping ventral edge at inner end (morphology complex, see Figure 14d); faint line on outer surface of valve curving from inner edge of incisur to anterior margin of valve ventral to incisur (Figure 14b). Tip of rostrum tending to be more uneven than valve margin elsewhere. Carapace weakly calcified, flexible, with smooth outer surface. Proto-plasm on inside of valve forming rows radiating from vicinity of central adductor muscle attachments. Distal end of caudal process may form open tube when valves close.

Infold (Figure 14d–f): Infold posterior to rostrum with 24–29 bristles including pair near incisur (Figure 14d); anteroventral infold with 2 bristles near inner corner of incisur, 1 bristle near inner margin of infold, and about 19 bristles forming row along narrow list parallel to valve margin; row continues along ventral margin with about 15 bristles with same spacing as those along anteroventral infold and then about 10 bristles with wider spacing; list becoming broader in vicinity of caudal process and with numerous minute processes and pores, and also minute bristles, the latter especially on list just anterior to caudal processes (Figure 14e,f); infold anterior to list of caudal process broader on left valve than on right valve, and with minute bristles near inner edge (Figure 14f); minute spines or processes present just within outer edge of infold in vicinity of caudal process (Figure 14f).

Selvage (Figure 14c,d): Selvage with lamellar prolongation with smooth edge and narrow faint striations present along ventral and anterior margins; lamellar prolongation along ventral margin of incisur broader and with more visible striations than elsewhere.

Size: USNM 156795, length 4.06 mm, height 2.33 mm; USNM 193071, length 3.52 mm, height 1.94 mm.

First Antenna (Figure 15a): 1st joint bare. 2nd joint with medial spines forming rows. 3rd joint short, with medial spines forming rows, and 2

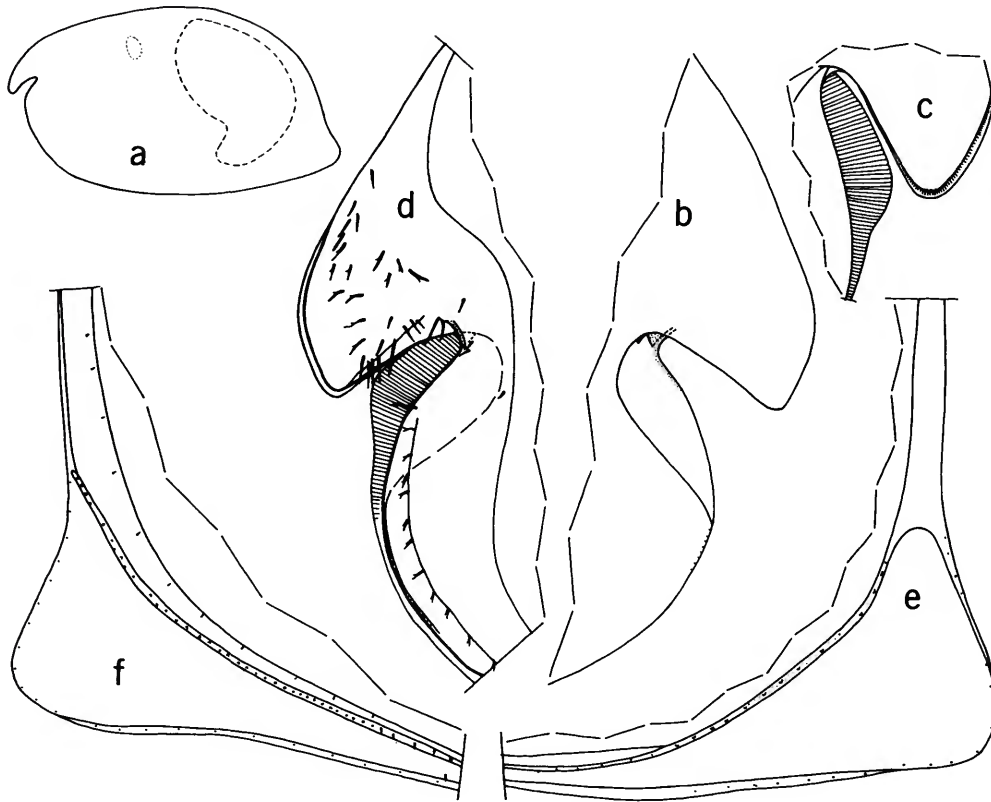


FIGURE 14.—*Vargula magna*, new species, USNM 156795, holotype, adult female, length 4.06 mm: *a*, lateral view of complete specimen showing position of lateral eye (small oval) and parasitic female isopod; *b*, anterior of right valve, outside view; *c*, detail of tip of rostrum of right valve showing lamella prolongation of selvage; *d*, anterior of right valve, inside view; *e*, caudal process of right valve, inside view; *f*, caudal process of left valve, inside view.

spinous bristles (1 ventral, 1 dorsal). 4th joint with 2 spinous bristles (1 ventral, 1 dorsal). Sensory bristle of 5th joint with 10 long proximal filaments (only 9 shown on illustrated limb), 2 shorter and more slender distal filaments, and bifurcate tip. 6th joint with short spinous medial bristle near dorsal margin. 7th joint: a-bristle spinous, longer than bristle of 6th joint; b-bristle with distal part broken off on both limbs of specimen examined (USNM 156795), with 2 or 3 short filaments on remaining part; c-bristle long, with tip broken off on specimen examined (remaining part with about 9 slender filaments,

some with spines). 8th joint: d- and e-bristles long, bare, about twice length of a-bristle, with rounded tips; f- and g-bristles long with about 12 short filaments, some with spines.

Second Antenna: Protopodite with short distal medial bristle (Figure 15*b*). Endopodite 3-jointed (Figure 15*b*): 1st joint with 4 proximal bristles (1 long, 3 short) and 1 long distal bristle; 2nd joint elongate with 1 short distal bristle; 3rd joint short, with long terminal filament. Exopodite (Figure 15*c*): 1st joint with spines along concave dorsal margin; bristle of 2nd joint reaching 9th joint, with 4 small ventral spines followed by 6



FIGURE 15.—*Vargula magna*, new species, USNM 156795, holotype, length 4.06 mm: *a*, right 1st antenna, medial view; *b*, endopodite and distal part of prodopodite of right 2nd antenna, medial view; *c*, exopodite of right 2nd antenna, lateral view; *d*, part of left 5th limb, anterior view; *e*, right 5th limb, posterior view; *f*, anterior of body showing medial eye, bellonci organ, and upper lip; *g*, lateral eye; *h*, upper lip, anterior to left.

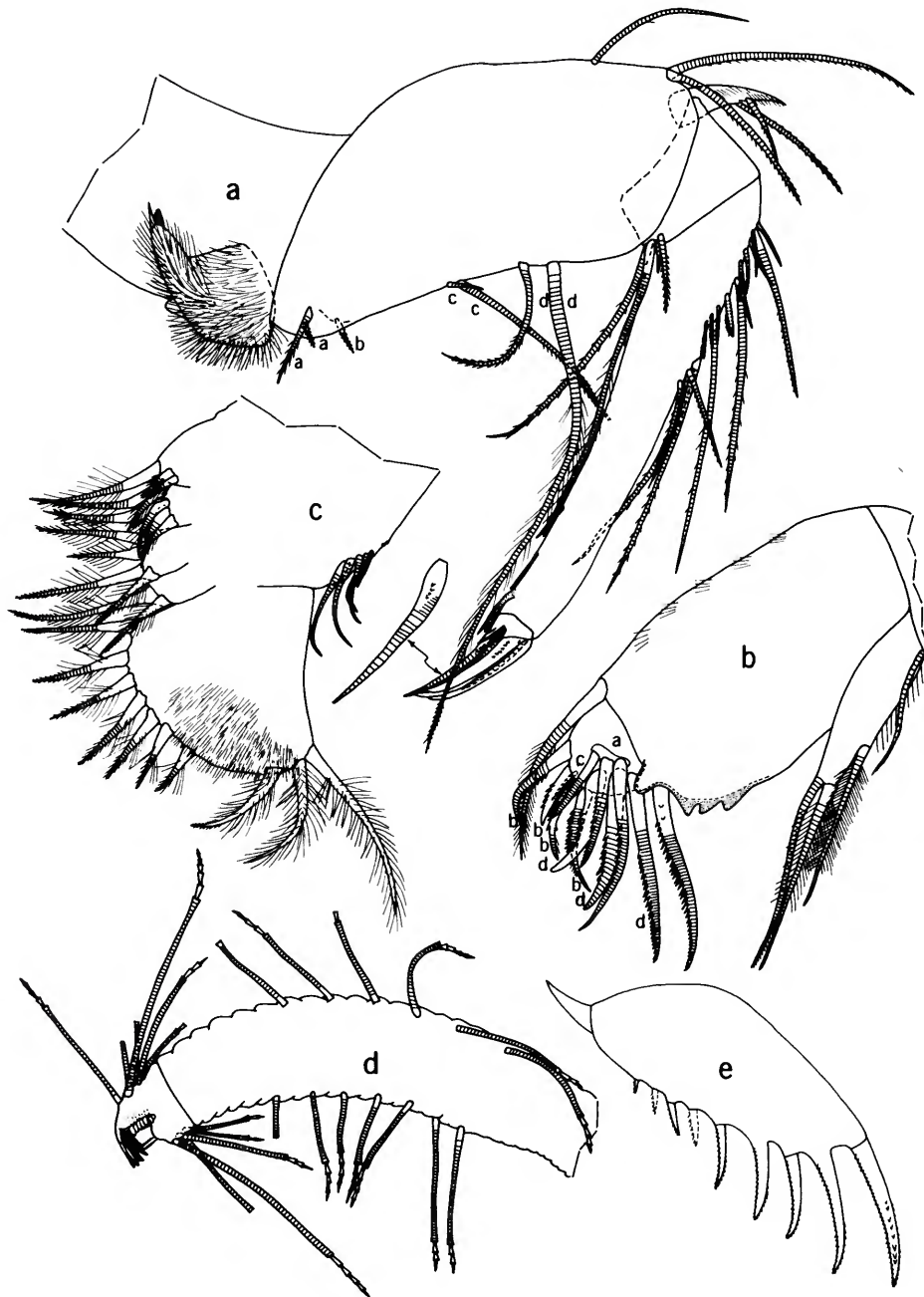


FIGURE 16.—*Vargula magna*, new species, USNM 156795, holotype, length 4.06 mm: *a*, left mandible, medial view; *b*, endopodite and exopodite of left maxilla, lateral view; *c*, right 6th limb, medial view; *d*, 7th limb; *e*, right lamella of furca.

or 7 stouter spines; bristles of joints 3–8 with natatory hairs, no spines; 9th joint with 4 bristles (2 long and 1 medium with natatory hairs, 1 short with small marginal spines); joints 3–8 with basal spines; 9th joint with lateral spine about same length as spine of 8th joint; joints 2–8 with small faint spines forming row along distal margin.

Mandible (Figure 16a): Coxale endite terminating in 2 spines (one of the spines with rounded tip); bristle present at base of endite. Basale: ventral margin with 2 short spinous a-bristles (bases on medial side), 1 short b-bristle (close to a-bristles and with base on lateral side), 1 long and 1 short c-bristle near middle of margin, and 2 distal d-bristles, both some distance from c-bristles; dorsal margin with 1 bristle distal to middle and 2 subterminal. Exopodite hirsute with pointed tip and 2 spinous ventral bristles. 1st endopodial joint with 4 ventral bristles (2 short, 2 long). 2nd endopodial joint: dorsal margin with about 17 bristles (4 long, 3 medium, 10 short; one of the short bristles with stout marginal spines); ventral margin with 2 single distal bristles and subterminal pair of bristles (medial of these cylindrical with broadly pointed tip). End joint with 3 long claws and 4 bristles; ventral bristle with stout base and several medial spines (see detail in Figure 16a).

Maxilla (Figure 16b): 3 endites with numerous stout spinous bristles, some with knife-like tips. Coxale with stout hirsute dorsal bristle. Basale with ventral bristle near base of exopodite (additional bristle may be present on medial side). Exopodite with 1 hirsute proximal bristle and 2 terminal bristles (inner bristle hirsute, outer bristle with short faint marginal spines). 1st endopodial joint with single alpha-bristle with long marginal hairs and single pectinate beta-bristle; cutting tooth with 4 constituent teeth (distal of these more rounded and some distance from others); joint with long hairs forming rows along dorsal margin. 2nd endopodial joint with 3 pectinate a-bristles, 4 pectinate b-bristles, 1 short c-bristle, and 3 stout pectinate d-bristles.

Fifth Limb (Figure 15d,e): Epipodial appendage with about 53 bristles. Endites I and II each

with 5 or 6 spinous bristles; endite III with 7 bristles (not all shown on illustrated limb). Protopodite with large undulate anterior tooth (Figure 15d). 1st exopodial joint with 6 pectinate teeth and proximal peg with spines at tip; bristle with few proximal spines present near peg; anterior side with 3 bristles forming row near inner margin and 1 near middle, all with long spines (innermost bristle also pectinate distally). 2nd exopodial joint with 4 a-bristles, 4 b'-bristles, and 4 b''-bristles, all pectinate; anterior and posterior sides each with 1 short proximal bristle with long proximal hairs and short distal spines. Inner lobe of 3rd exopodial joint with 1 proximal bristle (with long proximal hairs and short distal spines) and 1 terminal bristle with short marginal spines; outer lobe with 2 terminal bristles with short marginal spines. 4th and 5th exopodial joints fused, hirsute with total of 4 bristles; no process present terminally between bristles.

Sixth Limb (Figure 16c): 5 bare bristles in place of epipodial appendage; 1 or 2 small nodes present on margin proximal to bristles. Endite I with 3 spinous bristles (2 short medial, 1 long terminal); endite II with 6 or 7 spinous bristles (4 or 5 medial, 2 terminal); endite III with 4 spinous bristles (1 medial, 3 terminal); endite IV with 2 spinous bristles (1 medial, 1 terminal). End joint with 6 or 7 anterior bristles (with long proximal and short distal spines) followed by space and 3 hirsute bristles (anterior of these with short spines distally).

Seventh Limb (Figure 16d): Comb side with 5 or 6 proximal bristles, each with 3 or 4 bells, and 6 terminal bristles, each with 1 to 5 bells; peg side with 6 or 7 proximal bristles, each with 3 or 4 bells, and 4 or 5 terminal bristles, each with 1 to 5 bells. Comb consisting of 11 long recurved teeth and 12 short teeth (6 on each side of long teeth). Single long spinous peg present opposite comb.

Furca (Figure 16e): Each lamella with 9 claws; claws 2 and 4 fused to lamella, remaining claws separated from lamella by suture; claw 3 about same width and length as 4th claw, or very slightly thinner; claw 1 with distal medial teeth becoming larger distally, as well as smaller teeth

along posterior margin and distal spines along anterior margin; remaining claws with teeth along posterior margins, some with distal spines along anterior margins.

Bellonci Organ (Figure 15f): Short, cylindrical, with step-like rounded tip.

Eyes: Medial eye small, bare, unpigmented (Figure 15f). Lateral eye about twice size of medial eye, with brown pigment and about 16 ommatidia (Figure 15g).

Upper Lip (Figure 15f,h): Anterior undivided part with numerous small glandular processes; middle with 2 long tusks, 1 on each side; each tusk with small glandular processes; part posterior to tusks, rounded hirsute.

Posterior of Body: Smoothly rounded, bare.

Genitalia: Well developed.

Eggs: USNM 193071 with 8 eggs in marsupium.

Parasites: USNM 156795 with male and female isopod in brood chamber (outline of female inside ostracode carapace shown in Figure 14a).

Comparisons: The new species *V. magna* is much larger than other species of the genus reported in the western Atlantic. The adult female types have carapace lengths of 3.52–4.06 mm, whereas, other species of *Vargula* in the area have lengths less than 3 mm. The female *Vargula norvegica* Baird, 1860, does not have the triangular caudal process of *V. magna*.

***Vargula* species and species indeterminate**

Hulings (1967:311) tentatively referred specimens collected at six R/V *Vema* stations off Newfoundland and Greenland (91–448 m depth) to *Cypridina norvegica* Baird (= *Vargula norvegica* (Baird, 1860)). His identified specimens could not be located; however, the Smithsonian collections contain samples collected at two of the Greenland stations listed by Hulings. One of the samples (from sta V-16-50) contains 2 juvenile cypridinids (1 A-1 male, USNM 193092A; 1 A-1 ?female, USNM 193092B). Both specimens belong to the genus *Vargula* and probably to the species *V. norvegica*, but certain placement of the species in the vicinity of Greenland should be

based on mature specimens. Both specimens are herewith referred to *Vargula* species. A second sample (from sta V-16-48) contains 1 juvenile cypridinid (instar I, USNM 193093). It also belongs to the genus *Vargula* but because 1st instars are difficult to identify at the species level, the specimen is herewith referred to *Vargula* species indeterminate. The identity of specimens from off New Foundland tentatively referred by Hulings (1967:311) to *V. norvegica* requires confirmation.

Specimens referred to *Vargula* species or *Vargula* species indeterminate herein are listed in the "Station Data and Specimens Examined." Except for the Greenland specimens, distribution is shown in Map 2.

Genus and Species Inquirenda

***Cypridina flatus* Tressler, 1949**

FIGURE 17

Cypridina flatus Tressler, 1949:336, figs. 15, 16.

HOLOTYPE.—USNM 88845, unique female, length 2.44 mm, height 1.50 mm.

TYPE-LOCALITY.—40 miles (64.4 km) south of No. 2 Red Channel Buoy, Tortugas, Florida;

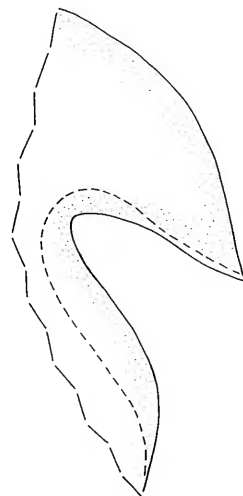


FIGURE 17.—*Cypridina flatus* Tressler, 1949, USNM 88845, holotype, female, length 2.44 mm, rostrum and incisur of right valve, outside view.

water depth 580–600 fathoms.

DISCUSSION.—The slide containing the holotype bears only 2 separated valves, no appendages. Tressler illustrated only the shell and furca of this species, and stated (1949:336) that the antennae and other appendages are typical of the genus. From the morphology of the shell it is possible to conclude that the species is a member of the subfamily Cypridininae. The convex outline of the anterior margin of the rostrum (Figure 17) shows that the specimen probably does not belong in *Cypridina* sensu Poulsen (1962:255). Without knowledge of the morphology of additional appendages and the upper lip, it is not possible with certainty to refer this species to any particular genus of Cypridinidae. With the little that is known about the species, it would be difficult to identify additional specimens. There-

fore, I hereby refer *Cypridina flatus* to the category "Genus and Species Inquirenda," and do not discuss it further in the present paper.

***Cypridina* sp.**

Cypridina sp.—Hulings, 1958:166.

This species was listed by Hulings (1958:166) as living in the outer neritic zone of the west coast of Florida. The identification by Hulings was prior to revision of the Cypridinidae by Poulsen (1962). No specimens of *Cypridina* sensu Poulsen are in the present collections. The deposition of the Hulings' specimens is unknown, and they may not be extant. Therefore, I hereby refer *Cypridina* sp. sensu Hulings, 1958, to the category "Genus and Species Inquirenda," and do not discuss it further in the present paper.

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