

Rutidermatidae  
of the Continental Shelf  
of Southeastern North America  
and the Gulf of Mexico  
(Ostracoda: Myodocopina)

LOUIS S. KORNICKER

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Rutidermatidae of the Continental Shelf  
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*Louis S. Kornicker*



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## ABSTRACT

Kornicker, Louis S. Rutidermatidae of the Continental Shelf of Southeastern North America and the Gulf of Mexico (Ostracoda: Myodocopina). *Smithsonian Contributions to Zoology*, number 371, 89 pages, 51 figures, 3 plates, 1 table, 1983.—The distribution of Rutidermatidae, consisting of the genus *Alternochelata* with 2 species (1 new) and the genus *Rutiderma* with 11 species (7 new) on the continental shelf of southeastern North America, the Gulf of Mexico, and the West Indies and Bermuda is discussed. The new species, as well as some previously known species, are described and illustrated (1 of the new species is left in open nomenclature).

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# Rutidermatidae of the Continental Shelf of Southeastern North America and the Gulf of Mexico (Ostracoda: Myodocopina)

*Louis S. Kornicker*

## Introduction

This work mainly concerns the Rutidermatidae living on the continental shelf of southeastern North America and the northern half of the Gulf of Mexico. It also includes a few small collections from the West Indies and Bermuda. Localities in the West Indies south of latitude 24°S and in Bermuda are not included in maps showing distributions of species (Figures 1-4), but they are listed in Table 1.

The study includes discussions of species of Rutidermatidae previously reported from the study area, as well as those obtained in new collections. Two genera and 13 species (8 new) are known from the study area. One of the new species is not formally named, because it will be described by Anne C. Cohen (in prep.) from specimens collected in Belize. Keys are constructed for the genera and species in the study area. Specimens recorded as *Rutiderma* species indeterminate herein are not included on distribution maps or in Table 1. Zoogeographic analyses will be attempted after my completion of work on the 4 remaining families of Cypridinacea, which is in progress.

DISPOSITION OF SPECIMENS.—Most of the speci-

mens have been deposited at the National Museum of Natural History, Smithsonian Institution. These have been assigned USNM numbers. The disposition of other specimens is given in the text in the appropriate section where the species is described. The specimens in the material examined sections are listed in the same order as the station data.

ACKNOWLEDGMENTS.—Credits are given in the "Station Data" to the individuals and institutions who have contributed specimens used in this study. The collecting of many specimens was 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 carapaces and for inking illustrations of the adult male of *Alvernochelata sikorai*, and males and females of *Rutiderma kalkei* and *Rutiderma* species B; Kathryn Schroeder Brown for assisting in preparation and inking of appendage drawings; I.G. Sohn and Anne C. Cohen for reviewing the manuscript; and Joan B. Horn for final editing and preparation of the manuscript for publication.

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**Station Data**

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

**NORTH CAROLINA CONTINENTAL SHELF**

Collected aboard R/V *Easton*. Received from Donald Weston, Virginia Institute of Marine Science, Gloucester Point, Virginia.

Cruise E-5-77, Aug 1977.

Sta 015-1; 34°37'54"N, 76°09'36"W; 36 m.

*Rutiderma licinum*: 1 specimen (USNM 158569); 3 specimens returned to Donald Weston.

Cruise E-8-77, Oct 1977.

Sta 005-1; 34°35'30"N, 76°05'30"W; 38 m.

*Rutiderma darbyi*: 1 specimen (USNM 158566).

Sta 006-1; 34°38'00"N, 76°05'48"W; 39 m.

*Rutiderma darbyi*: 1 specimen (USNM 158567).

Bureau of Land Management Southeast Coastal Study; received from Linda H. Pequegnat, Texas A&M University.

Sta 0114-1 (1E); 10 Feb 1977; 32°12'N, 77°36'W; 44 m.

*Rutiderma darbyi*: 1 juvenile (USNM 158185).

Sta 0114-3 (1E); 10 Feb 1977; 32°12'N, 77°36'W; 44 m.

*Rutiderma darbyi*: 2 specimens (USNM 158186).

Bureau of Land Management Southeast Coastal Study; received from J. Kevin Shaw, Texas Instruments Incorporated.

Sta 0118-5 (1D); 11 Feb 1977; 33°20'10.3"N, 77°44'58.6"; 28 m.

*Rutiderma darbyi*: 5 specimens (USNM 158807).

Bureau of Land Management Southeast Coastal Study; collected by Texas Instruments Incorporated; received from Marcia Bowen, Virginia Institute of Marine Science.

Sta 0720-5 (1C); 16 Aug 1977; 33°35'00.2"N, 78°03'59.0"W; 19 m.

*Rutiderma darbyi*: 1 specimen (USNM 158831).

**SOUTH CAROLINA CONTINENTAL SHELF**

Bureau of Land Management Southeast Coastal Study; received from Linda H. Pequegnat, Texas A&M University.

Sta 0131-3 (2B); 12 Feb 1977; 32°54'N, 79°12'W; 16 m.

*Rutiderma darbyi*: 2 ovigerous females (USNM 158192).

Sta 0140-2 (2D); 13 Feb 1977; 32°45'N, 78°56'W; 30 m.

*Rutiderma darbyi*: 1 ovigerous female (USNM 158195).

Sta 0146-1 (2E); 14 Feb 1977; 32°40'N, 78°47'W; 36 m.

*Rutiderma darbyi*: 1 ovigerous female and 2 juveniles (USNM 158182).

Sta 0170-3 (3C); 17 Feb 1977; 32°13'N, 79°52'W; 24 m.

*Rutiderma darbyi*: 1 ovigerous female (USNM 158194); 1 specimen returned to sender.

Sta 0177-2 (3E); 18 Feb 1977; 32°01'N, 79°31'W; 43 m.

*Rutiderma mollitum*: 1 juvenile female (USNM 158203).

Sta 0177-4 (3E); 18 Feb 1977; 32°01'N, 79°31'W; 43 m.

*Rutiderma darbyi*: 1 specimen with chonistomatid copepod parasite (USNM 158109).

*Rutiderma mollitum*: 1 adult female (USNM 158204).

Bureau of Land Management Southeast Coastal Study; received from J. Kevin Shaw, Texas Instruments Incorporated.

Sta 0136-3 (2C); 13 Feb 1977; 32°50'02.0"N, 79°03'58.0"W; 22 m.

*Rutiderma darbyi*: 3 specimens (USNM 158806).

Sta 0136-5 (2C); 13 Feb 1977; 32°50'02.0"N, 79°03'58.0"W; 22 m.

*Rutiderma darbyi*: 2 specimens (USNM 158805).

Sta 0136-6 (2C); 13 Feb 1977; 32°50'02.0"N, 79°03'58.0"W; 22 m.

*Rutiderma darbyi*: 2 specimens (USNM 158815).

Sta 0140-6 (2D); 13 Feb 1977; 32°44'53.5"N, 78°55'56.8"W; 30 m.

*Rutiderma darbyi*: 2 specimens (USNM 158809).

Sta 0150-5 (2F); 14 Feb 1977; 32°36'01.0"N, 78°38'57.0"W; 44 m.

*Rutiderma darbyi*: 1 juvenile (USNM 158799).

Sta 0170-4 (3C); Feb 1977; 32°13'00.5"N, 79°52'02.2"W; 22 m.

*Rutiderma darbyi*: 2 specimens (USNM 158796).

Sta 0170-5 (3C); 17 Feb 1977; 32°13'00.5"N, 79°52'02.2"W; 22 m.

*Rutiderma darbyi*: 3 specimens (USNM 158800).

**GEORGIA CONTINENTAL SHELF**

Bureau of Land Management Southeast Coastal Study; received from Linda H. Pequegnat, Texas A&M University.

Sta 0194-3 (4D); 20 Feb 1977; 31°40'N, 80°16'W; 26 m.

*Rutiderma darbyi*: 1 juvenile (USNM 158183).

Sta 0194-1 (4D); 24 Feb 1977; 31°40'N, 80°16'W; 26 m.

*Rutiderma darbyi*: 1 ovigerous female (USNM 158193).

Sta 0215-1 (5B); 1 Feb 1977; 31°12'N, 81°08'W; 11 m.

*Rutiderma mollitum*: 1 adult female (USNM 158207).

*Rutiderma darbyi*: 1 juvenile (USNM 158184).



- Sta 0215-1 (5B); 21 Feb 1977; 31°12'N, 81°08'W; 11 m.  
*Rutiderma mollitum*: 1 adult female (USNM 158205), 2 ovigerous females (USNM 158001, 158004).  
*Rutiderma darbyi*: 1 juvenile male (USNM 158190); 1 specimen with female chonistomatid parasite (USNM 158199); 2 specimens returned to sender.
- Sta 0225-2 (5D); 25 Feb 1977; 31°05'N, 80°35'W; 26 m.  
*Rutiderma darbyi*: 1 ovigerous female + 1 juvenile (USNM 158196).
- Sta 0225-3 (5D); 25 Feb 1977; 31°05'N, 80°35'W; 26 m.  
*Rutiderma darbyi*: 2 ovigerous females (USNM 158002; 158003, holotype) [female and juvenile chonistomatid copepods from 158003 sent to Janet Bradford (1980:141)].
- Sta 0230-3 (5E); 26 Feb 1977; 31°03'N, 80°26'W; 33 m.  
*Rutiderma mollitum*: 1 juvenile male (USNM 158202).
- Sta 0238-2 (5G); ? Feb 1977; 30°59'N, 80°08'W; 41 m.  
*Rutiderma darbyi*: 1 ovigerous female (USNM 158200).
- Sta 0243-2 (5H); 22 Feb 1977; 30°57'N, 79°58'W; 101 m.  
*Rutiderma mollitum*: 1 juvenile female (USNM 158206).

Bureau of Land Management Southeast Coastal Study; collected by Texas Instruments Incorporated; received from Marcia Bowen, Virginia Institute of Marine Science.

- Sta 0234-5 (5F); 26 Feb 1977; 31°01'01.6"N, 80°16'56.3"W; 37 m.  
*Rutiderma darbyi*: 1 specimen (USNM 158830).

Bureau of Land Management Southeast Coastal Study; received from J. Kevin Shaw, Texas Instruments Incorporated.

- Sta 0220-5 (5C); 25 Feb 1977; 31°08'00.0"N, 80°49'57.3"W; 19 m.  
*Rutiderma darbyi*: 1 specimen (USNM 158801).  
*Rutiderma mollitum*: 1 specimen (USNM 158802).
- Sta 0220-6 (5C); 25 Feb 1977; 31°08'00.0"N, 80°49'57.3"W; 19 m.  
*Rutiderma darbyi*: 1 specimen (USNM 158803).  
*Rutiderma mollitum*: 2 specimens (USNM 158804).
- Sta 0527-1 (5E); 16 May 1977; 31°02'58.0"N, 80°25'58.5"W; 33 m.  
*Rutiderma darbyi*: 1 specimen (USNM 158816).
- Sta 0531-4 (5F); 16 May 1977; 31°01'01.6"N, 80°16'56.3"W; 37 m.  
*Rutiderma darbyi*: 1 specimen (USNM 158810).  
*Rutiderma mollitum*: 2 specimens (USNM 158811).
- Sta 0531-6 (5F); 16 May 1977; 31°01'01.6"N, 80°16'56.3"W; 37 m.  
*Rutiderma darbyi*: 4 specimens (USNM 158817).  
*Rutiderma mollitum*: 4 specimens (USNM 158818).
- Sta 0540-5 (5H); 17 May 1977; 30°57'06.0"N, 79°58'03.7"W; 101 m.

- Rutiderma darbyi*: 1 specimen (USNM 158813).  
*Rutiderma mollitum*: 1 specimen (USNM 158812).

In collection of the Museum of Paleontology, University of Michigan (UMMP); received from Robert V. Kesling.

- Off Sapelo Island; Aug 1961; Darby (1965:29) gives depths of hypotypes as 57-441 ft (17.4-134.4 m), but he does not give depths at which individual specimens were collected.  
*Rutiderma darbyi*: 3 specimens (UMMP 48788, 48789, 48790).
- Off Sapelo Island; August 1961; 19.8 m.  
*Rutiderma mollitum*: 1 female (UMMP 48791, holotype), 1 female (UMMP 48792, paratype).

#### FLORIDA CONTINENTAL SHELF

##### Atlantic

Bureau of Land Management Southeast Coastal Study; received from Linda H. Pequegnat, Texas A&M University.

- Sta 0258-1 (6C); 28 Feb 1977; 30°23'N, 80°51'W; 29 m.  
*Rutiderma darbyi*: 1 juvenile (USNM 158188); 1 ovigerous female + 5 juvenile males (USNM 158191).
- Sta 0258-2 (6C); 28 Feb 1977; 30°23'N, 80°51'W; 29 m.  
*Rutiderma darbyi*: 1 specimen (USNM 158197).
- Sta 0265-1 (6E); 1 Mar 1977; 30°23'N, 80°26'W; 39 m.  
*Rutiderma darbyi*: 1 specimen (USNM 158187).
- Sta 0265-3 (6E); 1 Mar 1977; 30°23'N, 80°26'W; 39 m.  
*Rutiderma darbyi*: 1 juvenile male (USNM 158198).  
*Rutiderma mollitum*: 1 adult male (USNM 158209).
- Sta 0269-2 (6F); 1 Mar 1977; 30°23'N, 80°18'W; 43 m.  
*Rutiderma mollitum*: 1 juvenile male (USNM 158210).  
*Rutiderma* species indeterminate: 1 early instar (USNM 158211).
- Sta 0269-3 (6F); 1 Mar 1977; 30°23'N, 80°18'W; 43 m.  
*Rutiderma darbyi*: 1 specimen (USNM 158201).

Bureau of Land Management Southeast Coastal Study; received from J. Kevin Shaw, Texas Instruments Incorporated.

- Sta 0258-4 (6C); 28 Feb 1977; 30°22'59.2"N, 80°50'59.7"W; 26 m.  
*Rutiderma darbyi*: 4 specimens (USNM 158797).
- Sta 0258-5 (6C); 28 Feb 1977; 30°22'59.2"N, 80°50'59.7"W; 26 m.  
*Rutiderma darbyi*: 4 specimens (USNM 158795).
- Sta 0258-6 (6C); 28 Feb 1977; 30°22'59.2"N, 80°50'59.7"W; 26 m.

*Rutiderma darbyi*: 3 specimens (USNM 158798).

Sta 0556-6 (7C); 20 May 1977; 29°31'00.0"N, 80°40'01.0"W; 20 m.

*Rutiderma darbyi*: 3 specimens (USNM 158814).

Off Hutchinson Island, St. Lucie County, Florida, station no. 4; 27°20'42"N, 80°12'48"W; east of Florida Power and Light electrical generating plant; 7 Sep 1972. Salinity: surface and bottom both 35.0 parts per thousand; surface 31.5°C, bottom 32°C; collected at bottom 10.9 m; Shipek grab sampler; collected by W.G. Lyons, C.R. Futch, R.M. Gallagher; received from D.K. Camp; specimens reported as "Ostracoda" in Camp et al. (1977:10).

Field no. EJ-72-175, HI-424.

*Rutiderma mollitum*; 1 specimen returned to D.K. Camp.

Field no. EJ-72-177, HI-426.

*Rutiderma mollitum*: 1 specimen returned to D.K. Camp.

"Jeff's Reef"; R/V *Johnson*, cruise J-042, Johnson Sea Link II, dive number 184; 15 April 1977; 27°32'48"N, 79°58'48"W; 80.2 m; collected by F. Stanton; using lockout diver.

*Rutiderma gyre*: 1 ovigerous female (USNM 158363).

Pepper State Park, St. Lucie Co., ledge dive number LD-17A; 25 Jan 1977; 27°29'36"N, 80°17'18"W; 6.1 m; collected by J.K. Reed using Scuba gear.

*Rutiderma gyre*: 2 juveniles returned to John E. Miller, Harbor Branch Foundation.

Biscayne Key, sta 1, 11 Jul 1965; intertidal to 2 m; collected by D.W. Kirtley.

*Rutiderma darbyi*: 1 male (USNM 152851)

Biscayne Bay, Rickenbacker Causeway, opposite entrance to Marine Stadium, in sea grasses just below low tide; 30 Apr 1976; collected by F.M. Bayer.

*Rutiderma darbyi*: 1 juvenile male (USNM 158189).

Virginia Key, northeast shore facing Bear Cut; 17 Feb 1976; tidal flat with rocks, green algae (*Caulerpa*, *Padina*); sample collected by F.M. Bayer with small net in few centimeters of water drawn along sediment between rocks.

*Rutiderma darbyi*: 2 juveniles (USNM 156737).

Biscayne Bay, north end of Virginia Key, Norris Cut, opposite Fisher Island, 17 Feb 1976; tidal flat with *Diplanthera*; residue from surface sediment, collected with small net in few centimeters of water by F.M. Bayer.

*Rutiderma darbyi*: 1 adult male (USNM 156741).

Fleming Key, Key West, sta KW-17, 24 May 1967; subtidal, collected by M.L. Jones.

*Rutiderma cohenae*: 1 juvenile (USNM 158213).

Mouth of Florida Bay; 209 Apr 1965; R/V *Hernan Cortez*, cruise 17, sta VII, 24°55'N, 81°17'W; 3.8 m.

*Rutiderma darbyi*: 1 adult female (USNM 158618).

#### Gulf of Mexico

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 I, west of southern part of Florida peninsula.

Sta 2101; 26°24'59.6"N, 82°15'08.9"W; 10 m. I have grouped samples collected from May 1975 to Dec 1977.

*Rutiderma darbyi*: 9 specimens (USNM 158678, 158664, 158663, 158707, 158706, 158709, 158785, 158786, 158780).

*Rutiderma mollitum*; 1 male (USNM 158708).

Sta 2102; 26°24'59.6"N, 82°24'59.6"W; 18 m. I have grouped samples collected from May 1975 to Dec 1977.

*Rutiderma darbyi*: 14 specimens (USNM 158677, 158676, 158705, 158710, 158704, 158770, 158789, 158779, 158777).

Sta 2103; 26°25'00.0"N, 82°51'59.7"W; 38 m. I have grouped 11 samples collected from May 1975 to 1976 (?).

*Rutiderma darbyi*: 8 specimens (USNM 158668, 158673, 158667, 158674, 158670, 158665).

*Rutiderma licinum*: 4 specimens (USNM 158671, 158727, 158720).

Sta 2104; 26°25'00.0"N, 83°23'00.8"W; 53 m. I have grouped 7 samples collected from May 1975 to Dec 1977.

*Rutiderma darbyi*: 2 specimens (USNM 158782, 158722).

*Rutiderma licinum*: 5 specimens (USNM 158672, 158666, 158669, 158726, 158728).

- Rutiderma gyre*: 2 specimens (USNM 158675, 158721).  
*Rutiderma mollitum*: 3 specimens (USNM 158781, 158723).
- Sta 2105; 26°24'59.5"N, 83°49'57.6"W; 90 m. I have grouped 6 samples collected from Sep 1975 to 1976(?).  
*Rutiderma mollitum*: 8 specimens (USNM 158732, 158733, 158734, 158735, 158731, 158729).
- Sta 2106; May 1975; 26°24'56.8"N, 84°15'00.0"W; 168 m. One sample (2106B).  
*Rutiderma darbyi*: 9 specimens (USNM 158679).
- Transect II, west of middle part of Florida peninsula.  
 Sta 2207; 27°57'00.4"N, 83°09'00.3"W; 17 m. I have grouped 7 samples collected from Jul 1975 to Nov 1977.  
*Rutiderma darbyi*: 6 specimens (USNM 158703, 158714, 158773, 158784).  
*Rutiderma licinum*: 2 specimens (USNM 158702, 158791).  
*Rutiderma mollitum*: 3 specimens (USNM 158772, 158774, 158783).
- Sta 2208; 27°56'00.5"N, 83°27'29.6"W; 28 m. I have grouped 2 samples collected in 1976(?).  
*Rutiderma darbyi*: 2 specimens (USNM 158712, 158711).
- Sta 2209; 27°52'30.5"N, 83°33'59.0"W; 33 m. One sample (2209 D 22) collected in Sep 1975.  
*Rutiderma darbyi*: 1 male (USNM 158716).
- Sta 2211; 27°56'29.5"N, 83°52'59.5"W; 40 m. I have grouped 13 samples collected from Jul 1975 to Jul 1978.  
*Rutiderma darbyi*: 5 specimens (USNM 158718, 158660, 158653, 158658).  
*Rutiderma licinum*: 1 male (USNM 158662).  
*Rutiderma mollitum*: 13 specimens (USNM 158700, 158701, 158661, 158655, 158659, 158736).  
*Rutiderma gyre*: 7 specimens (USNM 158717, 158719, 158656, 158654, 158657, 158741).
- Sta 2212; Sep 1975; 27°51'00.0"N, 84°47'59.6"W; 190 m. One sample (2212 F 22).  
*Rutiderma mollitum*: 1 specimen (USNM 158715).
- Transect III, west of northern part of Florida peninsula.  
 Sta 2316; 28°42'00.3"N, 84°20'00.7"W; 33 m. I have grouped 4 samples collected from Aug 1977 to Nov 1977.  
*Rutiderma darbyi*: 1 juvenile (USNM 158792).  
*Rutiderma licinum*: 4 specimens (USNM 158767, 158769, 158752).
- Sta 2318; Aug 1977; 29°05'00.8"N, 83°45'00.5"W; 20 m. One sample (2318C).  
*Rutiderma licinum*: 1 specimen (USNM 158771).
- Transect IV, southwest of northern end of Florida peninsula.  
 Sta 2419; Sep 1977; 29°46'59.8"N, 84°05'00.2"W; 10 m. Three samples (2419C, G, H).  
*Rutiderma darbyi*: 7 specimens (USNM 158758, 158754, 158755).
- Sta 2423; 29°20'00.4"N, 84°44'02.3"W; 30 m. I have grouped 4 samples collected from Sep 1977 to Nov 1977.  
*Rutiderma licinum*: 1 specimen (USNM 158757).  
*Rutiderma mollitum*: 3 specimens (USNM 158760, 158761, 158766).
- Transect V, southwest of eastern end of Florida.  
 Sta 2528; 29°54'58.6"N, 86°04'58.5"W; 36 m. I have grouped 4 samples collected from Aug 1973(?) to Sep 1977.  
*Rutiderma darbyi*: 2 specimens (USNM 158759, 158763).  
*Rutiderma licinum*: 2 specimens (USNM 158742, 158756).
- Sta 2531; Sep 1977; 29°47'58.9"N, 86°09'28.9"W; 47 m. I have grouped 2 samples (2531C, G).  
*Rutiderma mollitum*: 2 specimens (USNM 158765, 158762).
- Transect VII, on continental shelf west of middle of Florida peninsula.  
 Sta 2747; Aug-Sep, 1977; 27°24'12"N, 84°07'18"W; 76 m. One sample (2747-04).  
*Rutiderma mollitum*: 1 specimen (USNM 158794).
- Sta 2748; 27°37'12"N, 83°53'30"W; 50 m. I have grouped 5 samples collected between summer 1976 and Feb 1978.  
*Rutiderma darbyi*: 1 specimen (USNM 158787).  
*Rutiderma gyre*: 1 ovigerous female (USNM 158824).  
*Rutiderma mollitum*: 3 specimens (USNM 158790, 158775, 158740).
- Sta 2749; 6 Feb 1978; 27°51'54"N, 83°27'12"W; 34 m. One sample.  
*Rutiderma mollitum*: 1 male (USNM 158738).
- Transect IX, on continental shelf west of southern tip of Florida peninsula.  
 Sta 2960; 25°40'N, 82°20'W; 27 m. I have grouped 5 samples collected from Aug 1977 to Feb 1978.  
*Rutiderma darbyi*: 7 specimens (USNM 158793, 158776, 158778, 158737, 158739).
- Supplemental transect, on continental shelf west of middle part of Florida peninsula.  
 Sta 2851; summer 1976; 27°03'25.8"N, 83°01'08.5"W; 36 m. I have grouped 3 samples.  
*Rutiderma darbyi*: 1 adult male (USNM 158819).  
*Rutiderma licinum*: 4 ovigerous females (USNM 158823, 158827, 158829).
- Sta 2852; summer 1976; 28°30'00.4"N, 83°29'58.4"W; 22 m. I have grouped 5 samples.  
*Rutiderma darbyi*: 10 specimens (USNM 158828, 158822, 158826, 158820, 158821).  
*Rutiderma licinum*: 2 specimens (USNM 158825).
- Sta 2853; Sep 1977; 29°18'01.9"N, 84°19'59.0"W; 29 m. One sample (2853J).  
*Rutiderma darbyi*: 1 ovigerous female (USNM 158768).
- Sta 2855; Sep 1977; 30°08'02.1"N, 86°30'00.0"W; 40 m. One sample (2855D).  
*Rutiderma licinum*: 2 specimens (USNM 158158764).

Florida continental shelf off Panama City; 8 Apr 1958; 30°02'24"N, 86°14'12"W; water depth about 40 m; collected by M. L. Jones.

*Rutiderma mollitum*: 1 specimen (USNM 158832).

### Southwest Florida

Bureau of Land Management Southwest Florida Continental Shelf Study. Specimens collected by, and returned to, James K. Culter, 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 unseled spade corer.

Sta 2; 14 Nov 1980; 26°45'50"N, 82°45'11"W; 24.4 m.

*Rutiderma darbyi*: 2 specimens (USNM 158628A,B).

*Rutiderma licinum*: 7 specimens (USNM 158629).

Sta 2; 2 May 1981

*Rutiderma licinum*: 10 specimens.

Sta 4; 31 Oct 1980; 26°45'49"N, 83°32'07"W; 55.8 m.

*Rutiderma gyre*: 2 specimens

*Rutiderma licinum*: 2 specimens.

*Rutiderma mollitum*: 4 specimens.

Sta 4; 1 May 1981

*Rutiderma gyre*: 6 specimens.

*Rutiderma licinum*: 6 specimens.

*Rutiderma mollitum*: 5 specimens.

Sta 4; 21 Jul 1981

*Rutiderma gyre*: 1 specimen.

*Rutiderma mollitum*: 4 specimens.

Sta 4; 31 Jan 1982

*Rutiderma gyre*: 9 specimens.

*Rutiderma mollitum*: 3 specimens.

Sta 5; 1 Nov 1980; 26°45'42"N, 84°00'08"W; 90.8 m.

*Rutiderma mollitum*: 6 specimens.

Sta 5; 1 May 1981

*Rutiderma mollitum*: 10 specimens.

Sta 5; 22 Jul 1981

*Rutiderma mollitum*: 6 specimens.

Sta 5; 31 Jan 1982

*Rutiderma mollitum*: 18 specimens.

Sta 6; 6 Nov 1980; 26°16'47"N, 82°38'21"W; 26.5 m.

*Rutiderma licinum*: 9 specimens.

Sta 6; 1 May 1981

*Rutiderma licinum*: 13 specimens.

Sta 6; 28 Jul 1981

*Rutiderma licinum*: 11 specimens.

Sta 6; 2 Feb 1982

*Rutiderma licinum*: 9 specimens.

Sta 8; 5 Nov 1980; 26°16'43"N, 83°12'49"W; 48.5 m.

*Rutiderma licinum*: 5 specimens.

Sta 14; 8 Nov 1980; 25°46'01"N, 82°23'49"W; 26.0 m.

*Rutiderma licinum*: 16 specimens.

Sta 14; 28 Apr 1981

*Rutiderma licinum*: 9 specimens.

Sta 14; 28 Jul 1981

*Rutiderma darbyi*: 1 specimen.

*Rutiderma licinum*: 21 specimens.

Sta 14; 12 Feb 1982

*Rutiderma licinum*: 16 specimens.

Sta 16; 9 Nov 1980; 25°45'42"N, 83°11'04"W; 53.9 m.

*Rutiderma licinum*: 16 specimens.

Sta 16; 28 Apr 1981

*Rutiderma licinum*: 2 specimens.

Sta 16; 27 Jul 1981

*Rutiderma gyre*: 1 specimen.

*Rutiderma licinum*: 6 specimens.

Sta 16; 12 Feb 1982

*Rutiderma darbyi*: 6 specimens.

*Rutiderma gyre*: 2 specimens.

*Rutiderma mollitum*: 2 specimens.

Sta 18; 15 Nov 1980; 25°45'37"N, 83°42'13"W; 86.6 m.

*Rutiderma mollitum*: 3 specimens.

Sta 18; 4 Apr 1981

*Rutiderma mollitum*: 3 specimens.

Sta 20; 18 Nov 1980; 25°17'20"N, 82°09'44"W; 22.5 m.

*Rutiderma darbyi*: 28 specimens.

Sta 20; 27 May 1981

*Rutiderma darbyi*: 1 specimen.

*Rutiderma gyre*: 2 specimens.

*Rutiderma licinum*: 4 specimens.

Sta 20; 29 Jul 1981

*Rutiderma darbyi*: 12 specimens.

*Rutiderma mollitum*: 1 specimen.

Sta 20; 12 Feb 1982

*Rutiderma darbyi*: 46 specimens.

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

*Rutiderma darbyi*: 2 specimens.

*Rutiderma gyre*: 4 specimens including 1 adult male.

*Rutiderma licinum*: 5 specimens.

Sta 22; 26 April 1981

*Rutiderma darbyi*: 1 specimen

*Rutiderma gyre*: 2 specimens.

*Rutiderma licinum*: 4 specimens.

Sta 22; 1 Aug 1981

*Rutiderma darbyi*: 2 specimens.

*Rutiderma licinum*: 2 specimens.

Sta 22; 11 Feb 1982

*Rutiderma licinum*: 1 specimen.

Sta 24; 1 Aug 1981; 25°16'54"N, 83°43'11"W; 88.4 m

*Rutiderma mollitum*: 1 specimen.

Sta 28; 20 Nov 1980; 24°47'07"N, 83°13'05"W; 58.5 m.

*Rutiderma darbyi*: 1 specimen.

*Rutiderma gyre*: 7 specimens.

*Rutiderma licinum*: 7 specimens.

Sta 28; 24 Apr 1981

- Rutiderma gyre*: 6 specimens.  
*Rutiderma licinum*: 4 specimens.  
 Sta 28; 4 Aug 1981  
*Rutiderma gyre*: 4 specimens.  
*Rutiderma licinum*: 3 specimens.  
 Sta 28; 11 Feb 1982  
*Rutiderma gyre*: 4 specimens.  
*Rutiderma licinum*: 1 specimen.  
 Sta 37; 2 Aug 1981; 25°16'38"N, 84°09'23"W; 148.0 m.  
*Rutiderma gyre*: 1 specimen.

Southwest Florida Continental Shelf off Pinellas County; collected by, and returned to, James K. Culter, Mote Marine Laboratory, Sarasota, Florida. Vials contained specimens from one or more stations. Substrate fine to coarse sand. Localities of these specimens not shown on maps.

- Vial C, containing specimens collected on 28–30 May 1980 from 11 stations between 27°55'06"N–28°10'00"N and 82°50'45"W–83°01'36"W; depth range 5.4–13.9 m; and on 13–17 Oct 1980 from 9 stations in same area.  
*Rutiderma darbyi*: 15 specimens.  
*Rutiderma mollitum*?: 1 juvenile.  
 Vial E, containing specimens collected on 28–30 May 1980 from 3 stations and on 13–17 Oct 1980 from 4 stations in same area as vial C; depth range 8.4–13.9 m.  
*Rutiderma darbyi*: 29 specimens.  
*Rutiderma mollitum*: 1 specimen.  
 Vial L, containing specimens collected between 13–17 Oct 1980 at a single station at 28°03'30"N, 82°59'36"W; depth 11.7 m.  
*Rutiderma darbyi*: 3 specimens.  
*Rutiderma mollitum*: 1 adult female.

#### ALABAMA 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 VI.

- Sta 2640; Sep 1977; 29°43'29.3"N, 87°54'30.3"W; 35 m.  
 I have grouped 2 samples (2640D, E).  
*Rutiderma licinum*: 2 specimens (USNM 158751, 158750).  
 Sta 2643; 1974; 29°36'31.0"N, 87°27'00.8"W; 68 m. I have grouped 6 samples.  
*Rutiderma licinum*: 7 specimens (USNM 158749, 158744, 158745, 158743, 158748).  
*Rutiderma gyre*: 1 specimen (USNM 158747).  
*Rutiderma mollitum*: 1 specimen (USNM 158746).

#### 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-1; 20 Jun 1977; 60 m.  
*Rutiderma gyre*: 1 ovigerous female (USNM 157999); 1 adult male (USNM 158000).  
 Sta THR-2; 20 Jun 1977; water depth 62 m.  
*Rutiderma gyre*: 1 specimen (USNM 158850).  
 Sta THR-3; 20 Jun 1977; 61 m.  
*Altenochelata sikorai*: 9 specimens (USNM 158484); 1 specimen sent to Dr. Linda Pequegnat, Texas A&M University, at request of Dr. Sikora.

#### TEXAS CONTINENTAL SHELF

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

- Sta EFG-1; 11 Jun 1977; 1 mile upstream of East Flower Garden; 117 m.  
*Altenochelata sikorai*: 1 adult female (USNM 158486); 1 juvenile (USNM 158852).  
 Sta EFG-1; 14 Sep 1977; 116 m.  
*Altenochelata sikorai*: 1 adult female (USNM 158022).  
 Sta EFG-2; 14 Sep 1977; one-half mile upstream of East Flower Garden; 112 m.  
*Altenochelata sikorai*: 2 adult females (USNM 158027, holotype; 158483).  
 Sta EFG-2; 15 Mar 1978; 115 m.  
*Altenochelata sikorai*: 1 adult female (USNM 158485A); 1 juvenile male (USNM 158485B).  
 Sta EFG-4; 17 Jun 1977; 99 m; 1 mile downstream of East Flower Garden.  
*Rutiderma gyre*: 1 adult male (USNM 158841).

East Flower Garden, at base of canyon leading from brine seep; received from Eric N. Powell, Texas A&M University.

- Sta 902-3; 2–5 Sep 1980; 70–75 m.  
*Rutiderma gyre*: 1 ovigerous female (USNM 158833).

"28 Fathom Bank", off Galveston; 27°54'53"N, 93°26'50"W; received from Rosalie Maddocks, University of Houston, who had received collection from Richard Titgen, Department of Oceanography, Texas A&M University.

- Sta 3-1; 4 Sep 1976; 77 m.  
*Rutiderma gyre*: 3 specimens (USNM 158646).

- Sta 3-2; 4 Sep 1976; 77 m.  
*Rutiderma gyre*: 2 specimens (USNM 158647).  
 Sta 3-3; 4 Sep 1976; 77 m.  
*Rutiderma gyre*: 1 specimen (USNM 158644).  
 Sta 3-4; 4 Sep 1976; 77 m.  
*Rutiderma gyre*: 2 specimens (USNM 158649).

Southwest peak of "28 Fathom Bank"; 27°53'24"N, 93°27'50"W; received from Rosalie Maddocks, who had received collection from Richard Titgen.

- Sta 2D; 2 Aug 1976; 76.8 m.  
*Rutiderma gyre*: 1 specimen (USNM 158652).  
 Sta 3A; 3 Aug 1976; 137.2 m.  
*Altemochelata sikorai*: 2 specimens (USNM 158651).

Gulf of Mexico, off Galveston, R/V *Gyre* (Texas A&M University); 1974; collector: David Gettle-son.

Cruise 10.

- Sta 8; 28°10'N, 94°18'W; 56 m.  
*Rutiderma licinum*: 1 specimen (USNM 157983), 4 specimens (USNM 157996).  
 Sta 16; 28°10'N, 94°18'W; 53.5 m.  
*Rutiderma gyre*: 2 specimens (USNM 157875), 2 ovigerous females (USNM 157988, holotype; USNM 157991).  
*Rutiderma licinum*: 4 specimens (USNM 157876), 1 adult female (USNM 157989), 1 specimen (USNM 157990).

Cruise 11.

- Sta 1; 28°24'N, 93°57'30"W; 49.25 m.  
*Rutiderma licinum*: 1 adult female (USNM 157987).  
 Sta 2; 28°22'36"N, 94°01'30"W; 49.75 m.  
*Rutiderma licinum*: 1 ovigerous female (USNM 157982), 2 specimens (USNM 157985; USNM 157986), 1 specimen (USNM 157998).  
 Sta 5; 28°19'30"N, 94°09'00"W; 50 m.  
*Rutiderma gyre*: 1 juvenile (USNM 157420), 1 adult female (USNM 154185).  
*Rutiderma licinum*: 1 juvenile male (USNM 157981), 1 specimen (USNM 157992).  
 Sta 7; 28°16'N, 94°06'30"W; 53 m.  
*Rutiderma gyre*: 1 adult male (USNM 157993).  
*Rutiderma licinum*: 1 ovigerous female (USNM 154186, holotype), 1 adult female (USNM 154187), 4 specimens (USNM 157874), 5 specimens (USNM 157877), 1 adult male (USNM 157878), 1 ovigerous female (USNM 157879), 7 specimens (USNM 157980), 1 juvenile (USNM 157984), 5 specimens (USNM 157995).  
 Sta 8; 28°15'18"N, 94°03'W; 57.75 m.  
*Rutiderma licinum*: 1 specimen (USNM 157997).

Stetson Bank; 28°10'N, 94°18'W; received from Rosalie Maddocks, University of Houston, who had received collection from Richard Titgen, Department of Oceanography, Texas A&M University.

- Sta STB-1A; 5 Aug 1976; 55.8 m.  
*Rutiderma gyre*: 3 specimens (USNM 158641).  
 Sta STB-1B; 5 Aug 1976; 55.8 m.  
*Rutiderma gyre*: 2 specimens (USNM 158639).  
 Sta STB-2B; 5 Aug 1976; 51.2 m.  
*Rutiderma gyre*: 2 specimens (USNM 158640).  
 Sta STB-2C; 5 Aug 1976; 51.2 m.  
*Rutiderma gyre*: 1 specimen (USNM 158633).  
*Rutiderma licinum*: 6 specimens (USNM 158632).  
 Sta STB-2D; 5 Aug 1976; 51.2 m.  
*Rutiderma gyre*: 4 specimens (USNM 158638).  
 Sta STB-2E; 5 Aug 1976; 52 m.  
*Rutiderma gyre*: 1 specimen (USNM 158636).  
*Rutiderma licinum*: 1 specimen (USNM 158637).  
 Sta STB-2F; 5 Aug 1976; 49.4 m.  
*Rutiderma gyre*: 8 specimens (USNM 158635).  
 Sta STB-3C; 6 Aug 1976; 54.9 m.  
*Rutiderma licinum*: 1 specimen (USNM 158631).  
 Sta STB-4A; 6 Aug 1976; 50 m.  
*Rutiderma gyre*: 1 specimen (USNM 158643).  
 Sta STB-4B; 6 Aug 1976; 50 m.  
*Rutiderma gyre*: 4 specimens (USNM 158634).  
 Sta STB-4C; 6 Aug 1976; 50 m.  
*Rutiderma gyre*: 2 specimens (USNM 158642).

South Texas Bureau of Land Management; Outer Continental Shelf Study; The University of Texas Marine Science Institute's benthic ecology group; collected aboard R/V *Longhorn* by University of Texas Marine Science Institute personnel. Received from Richard D. Kalke. Number separated by dash following USNM number is replicate number and is not part of USNM number. Six replicates of each sample were collected using a Smith-McIntyre bottom grab (0.1 square meter). See Flint, 1981, fig. 1, for map showing station localities.

Transect I, south of Port O'Connor.

- Sta 3; 16 Feb 1976; 27°34'N, 96°07'W; 134 m.  
*Altemochelata sikorai*: 1 adult female (USNM 158999-1), 1 specimen (USNM 158961-3), 1 juvenile (USNM 158974-5).  
 Sta 3; 28 Jun 1976.  
*Altemochelata sikorai*: 4 juveniles (USNM 158992-2), 2 adult females (USNM 158976-3), 2 specimens

- (USNM 158994-4), 1 juvenile (USNM 158968-6).  
Sta 3; 10 Oct 1976.  
*Altemochelata sikorai*: 1 juvenile (USNM 158952-1).  
Sta 3; 14 Feb 1977.  
*Altemochelata sikorai*: 1 specimen (USNM 158889-1), 4 specimens (USNM 158914-2), 2 juveniles (USNM 158915-3), 3 specimens (USNM 158918-4), 3 specimens (USNM 158919-6).  
Sta 3; 1 Jun 1977.  
*Altemochelata sikorai*: 4 specimens (USNM 158927-1), 4 juveniles (USNM 158928-3), 1 juvenile (USNM 158929-5), 1 ovigerous female + 1 juvenile (USNM 158940-6).  
Sta 3; 6 Oct 1977.  
*Altemochelata sikorai*: 1 juvenile (USNM 159012-3), 1 adult female (USNM 158908-5), 2 juveniles (USNM 158905-6).  
Sta 6; 16 Feb 1976; 27°39'N, 96°12'W; 100 m.  
*Altemochelata sikorai*: 1 juvenile (USNM 158944-1), 1 juvenile (USNM 158986-3), 1 juvenile (USNM 158991-5).  
Sta 6; 14 Jun 1976.  
*Altemochelata sikorai*: 7 specimens (USNM 158967-1), 4 specimens (USNM 158975-2), 3 juveniles (USNM 158972-4), 2 specimens (USNM 158980-6).  
Sta 6; 10 Oct 1976.  
*Altemochelata sikorai*: 1 juvenile (USNM 158981-1), 1 adult female (USNM 158948-2), 1 adult female + 1 juvenile (USNM 158954-4), 4 juveniles (USNM 158959-5).  
Sta 6; 14 Feb 1977.  
*Altemochelata sikorai*: 2 juveniles (USNM 158910-1), 7 specimens (USNM 158917-2), 4 specimens (USNM 158912-3), 4 specimens (USNM 158913-4), 1 ovigerous female (USNM 158979-5), 2 ovigerous females + 1 juvenile (USNM 158970-6).  
Sta 6; 1 Jun 1977.  
*Altemochelata sikorai*: 4 specimens (USNM 158936-1), 2 juveniles (USNM 158930-3), 5 specimens (USNM 158939-4).  
Sta 6; Oct 1977.  
*Altemochelata sikorai*: 1 juvenile (USNM 158890-1), 1 specimen (USNM 158903-2), 2 juveniles (USNM 158901-3), 1 juvenile (USNM 158892-4), 2 juveniles (USNM 158920-5).
- Transect II, off Port Aransas area.  
Sta 3; 27 Mar 1976; 27°18'N, 96°23'W; 131 m.  
*Altemochelata sikorai*: 1 juvenile (USNM 159008-2).  
Sta 3; 27 Jun 1976.  
*Altemochelata sikorai*: 2 specimens (USNM 159001-2), 1 adult female (USNM 159014-4).  
Sta 3; 17 Jul 1976.  
*Altemochelata sikorai*: 1 adult female (USNM 158995-2), 1 adult male (USNM 158996-2).  
Sta 3; 9 Oct 1976.  
*Altemochelata sikorai*: 1 juvenile (USNM 158983-1).  
Sta 3; 19 Nov 1976.  
*Altemochelata sikorai*: 2 specimens (USNM 159002-3), 2 juveniles (USNM 158898-4).  
Sta 3; 9 Dec 1976.  
*Altemochelata sikorai*: 1 juvenile (USNM 159013-5).  
Sta 3; 10 Feb 1977.  
*Altemochelata sikorai*: 5 juveniles (USNM 158962-1), 1 juvenile (USNM 158957-3), 1 adult female (USNM 158947-5), 1 adult male without shell (USNM 159068-6).  
Sta 3; 3 Jun 1977.  
*Altemochelata sikorai*: 1 juvenile (USNM 158937-4).  
Sta 3; 5 Oct 1977.  
*Altemochelata sikorai*: 1 juvenile (USNM 158916-2).  
Sta 6; 27 Jun 1976; 27°24'N, 96°29'W; 98 m.  
*Altemochelata sikorai*: 4 specimens (USNM 159000-1), 2 specimens (USNM 159003-3), 1 ovigerous female + 1 juvenile (USNM 159015-4).  
Sta 6; 17 Jul 1976.  
*Altemochelata sikorai*: 1 specimen (USNM 158896-4).  
Sta 6; 27 Aug 1976.  
*Altemochelata sikorai*: 1 juvenile (USNM 158900-5).  
Sta 6; 9 Dec 1976.  
*Altemochelata sikorai*: 1 juvenile (USNM 159010-5).  
Sta 6; 4 Mar 1977.  
*Altemochelata sikorai*: 3 juveniles (USNM 158982-3).  
Sta 6; 2 Jun 1977.  
*Altemochelata sikorai*: 4 juveniles (USNM 158934-1), 2 adult females (USNM 158925-2), 1 adult male (USNM 158965-3), 1 adult male (USNM 158935-4), 4 juveniles (USNM 158942-5).
- Transect III, off middle part of Padre Island.  
Sta 3; 19 Feb 1976; 26°58'N, 96°33'W; 106 m.  
*Altemochelata sikorai*: 1 juvenile (USNM 158984-3).  
Sta 3; 27 Jun 1976.  
*Altemochelata sikorai*: 1 specimen (USNM 158998-4), 2 juveniles (USNM 159001-6).  
Sta 3; 23 Sep 1976.  
*Altemochelata sikorai*: 1 specimen (USNM 158949-1), 1 adult female (USNM 158958-2), 5 specimens (USNM 158966-4), 3 specimens (USNM 158973-5), 5 specimens (USNM 158956-6).  
Sta 3; 4 Mar 1977.  
*Altemochelata sikorai*: 2 specimens (USNM 158960-1), 3 juveniles (USNM 158945-2), 2 juveniles (USNM 158963-4), 2 juveniles (USNM 158953-5), 2 juveniles (USNM 158946-6).  
Sta 3; 26 May 1977.  
*Altemochelata sikorai*: 1 specimen (USNM 158928-1), 2 juveniles (USNM 158933-2), 8 juveniles (USNM 158950-3), 3 juveniles (USNM 158941-4), 2 juveniles (USNM 158922-5).

- Sta 3; 29 Sep 1977.  
*Altemochelata sikorai*: 1 juvenile (USNM 158891-1), 1 specimen (USNM 158888-2), 2 specimens (USNM 158894-3); 1 adult female + 1 juvenile (USNM 158907-4), 5 specimens (USNM 158893-5), 1 ovigerous female (USNM 158911-6).
- Sta 6; 19 Feb 1976; 26°58'N, 96°30'W; 125 m.  
*Altemochelata sikorai*: 1 adult female (USNM 158978-3), 1 juvenile (USNM 158990-5).
- Sta 6; 27 Jun 1976.  
*Altemochelata sikorai*: 1 ovigerous female (USNM 159004-1), 1 juvenile (USNM 159009-2), 2 juveniles (USNM 159005-6).
- Sta 6; 23 Sep 1976.  
*Altemochelata sikorai*: 2 juveniles (USNM 158988-1), 1 juvenile (USNM 158974-2), 3 specimens (USNM 158997-3), 1 juvenile (USNM 158993-6).
- Sta 6; 4 Mar 1977.  
*Altemochelata sikorai*: 1 juvenile (USNM 158943-1).
- Sta 6; 26 May 1977.  
*Altemochelata sikorai*: 1 adult female + 1 juvenile (USNM 158972-3), 1 adult female (USNM 158923-5), 1 juvenile (USNM 158924-6).
- Sta 6; 29 Sep 1977.  
*Altemochelata sikorai*: 2 juveniles (USNM 158921-3), 2 specimens including 1 adult female (USNM 158899-5), 2 juveniles (USNM 158906-6).
- Transect IV, off Port Isabel.  
 Sta 3; 20 Feb 1976; 26°10'N, 96°24'W; 91 m.  
*Altemochelata sikorai*: 1 juvenile (USNM 158975-1), 1 specimen (USNM 158976-5), 1 juvenile (USNM 158973-6).  
*Rutiderma kalkei*: 1 adult female (USNM 159045-5).
- Sta 3; 25 Jun 1976.  
*Altemochelata sikorai*: 1 juvenile (USNM 159007-1), 2 juveniles (USNM 158989-2), 5 specimens (USNM 158987-3), 1 ovigerous female (USNM 159006-4), 1 adult female (USNM 159016-5).  
*Rutiderma kalkei*: 1 adult female (USNM 159038-4).
- Sta 3; 19 Sep 1976.  
*Altemochelata sikorai*: 1 juvenile (USNM 158964-1), 1 juvenile (USNM 158985-2), 3 juveniles (USNM 158977-4), 2 juveniles (USNM 158971-5).  
*Rutiderma kalkei*: 1 ovigerous female + 1 juvenile male (USNM 159035-2), 4 specimens including 2 adult females (USNM 159032-3), 1 adult female (USNM 159017-4), 2 juvenile males (USNM 159025-5), 1 adult male (USNM 159039-5), 5 specimens (USNM 159046-6).
- Sta 3; 28 Jan 1977.  
*Altemochelata sikorai*: 1 juvenile (USNM 158969-2), 1 molting juvenile (USNM 158955-6).  
*Rutiderma kalkei*: 2 adult females (USNM 159060-1), 1 ovigerous female + 1 adult female + 1 juvenile (USNM 159070-2), 1 ovigerous female + 1 juvenile (USNM 159077-3), 2 adult females + 10 juveniles (USNM 159075-4), 3 juveniles (USNM 159073-5), 1 adult female (USNM 159071-6).
- Sta 3; 24 May 1977.  
*Altemochelata sikorai*: 1 juvenile (USNM 158932-6).  
*Rutiderma kalkei*: 1 ovigerous female (USNM 159066-3), 2 adult males (USNM 159069A,B-4), 3 juveniles (USNM 159076-4), 1 adult female (USNM 159064-5), 1 adult male (USNM 159072-6), 5 adult females + 3 juveniles (USNM 159074-6).
- Sta 3; 27 Sep 1977.  
*Altemochelata sikorai*: 1 juvenile (USNM 158887-3), 2 specimens (USNM 158897-5), 2 juveniles (USNM 158909-6).  
*Rutiderma kalkei*: 1 juvenile (USNM 159047-1), 1 ovigerous female (USNM 159079, holotype), 2 adult females + 2 juveniles (USNM 159055-2), 13 specimens (USNM 159062-3), 2 juveniles (USNM 159065-4), 1 adult female + 6 juveniles (USNM 159058-5), 3 juveniles (USNM 159063-6).
- Sta 4; 23 Feb 1976; 26°10'N, 97°08'W; 15 m.  
*Rutiderma* species B: 1 ovigerous female + 1 juvenile (USNM 159022-6), 1 ovigerous female (USNM 159023-2).
- Sta 4; 26 Jun 1976.  
*Rutiderma* species B: 1 adult male (USNM 159041-1).
- Sta 4; 26 Jun 1976.  
*Rutiderma* species B: 1 adult male (USNM 159042-5).
- Sta 4; 25 May 1977.  
*Rutiderma* species B: 1 adult female (USNM 159019-3); 1 ovigerous female, 2 ovigerous females, 6 juveniles (USNM 159020A,B,C-3); 6 specimens (USNM 159021-4).
- Sta 4; 28 Sep 1977.  
*Rutiderma* species B: 2 adult females, 1 A-1 male (USNM 159059-3).
- Sta 6; 19 Sep 1976; 26°10'N, 96°31'W; 65 m.  
*Rutiderma licinum*: 1 adult male (USNM 159054-6).
- Sta 7; 28 Jan 1977; 26°10'N, 96°20'W; 130 m.  
*Altemochelata sikorai*: 1 juvenile (USNM 158951-3).
- Sta 7; 24 May 1977.  
*Altemochelata sikorai*: 2 specimens (USNM 158926-3), 1 juvenile (USNM 158931-5).
- Sta 7; Sep 1977.  
*Altemochelata sikorai*: 1 juvenile (USNM 158895-1), 2 juveniles (USNM 158904-3), 1 specimen (USNM 158902-6).
- Transect HR, on soft bottom adjacent to Hospital Rock (hard bottom).  
 Sta 1; 13 Feb 1976; 27°32'05"N, 96°28'19"W; 75 m.  
*Rutiderma gyre*: 1 specimen (USNM 159034-1), 1 adult female (USNM 159043-2).
- Sta 1; 26 Mar 1976.  
*Rutiderma gyre*: 1 adult female (USNM 159044-2).
- Sta 1; 17 July 1976.



*Rutiderma gyre*: 1 juvenile male (USNM 159024-2), 1 juvenile (USNM 159033-3), 5 specimens (USNM 159031-4), 1 adult male + 2 juveniles (USNM 159030-5), 2 juveniles (USNM 159027-6).

Sta 1; 9 Oct 1976.

*Rutiderma gyre*: 1 adult female (USNM 159053-6).

Sta 1; 16 Nov 1976.

*Rutiderma gyre*: 1 ovigerous female + 1 adult female (USNM 159050-2), 1 adult female + 1 juvenile male (USNM 159051-4), 1 adult male (USNM 159057-4), 1 juvenile male (USNM 159067-5), 2 juveniles (USNM 159049-6).

Sta 2; fall 1977; 27°32'46"N, 96°27'25"W; 72 m.

*Rutiderma gyre*: 1 adult male (USNM 159048-3).

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

Sta 3; 9 Apr 1976; 27°26'06"N, 96°32'47"W; 82 m.

*Rutiderma gyre*: 1 ovigerous female + 1 juvenile (USNM 159037-6).

Sta 3; 12 Jun 1976.

*Rutiderma gyre*: 1 juvenile (USNM 159029-1), 1 juvenile (USNM 159040-3), 1 adult male + 1 juvenile male (USNM 159026-4), 4 specimens (USNM 159028-5), 6 specimens (USNM 159036-6).

Sta 3; 27 Aug 1976.

*Rutiderma gyre*: 1 fragment of adult male (lost).

Sta 3; 10 Dec 1976.

*Rutiderma gyre*: 1 adult male (USNM 159056-2), 1 adult male (USNM 159018-3), 1 adult male (USNM 159061-4), 1 adult female + 1 juvenile (USNM 159051-5), 1 juvenile (USNM 159052-6).

#### BAHAMA ISLANDS

San Salvador Island, dump reef, 22 Dec 1979; water depth about 4 m; small net drawn along bottom in *Thalassia* bed; collected by Anne C. Cohen.

*Rutiderma cohenae*: 1 ovigerous female (USNM 158359, holotype), 4 juveniles (USNM 158615), 1 ovigerous female (USNM 158414).

*Rutiderma darbyi*: 4 juveniles (USNM 158616).

Andros Island; collected by M.L. Jones.

Sta 72; 7 Mar 1966; 3/4th mile south of mouth of Fresh Creek; 24°43'12"N, 77°46'42"W; low intertidal to subtidal, collected at low tide.

*Rutiderma darbyi*: 1 juvenile (USNM 158617).

*Rutiderma* species indeterminate: 1 A-1 male (USNM 158630).

Sta 91; 10 Mar 1966; Calabash Bay; 24°44'30"N, 77°48'18"W; intertidal.

*Rutiderma dinochelatum*: 2 juveniles (USNM 158620).

*Rutiderma* species indeterminate: 2 juveniles (USNM 158621).

Bimini Islands; collected by Louis S. Kornicker, 1955–1956.

Sta 57; shallow water (about 3 m) near eastern outlet of Bimini lagoon.

*Rutiderma dinochelatum*: 1 adult female (USNM 122907, holotype).

Sta 110F-2; North Bimini harbor, depth 1–3 m.

*Altemochelata polychelata*: 1 specimen (USNM 122908, holotype).

Sta 144-1; North Bimini harbor, depth 1–3 m.

*Altemochelata polychelata*: 1 juvenile (USNM 122909, paratype).

Sta 247; shallow water (about 3 m) southeast of southeastern tip of South Bimini.

*Rutiderma dinochelatum*: 1 juvenile female (USNM 158525, paratype).

#### U.S. VIRGIN ISLANDS

St. Croix Island, Tague Bay; collected with net drawn through water column above bottom; collected by James R. Chess.

Ser. 10, 3 Jun 1981; time of collection 2005 hrs.

*Rutiderma* species indeterminate: 3 adult males.

Ser. 15, 8 Jun 1981; time of collection 2005 hrs.

*Rutiderma* species indeterminate: 13 adult males (2 species).

Outer reef, 8 Jun 1981; time of collection 0053 hrs., bottom at 9 m.

*Rutiderma arcuatile*: 1 ovigerous female (USNM 158886).

St. Thomas Island, east side of Bolongo Bay, 18°18'59"N, 64°53'45"W; 28 May 1967; intertidal at foot of rocks in shifting sand; collected by C.A. Child.

*Rutiderma arcuatile*: 1 adult female (USNM 158212).

#### WINDWARD ISLANDS, BARBADOS

Off Coral Reef, plankton net, 19 May 1978.

*Rutiderma* species indeterminate: 1 adult male, length 0.83 mm, height 0.52 mm (USNM 171462).

#### BERMUDA

Sta K-BI; Sep 1980; collected by Brian Kensley.

*Rutiderma sterreri*: 1 adult male (USNM 158573).

Sta 7; 19 Aug 1960; Hamilton Harbor, washed from red sponge and algae, low tide, 2-3 ft (0.6-0.9 m); collected by L. W. Peterson.

*Rutiderma sterreri*: 5 ovigerous females + 1 juvenile (USNM 106459).

Sta 630820; 29 Aug 1963; Harrington Sound, grab sample about 11 m depth, no sediment in grab, oysters with algae, and encrusted shells; collected by Rosalie Madocks.

*Rutiderma sterreri*: ovigerous female (USNM 158115, holotype).

### Distribution

All of the Rutidermatidae recorded along the coast of southeastern North America are also present in the Gulf of Mexico (Table 1, Figures 1-4). In spite of this, 2 species, *Rutiderma licinum* and *R. gyre*, may be considered predominantly Gulf species, because they were rarely collected elsewhere. Two species, *R. darbyi* and *R. mollitum*, are common along the coast of southeastern North America and in the northeastern part of the Gulf of Mexico, but they were not collected in the northwestern area of the Gulf. Three species, *R. kalke*, *Rutiderma* species B, and *Alternochelata sikorai*, were collected only in the northwestern Gulf. Only *Rutiderma licinum* and *R. gyre* were collected both in the northeastern and northwestern Gulf (Pequegnat and Pequegnat, 1970, fig. 1-1, divided the Gulf into 4 quadrants along 25°00'N latitude and 90°W longitude).

The rutidermid ostracodes along the Gulf and Caribbean coasts of Mexico and Central and South America are little known. *Rutiderma* species B, collected off South Texas, also lives off Belize (Anne C. Cohen, personal communication, 1982). The other 2 species collected only from the northwestern Gulf, *R. kalkei* and *Alternochelata sikorai*, have not been reported elsewhere. *Rutiderma darbyi*, abundant in the northeastern Gulf and along the southeastern coast of North America, also lives in the Bahamas. One species, *R. cohenae*, was collected both in the Bahamas and near Key West. *Rutiderma sterreri* has been collected only in Bermuda. The West Indies have many species: *R. darbyi*, *R. dinochelatum*, *R. arcuatile*, *R. mortenseni*, and *Alternochelata polychelata*. Also, some species of *Rutiderma* (probably including new species) known

from only adult males, which are difficult to classify, have been included in *Rutiderma* species indeterminate, herein. The West Indian species, *R. mortenseni* and *R. arcuatile* are not within the limits of distribution maps presented herein and, therefore, were omitted from them.

### RUTIDERMATIDAE Brady and Norman, 1896

This family contains three genera: *Rutiderma* Brady and Norman, 1896, *Alternochelata* Kornicker, 1958, and *Scleraner* Kornicker, 1975. Only the first two are represented in the collections from the study area.

DISTRIBUTION.—The genus *Scleraner* is known from a single species, *S. chaco* (Hartmann) (in Hartmann-Schröder and Hartmann, 1965:328), recorded in the vicinity of Chile. The distribution of other genera in the family is given herein in the distribution section of each genus. Members of the family are usually found on the continental shelf but have been collected at slope depths of 560 m and, questionably, at a depth of 1100 m (for latter depth see discussion of the distribution of *Alternochelata*, p. 16). Rutidermatidae have been collected between latitudes of 45°N and 50°S.

BEHAVIOR.—Carnivorous (see discussion in Kornicker and Myers, 1981:2). The adult female of *Alternochelata sikorai* apparently breaks off some of the exopodial bristles of the 2nd antenna after mating, relegating the female to a benthic existence. The only members of the family previously reported having broken exopodial bristles are *A. nealei* Kornicker and Caraion (1978:73) and *A. lizardensis* Kornicker (1982:801).

REMARKS.—Kornicker and Caraion (1978:72) in describing the adult male of *Alternochelata nealei*, which was the first adult male of the genus to be reported, stated concerning the mandible: "Exopodite appears fused to lateral side of 1st endopodial joint at dorsal margin and is full length of joint." An adult male of one of the new species described herein, *Rutiderma kalkei*, bears a bulge on the dorsal margin of the 1st endopodial joint that is weakly separated from the remaining part of the joint by a series of wrinkles. Although the degree of "separation" of the dorsal bulge on

TABLE 1.—Distribution and known depth range (m) of the Rutidermatidae on the continental shelf of southeastern North America and the Gulf of Mexico (dash indicates not collected; questionmark indicates collected but depth unknown)

Locality	<i>Altemochelata</i>					<i>Rutiderma</i>									
	<i>polychelata</i>	<i>sikorai</i>	<i>dinochelatum</i>	<i>mortenseni</i>	<i>mollitum</i>	<i>darbyi</i>	<i>licinum</i>	<i>gyre</i>	<i>cohenae</i>	<i>arcuatile</i>	<i>sterreri</i>	<i>kalkeri</i>	Species B		
ATLANTIC	-	-	-	-	-	-	-	-	-	-	-	-	-		
North Carolina shelf	-	-	-	-	-	19-44	36	-	-	-	-	-	-		
South Carolina shelf	-	-	-	-	43	16-43	-	-	-	-	-	-	-		
Georgia shelf	-	-	-	-	11-101	11-101	-	-	-	-	-	-	-		
Florida shelf	-	-	-	-	10.9-43	intertidal to 43	-	6.1-80.2	-	-	-	-	-		
Key West	-	-	-	-	-	-	-	-	subtidal	-	-	-	-		
GULF OF MEXICO	-	-	-	-	-	-	-	-	-	-	-	-	-		
Florida shelf	-	-	-	-	5.4-190	5.4-168	17-64.3	22.9-148.0	-	-	-	-	-		
Alabama shelf	-	-	-	-	68	-	35-68	68	-	-	-	-	-		
Louisiana shelf	-	-	-	-	-	-	-	-	-	-	-	-	-		
Sonnier Bank vicinity	-	61	-	-	-	-	-	60	-	-	-	-	-		
Texas shelf	-	-	-	-	-	-	-	-	-	-	-	-	-		
East Flower Garden vicinity	-	112-117	-	-	-	-	-	70-90	-	-	-	-	-		
"28 Fathom Bank"	-	137.2	-	-	-	-	-	76.8-77	-	-	-	-	-		
Off Galveston	-	-	-	-	-	-	49.25-57.75	50-56	-	-	-	-	-		
Stetson Bank	-	-	-	-	-	-	51.2-54.9	49.4-55.8	-	-	-	-	-		
South Texas shelf	-	91-134	-	-	-	-	65	72-82	-	-	-	91	15		
WEST INDIES	-	-	-	-	-	-	-	-	-	-	-	-	-		
Bahama Islands	1-5	-	intertidal to 20	-	-	intertidal to 4	-	-	4	-	-	-	-		
Virgin Islands	-	-	-	?	-	-	-	-	-	intertidal to 9	-	-	-		
BERMUDA	-	-	-	-	-	-	-	-	-	-	intertidal to 11	-	-		

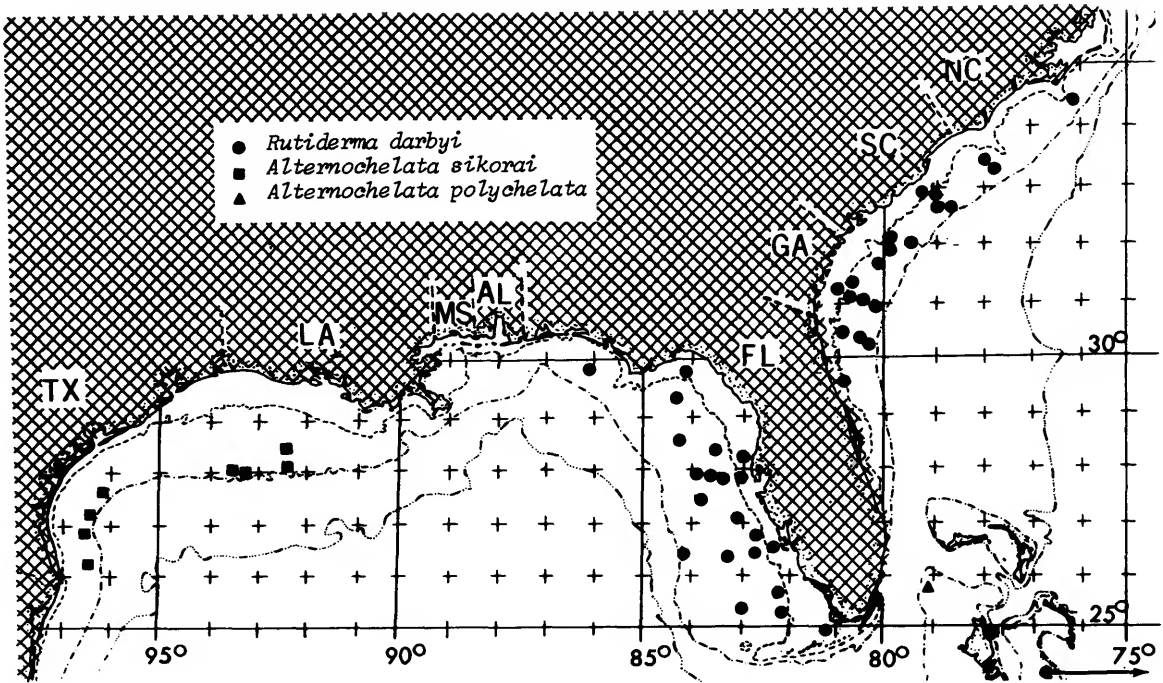


FIGURE 1.—Distribution of *Rutiderma darbyi*, *Alternochelata polychelata*, and *A. sikorai* (some closely spaced stations are represented by a single symbol; depth contours represent 10, 100, and 1000 fathoms).

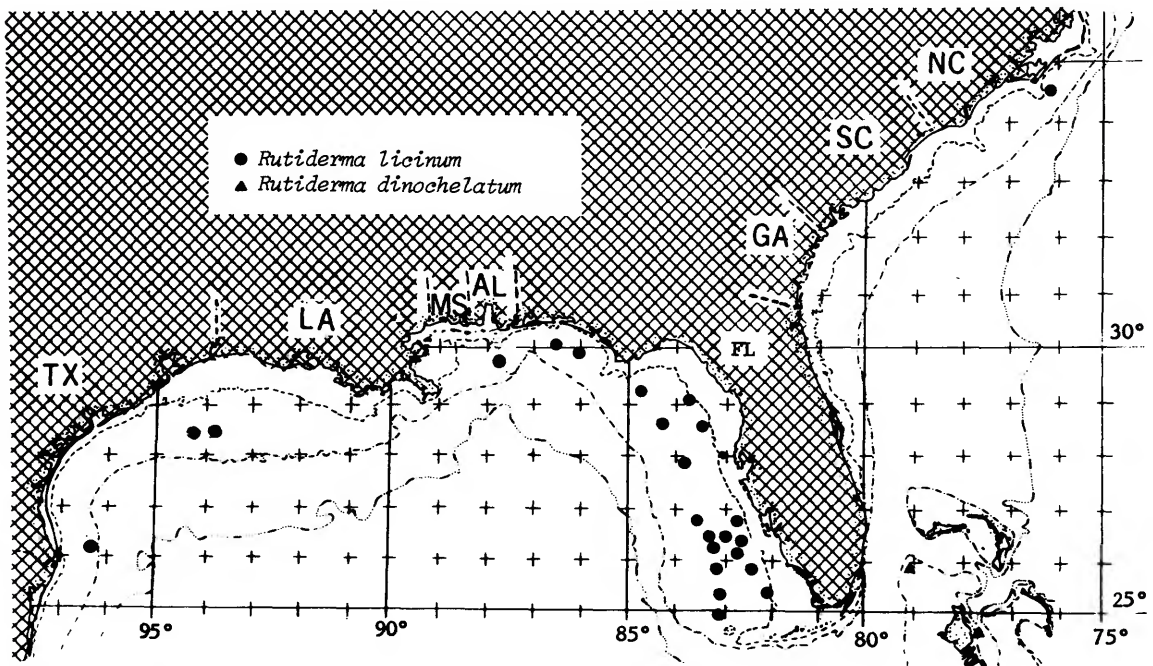


FIGURE 2.—Distribution of *Rutiderma licinum* and *R. dinochelatum* (presence of *R. dinochelatum* in parts of the Bahama Islands is off the map; some closely spaced stations are represented by a single symbol; depth contours represent 10, 100, and 1000 fathoms).

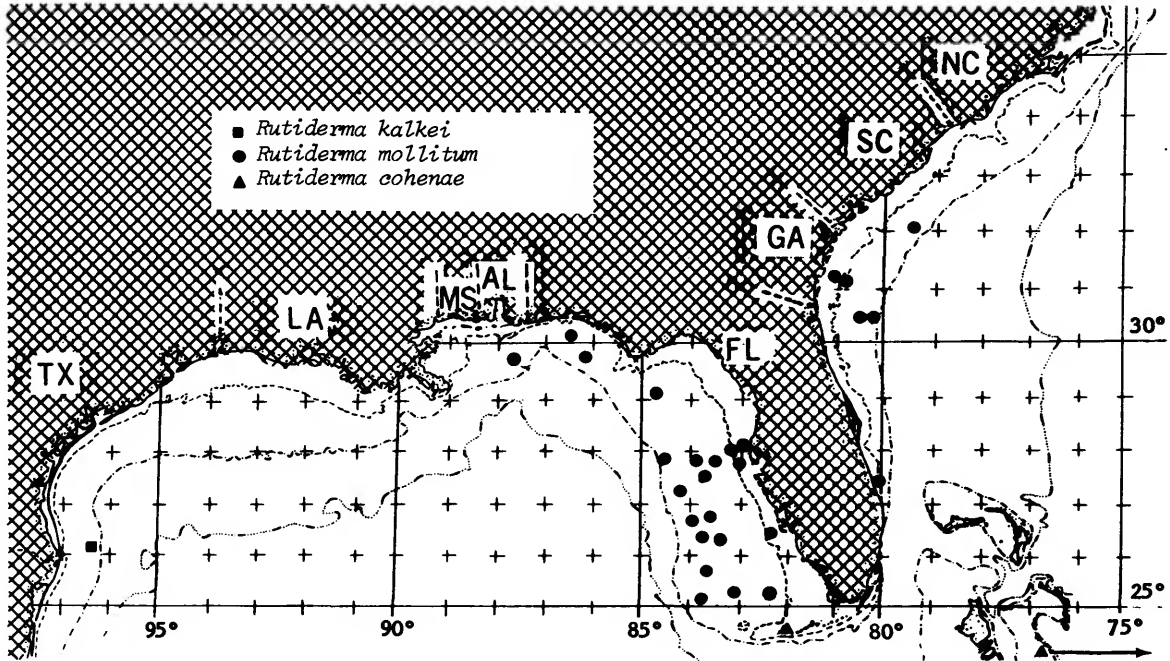


FIGURE 3.—Distribution of *Rutiderma kalkei*, *R. mollitum*, and *R. cohena* (some closely spaced stations are represented by a single symbol; depth contours represent 10, 100, and 1000 fathoms).

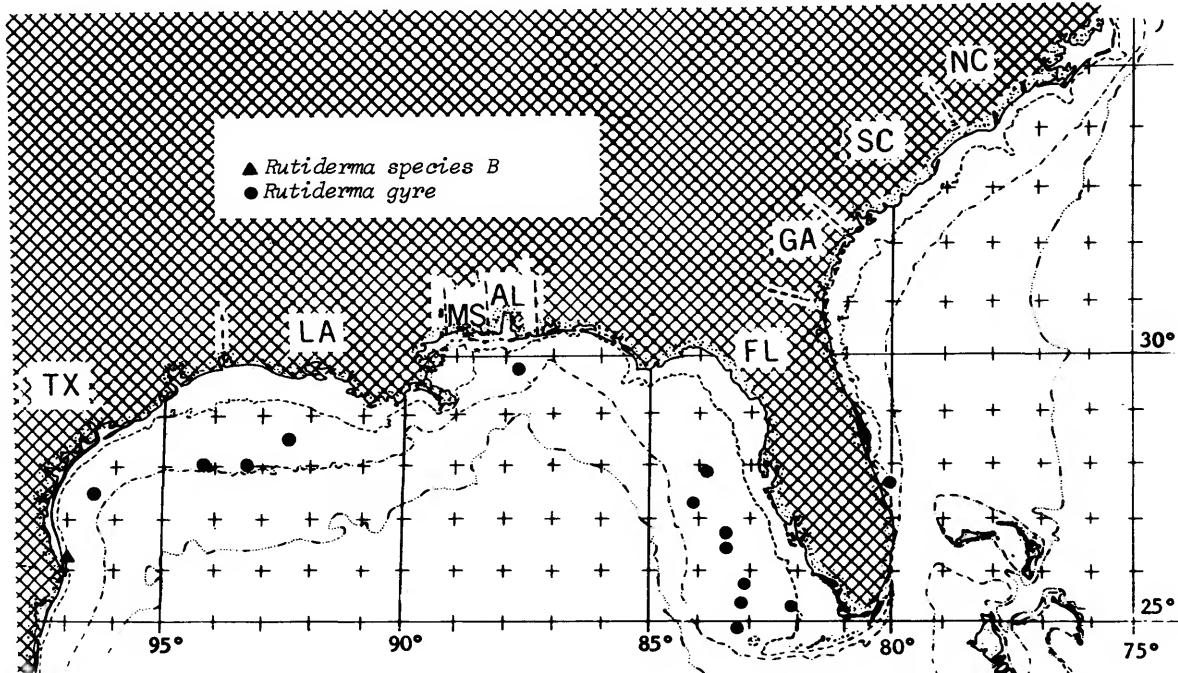


FIGURE 4.—Distribution of *Rutiderma species B* and *Rutiderma gyre* (some closely spaced stations are represented by a single symbol; depth contours represent 10, 100, and 1000 fathoms).

the mandible of *R. kalkei* is not nearly that observed in adult males of *Alternochelata*, it leads me to believe that the fused segment of *Alternochelata* is not homologous with the exopodite on adult males of *Rutiderma*. My present interpretation is that adult males of *Alternochelata* are without a mandibular exopodite.

Another difference in adult males of *Alternochelata*

and *Rutiderma* not previously pointed out is in the sensory bristle of the 5th joint of the 1st antenna. In species of *Rutiderma*, the sensory filaments are concentrated at the distal end of the broad proximal segment of the bristle, whereas, in known species of *Alternochelata*, the filaments are spread along the ventral side of the broad proximal segment.

### Key to the Genera of Rutidermatidae

(from Kornicker and Caraion, 1978:54)

1. Furca with secondary claws alternating with primary claws ..... *Alternochelata*
- Furca with secondary claws following primary claws ..... 2
2. Endopodite of female 2nd antenna with 1 joint ..... *Rutiderma*
- Endopodite of female 2nd antenna with 2 joints ..... *Scleraner*

### *Alternochelata* Kornicker, 1958

This genus is represented in the study area by 2 species, *A. polychelata* and *A. sikorai*, new species.

TYPE-SPECIES.—*Rutiderma (Alternochelata) polychelata* Kornicker, 1958:237.

DISTRIBUTION.—Members of this genus have been reported from the Great Bahama Bank (*A. polychelata*) at depths of 1–5 m, from off Mauritania at depths of 52–1100 m (*A. nealei* Kornicker and Caraion, 1978:66), and from the Great Bar-

rier Reef, Australia, at depths of intertidal to 12.3 m (*A. lizardensis* Kornicker, 1982:793). The new species *A. sikorai* was collected in the Gulf of Mexico (East Flower Garden and Sonnier Bank) at depths of 61–137.2 m. Kornicker (1981a:30) questioned the correctness of the depth of 1100 m for the sample off Mauritania because species of Cyclasteropinae and Asteropteroinae in the sample were collected only from continental shelf depths elsewhere in the area. If that sample is ignored the known depth range of *A. nealei* would be 52–560 m.)

### Key to the Species of *Alternochelata*

1. Carapace with rounded posteroventral corner; each lamella of furca with main claws 1, 2, 3, 5 ..... 2
- Carapace with angular posteroventral corner; each lamella of furca with main claws 1, 2, 4, 5, or 1, 2, 4, 6 ..... 3
2. Fossae on surface of carapace bordered by reticulations formed by minute but distinct pustules ..... *A. sikorai*, new species
- Fossae on surface of carapace not bordered by reticulations formed by minute pustules ..... *A. nealei*
3. Each lamella of furca with main claws 1, 2, 4, 5 ..... *A. lizardensis*
- Each lamella of furca with main claws 1, 2, 4, 6 ..... *A. polychelata*

***Alternochelata polychelata* Kornicker, 1958**

FIGURE 5

*Rutiderma* (*Alternochelata*) *polychelata* Kornicker, 1958:237, figs. 46:6A,B, 59A-E, 86C,G.—Poulsen, 1965:17 [key].*Alternochelata polychelata*.—McKenzie, 1965:62 [inferred].—Kornicker and Caraion, 1978:66 [key].**HOLOTYPE.**—USNM 122908, carapace in alcohol, appendages lost. Present size: length 1.37

mm, height 0.93 mm (size given by Kornicker, 1958:238; length 1.36 mm, height 0.98 mm).

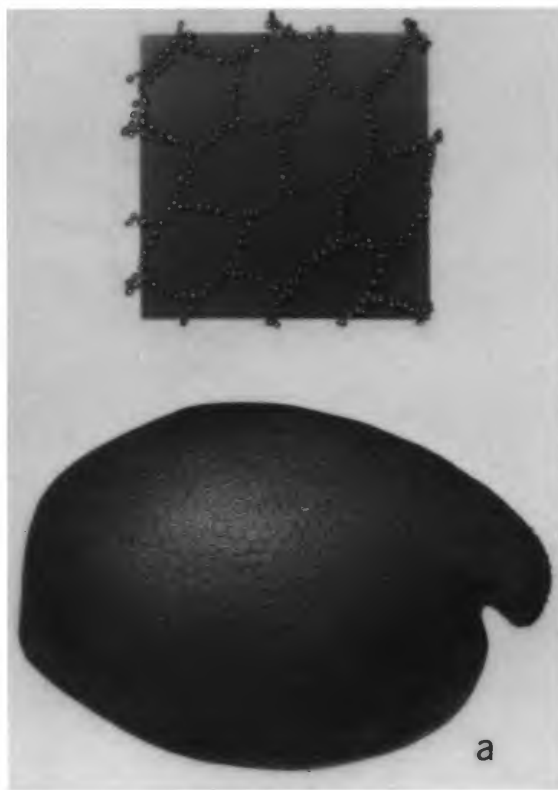
**TYPE-LOCALITY.**—Bimini Islands, Great Bahama Bank, station 110F-2.**MATERIAL.**—Holotype, and paratype USNM 122909, a dry specimen from station 144-1; no new material.**DISTRIBUTION.**—Known only from the vicinity of the Bimini Islands, Great Bahama Bank, at depths of 1–5 m (Kornicker, 1958:237, 238) (see Figure 1; Table 1).**DIAGNOSIS.**—Posteroventral corner of carapace compressed forming a small but distinct projection; rostrum overhanging incisur; surface reticulate; borders of reticulations formed by row of closely spaced pustules (Figure 5a).**Furca:** Each lamella with 10 claws consisting of 4 primary claws (claws 1, 2, 4, 6) and 6 secondary claws (claws 3, 5, 7–10) (Figure 5b).

FIGURE 5.—*Alternochelata polychelata* Kornicker: a, USNM 122908, holotype, length 1.37 mm, lateral view of complete specimen and detail showing pustules forming borders of reticulations; b, no. 110-2, paratype, furcal lamella (from Kornicker, 1958, fig. 95E).

***Alternochelata sikorai*, new species**

FIGURES 6–9

*Alternochelata* sp. A.—Flint, 1981, fig. 4.**ETYMOLOGY.**—The species is named for its collector, Walter B. Sikora, Texas A&M University.**HOLOTYPE.**—USNM 158027, 1 adult female on slide and in alcohol.**TYPE-LOCALITY.**—Sta EFG-2, in vicinity of East Flower Garden, continental shelf off Texas.**PARATYPES.**—Texas continental shelf, East Flower Garden vicinity, Sta EFG-1: USNM 158022, 1 adult female; USNM 158486, 1 adult female; USNM 158852, 1 juvenile. Sta EFG-2: USNM 158483, 1 adult female; USNM 158485A, 1 adult female; USNM 158485B, 1 juvenile male. Sonnier Bank, sta THR-3: USNM 158484, 9 specimens (1 specimen to Dr. Linda Pequegnat, Department of Oceanography, Texas A&M University). Southwest peak of “28 Fathom Bank,” sta 3A: USNM 158651, 2 specimens.

South Texas, transect I, sta 3: USNM 158999-1, 1 adult female; USNM 158961-3, 1 specimen; USNM 158974-5, 1 juvenile; USNM 158992-2, 4

juveniles; USNM 158976-3, 2 adult females; USNM 158994-4, 2 specimens; USNM 158968-6, 1 juvenile; USNM 158952-1, 1 juvenile; USNM 158889-1, 1 specimen; USNM 158914-2, 4 specimens; USNM 158915-3, 2 juveniles; USNM 158918-4, 3 specimens; USNM 158919-6, 3 specimens; USNM 158927-1, 4 specimens; USNM 158928-3, 4 juveniles; USNM 158929-5, 1 juvenile; USNM 158940-6, 1 ovigerous female + 1 juvenile; USNM 159012-3, 1 juvenile; USNM 158908-5, 1 adult female; USNM 158905-6, 2 juveniles. Sta 6: USNM 158944-1, 1 juvenile; USNM 158986-3, 1 juvenile; USNM 158991-5, 1 juvenile; USNM 158967-1, 7 specimens; USNM 158975-2, 4 specimens; USNM 158972-4, 3 juveniles; USNM 158980-6, 2 specimens; USNM 158981-1, 1 juvenile; USNM 158948-2, 1 adult female; USNM 158954-4, 1 adult female + 1 juvenile; USNM 158959-5, 4 juveniles; USNM 158910-1, 2 juveniles; USNM 158917-2, 7 specimens; USNM 158912-3, 4 specimens; USNM 158913-4, 4 specimens; USNM 158979-5, 1 ovigerous female; USNM 158970-6, 2 ovigerous females + 1 juvenile; USNM 158936-1, 4 specimens; USNM 158930-3, 2 juveniles; USNM 158939-4, 5 specimens; USNM 158890-1, 1 juvenile; USNM 158903-2, 1 specimen; USNM 158901-3, 2 juveniles; USNM 158892-4, 1 juvenile; USNM 158920-5, 2 juveniles.

South Texas, transect II, sta 3: USNM 159008-2, 1 juvenile; USNM 159001-2, 2 specimens; USNM 159014-4, 1 adult female; USNM 158995-2, 1 adult female; USNM 158996-2, 1 adult male; USNM 158983-1, 1 juvenile; USNM 159002-3, 2 specimens; USNM 158898-4, 2 juveniles; USNM 159013-5, 1 juvenile; USNM 158962-1, 5 juveniles; USNM 158957-3, 1 juvenile; USNM 158947-5, 1 adult female; USNM 159068-6, 1 adult male without shell; USNM 158937-4, 1 juvenile; USNM 158916-2, 1 juvenile. Sta 6: USNM 159000-1, 4 specimens; USNM 159003-3, 2 specimens; USNM 159015-4, 1 ovigerous female + 1 juvenile; USNM 158896-4, 1 specimen; USNM 158900-5, 1 juvenile; USNM 159010-5, 1 juvenile; USNM 158982-3, 3 juveniles; USNM 158934-1, 4 juveniles; USNM 158925-2, 2 adult

females; USNM 158965-3, 1 adult male; USNM 158935-4, 1 adult male; USNM 158942-5, 4 juveniles.

South Texas, transect III, sta 3: USNM 158984-3, 1 juvenile; USNM 158998-4, 1 specimen; USNM 159011-6, 2 juveniles; USNM 158949-1, 1 specimen; USNM 158958-2, 1 adult female; USNM 158966-4, 5 specimens; USNM 158973-5, 3 specimens; USNM 158956-6, 5 specimens; USNM 158960-1, 2 specimens; USNM 158945-2, 3 juveniles; USNM 158963-4, 2 juveniles; USNM 158953-5, 2 juveniles; USNM 158946-6, 2 juveniles; USNM 158928-1, 1 specimen; USNM 158933-2, 2 juveniles; USNM 158950-3, 8 juveniles; USNM 158941-4, 3 juveniles; USNM 158922-5, 2 juveniles; USNM 158891-1, 1 juvenile; USNM 158888-2, 1 specimen; USNM 158894-3, 2 specimens; USNM 158907-4, 1 adult female + 1 juvenile; USNM 158893-5, 5 specimens; USNM 158911-6, 1 ovigerous female. Sta 6: USNM 158978-3, 1 adult female; USNM 158990-5, 1 juvenile; USNM 159004-1, 1 ovigerous female; USNM 159009-2, 1 juvenile; USNM 159005-6, 2 juveniles; USNM 158988-1, 2 juveniles; USNM 158974-2, 1 juvenile; USNM 158997-3, 3 specimens; USNM 158993-6, 1 juvenile; USNM 158943-1, 1 juvenile; USNM 158972-3, 1 adult female + 1 juvenile; USNM 158923-5, 1 adult female; USNM 158924-6, 1 juvenile; USNM 158921-3, 2 juveniles; USNM 158899-5, 2 specimens including 1 adult female; USNM 158906-6, 2 juveniles.

South Texas, transect IV, sta 3: USNM 158975-1, 1 juvenile; USNM 158976-5, 1 specimen; USNM 158973-6, 1 juvenile; USNM 159007-1, 1 juvenile; USNM 158989-2, 2 juveniles; USNM 158987-3, 5 specimens; USNM 159006-4, 1 ovigerous female; USNM 159016-5, 1 adult female; USNM 158964-1, 1 juvenile; USNM 158985-2, 1 juvenile; USNM 158977-4, 3 juveniles; USNM 158971-5, 2 juveniles; USNM 158969-2, 1 juvenile; USNM 158955-6, 1 molting juvenile; USNM 158932-6, 1 juvenile; USNM 158887-3, 1 juvenile; USNM 158897-5, 2 specimens; USNM 158909-6, 2 juveniles. Sta 7; USNM 158951-3, 1 juvenile; USNM 158926-3, 2



specimens; USNM 158931-5, 1 juvenile; USNM 158895-1, 1 juvenile; USNM 158904-3, 2 juveniles; USNM 158902-6, 1 specimen.

**DISTRIBUTION.**—Gulf of Mexico off Louisiana and Texas (Figure 1). Known depth range 61–137.2 m (Table 1).

**DESCRIPTION OF ADULT FEMALE** (Figures 6–8).—Carapace oval in lateral view with greatest height and length near middle (Figure 6); rostrum rounded anteriorly and projecting only slightly over shallow but distinct incisur; posterior evenly rounded, without projecting caudal process.

**Ornamentation** (Figure 6): Surface with minute pustules forming boundaries of reticulations; no ribs. Margins and lateral surface, especially posterior end, with long and short bristles (long bristles with broad base).

**Infold** (Figure 7a,b): Broad along anterior, ventral, and posteroventral margin; infold on rostrum with 6 bristles forming row paralleling anterior margin (Figure 7a); 1 long bristle at middle of upper margin of incisur, and 1 short bristle at inner end of incisur; broad part of anteroventral infold with 5 parallel ridges proximal to thin list; anteroventral infold with 1 bristle near incisur separated by space from 5 or 6 bristles

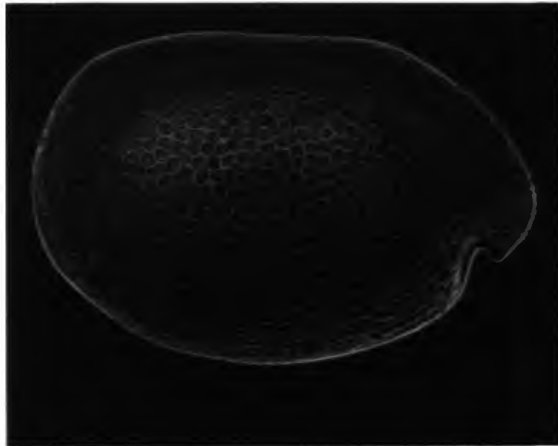


FIGURE 6.—*Altemochelata sikorai*, new species, USNM 158022, paratype, adult female, length 1.27 mm, lateral view of complete specimen.

forming row in vicinity of list; middle part of ventral infold bare of bristles; posteroventral and posterior infold with narrow list and row of about 8 groups of bristles containing single or paired bristles (Figure 7b, not all bristles shown in illustration).

**Selvae:** Fringed lamella prolongation present along anterior, ventral, and posterior margins; fringe absent along posterodorsal margin.

**Size:** USNM 158022, length 1.27 mm, height 0.86 mm; USNM 158027, length 1.40 mm, height 0.88 mm; USNM 158483, length 1.25 mm, height 0.93 mm; USNM 158485A, length 1.27 mm, height 0.88 mm; USNM 158486, length 1.30 mm, height 0.90 mm; USNM 158911, length 1.35 mm, height 0.94 mm.

**First Antenna** (Figure 7d): 1st joint with long medial hairs on ventral half. 2nd joint with long hairs along ventral and dorsal margins, short lateral spines forming row along distal margins, and 3 bristles (1 ventral, 1 dorsal, 1 lateral). 3rd joint short with dorsal hairs and 2 bristles (1 ventral, 1 dorsal). 4th joint separated from 3rd joint by distinct suture; with ventral and dorsal hairs and 4 bristles (3 ventral, 1 dorsal). 5th joint with few hairs on dorsal margin and at base of ventral bristle; ventral bristle with small proximal filament and bifurcate tip. 6th joint minute, fused to 5th joint, with short medial bristle. 7th joint: a-bristle longer than bristle of 6th joint, with ventral spines; b-bristle slightly longer than a-bristle; c-bristle slightly shorter than bristle of 5th joint, with bifurcate tip. 8th joint: d- and e-bristles about same length as bristle of 5th joint, bare with blunt tips; f-bristle shorter than c-bristle, with minute spine and process at tip; g-bristle about same length as c-bristle, with bifurcate tip.

**Second Antenna** (Figure 7e): Protopodite bare. Endopodite 2-jointed: 1st joint with 5 proximal anterior bristles; 2nd joint elongate with 1 long, spinous, ventral bristle. Exopodite: elongate 1st joint with minute, distal, medial bristle; bristles of joints 2–5 fairly short, bare; stout bristles of joints 6–8 with natatory hairs (bristles broken off on both limbs of USNM 158027); 9th joint with 7 bristles (4 stout bristles with natatory hairs, 1

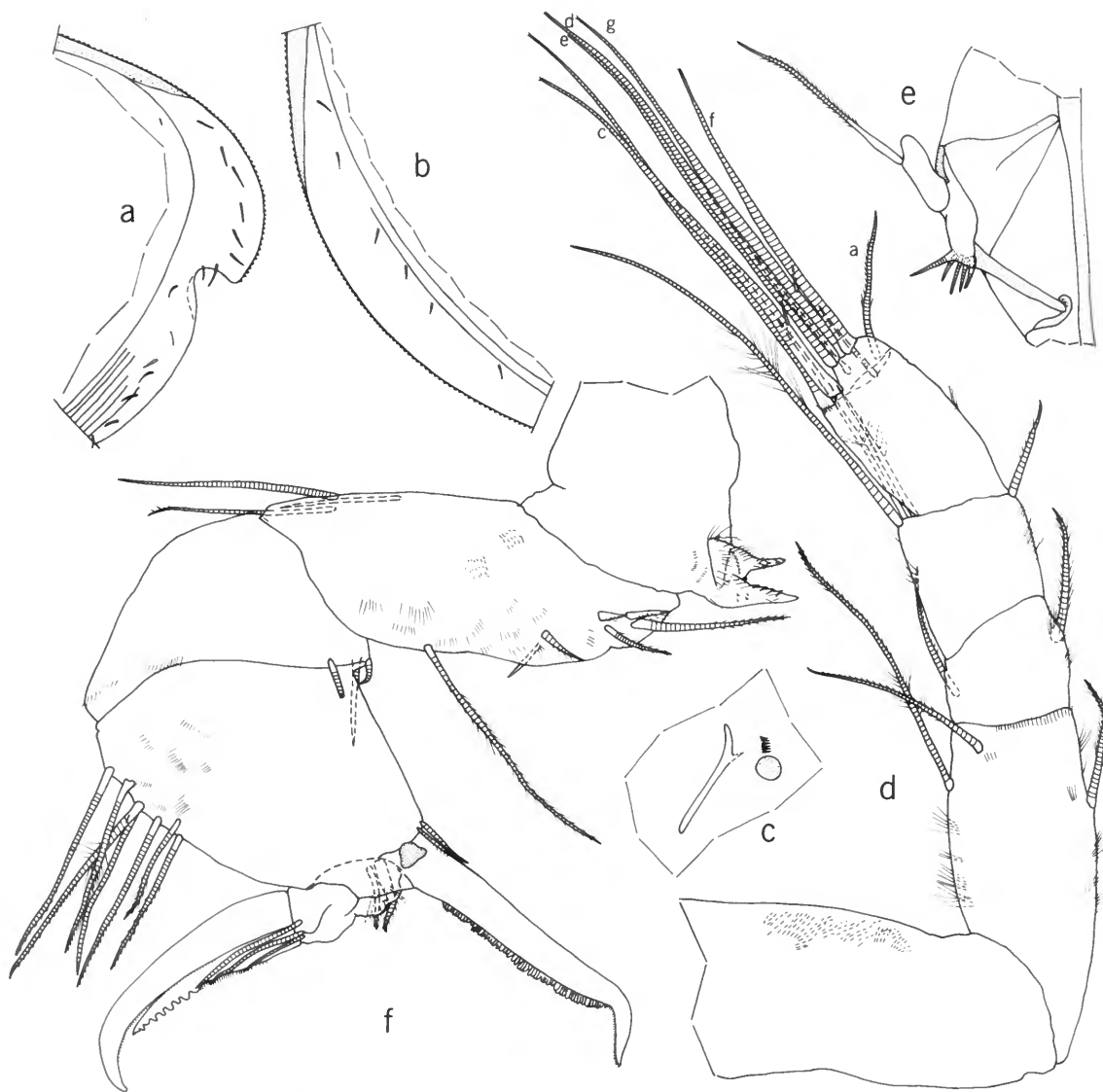


FIGURE 7.—*Alternochelata sikorai*, new species. USNM 158022, paratype, adult female, length 1.27 mm: *a*, anterior of left valve, inside view; *b*, posterior of left valve, inside view. USNM 158483, paratype, adult female, length 1.25 mm: *c*, right side of body showing Y-sclerite, brushlike organ and genital opening (stippled). USNM 158027, holotype, adult female, length 1.40 mm: *d*, left 1st antenna, lateral view; *e*, endopodite and distal part of protopodite of left 2nd antenna, medial view; *f*, right mandible, medial view.

shorter bristle with natatory hairs, and 2 small bristles with short marginal hairs or spines; 3 of the stout bristles broken off on both limbs of USNM 158027); joints 2-8 with spines forming

row along distal margins; basal spines absent.

**Mandible** (Figure 7*f*): Coxale endite bifurcate with long proximal hairs and stout distal spines. Basale: ventral surface with spines forming rows

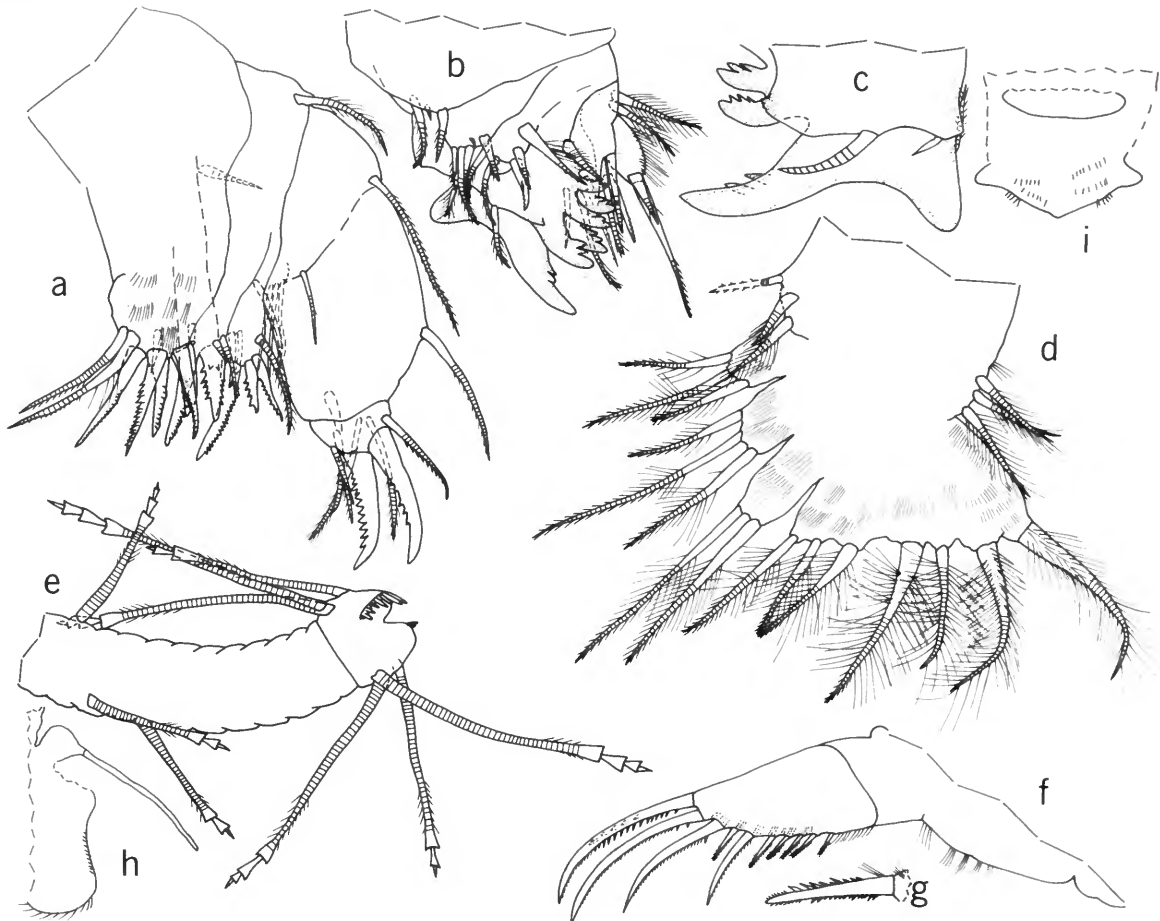


FIGURE 8—*Altemochelata sikorai*, new species, USNM 158027, holotype, adult female, length 1.40 mm: *a*, left maxilla, medial view; *b*, right 5th limb, anterior view; *c*, left 5th limb showing part of 1st and 2nd exopodial joints, anterior view; *d*, 6th limb; *e*, 7th limb; *f*, left lamella of furca and posterior of body; *g*, posterior view of claw 1 of right lamella of furca, medial side towards top of illustration; *h*, anterior of body showing medial eye, bellonci organ, and upper lip; *i*, ventral view of upper lip showing oval mouth.

and 5 proximal bristles (3 ringed, 2 unringed pectinate); ventral margin with 1 or 2 long distal bristles; lateral surface with long hairs forming rows, and 1 short proximal bristle near ventral margin; dorsal margin with 3 distal bristles. Exopodite absent. 1st endopodial joint with few distal medial spines forming rows, and 3 short ventral bristles. 2nd endopodial joint: dorsal margin with 7 bristles; medial surface with spines forming rows; ventral margin with stout terminal claw with stout teeth along inner margin; smaller

teeth along recurved tip of claw; 2 small ventral bristles and small, spade-shaped, sclerotized, medial process present near base of claw. 3rd endopodial joint with 2 stout terminal claws (inner claw with large distal and small proximal teeth along inner margin; outer claw with minute teeth along inner margin); lateral surface with 2 short bristles; medial surface with 3 bristles near bases of claws.

*Maxilla* (Figure 8*a*): Endite I with distal spines forming rows, and 8 terminal bristles (3

ringed, 5 unringed pectinate); endite II with 5 terminal bristles (3 ringed, 2 unringed pectinate); endite III with 1 proximal ringed bristle and 6 terminal bristles (3 ringed, 3 unringed pectinate). Precoxale and coxale with fringe of dorsal hairs (not shown on illustrated limb); coxale with dorsal bristle with short marginal hairs. Basale with 3 distal bristles (1 dorsal, 1 medial, and 1 lateral near exopodite). Exopodite small with 3 bristles. Endopodite: 1st joint with 1 alpha- and 1 beta-bristle; 2nd joint with 2 spinous a-bristles, 2 stout, pectinate, clawlike bristles, and 3 ringed bristles with small spines or teeth.

*Fifth Limb* (Figure 8b,c): Epipodial appendage with 50 bristles. Endite I with 3 bristles (2 ringed, 1 smaller, unringed, with pointed tip); endite II with 5 bristles (1 of these minute ringed); endite III with 5 spinous and pectinate bristles. 1st exopodial joint with main tooth consisting of 3 large prongs and 1 small, proximal, pointed node; each prong with 2 marginal teeth along inner margin; distal prong with small teeth near its base (Figure 8b); outer margin proximal to distal tooth with ringed bristle; inner margin proximal to small pointed node with short annulate bristle; small cluster of long hairs present near this bristle; distal anterior margin of joint with 1 annulate bristle near middle and 1 short nonannulate bristle near outer edge; inner end of joint anterior to main tooth sclerotized and forming small tooth (Figure 8c). 2nd exopodial joint with large triangular tooth with 3 prongs, each prong with 2 or 3 marginal teeth; outer edge of triangular tooth with small hirsute bristle near rounded end; posterior side of joint with 1 proximal bristle near inner margin, and a pair of bristles distal to proximal bristle. 3rd exopodial joint with 3 bristles on inner lobe and 2 on outer lobe. 4th and 5th joints fused, hirsute, with 2-4 terminal bristles.

*Sixth Limb* (Figure 8d): 2 or 3 plumose bristles in place of epipodial appendage; endite I with 3 short bristles (2 medial stout bristles with long spines, 1 slender bristle with short spines); endite II with 3 terminal bristles with long proximal and short distal spines; endite III with 3 bristles (mid-

dle bristle longer than others, all with long proximal and short distal spines); 4th endite slender, with 2 long terminal bristles bearing long proximal and short distal spines; end joint with anterior part slightly projecting ventrally, with 3 slender ventral bristles bearing long proximal and short distal spines (posterior of these bristles more hirsute than others), and posterior part with 3 or 4 plumose bristles (anterior of these with short marginal spines distally); limb hirsute medially and laterally.

*Seventh Limb* (Figure 8e): Terminal comb with about 14 alate teeth (proximal teeth shorter than distal teeth), with small teeth near bases; 2 bare pegs opposing comb; each limb with 9 or 10 bristles, 3 or 4 in proximal group (1 or 2 on one side, 2 on other), and 6 in terminal group (3 on each side); each bristle with 2 or 3 bells and distal marginal spines.

*Furca* (Figure 8f,g): Each lamella with 3 strong main claws followed by 1 short secondary claw, 1 main claw (about twice length of secondary claw 4), and 5 short secondary claws; hairs present medially at bases of claws and following claws; claw 1 with teeth forming medial and lateral rows.

*Bellonci Organ* (Figure 8h): Elongate, almost cylindrical, with rounded tip.

*Eyes*: Lateral eyes absent; medial eye unpigmented, bare (Figure 9h).

*Upper Lip* (Figure 8h,i): Rounded in lateral view, hirsute.

*Posterior of Body* (Figure 8f): Clusters of hairs present along lower half of posterior margin.

*Brushlike Organ* (Figure 7c): Consisting of 5 or 6 minute bristles near genitalia.

*Genitalia* (Figure 7c): Consisting of faint oval area on each side of body.

*Y-Sclerite* (Figure 7c): Linear with faint ventral branch.

*Eggs*: USNM 158911, 158917, 158979, 159004, 159006, 159015: 1 egg in each. USNM 158934: 2 eggs. USNM 158970: 2 specimens each with 3 eggs.

DESCRIPTION OF ADULT MALE (Figure 9).—Carapace more elongate than that of adult female

with incisur forming a right angle (Figure 9a).

**Ornamentation** (Figure 9a): Surface with minute pustules forming reticulations similar to those of female; scattered pustules also within many reticulations.

**Infold, Selvage:** In general, similar to that of adult female.

**Size:** USNM 158935, length 1.38 mm, height 0.84 mm; USNM 158966, length 1.40 mm, height 0.81 mm.

**First Antenna:** 1st joint with distal medial spines forming rows. 2nd joint spinous, with 3 spinous bristles (1 ventral, 1 dorsal, 1 lateral); 3rd joint with abundant spines on medial surface and along dorsal margin, with 2 spinous bristles (1 ventral, 1 dorsal); suture between 3rd and 4th joints well developed on medial surface; long 4th joint with spines on medial surface and ventral and dorsal margins, with 5 spinous bristles (4 ventral, 1 dorsal). 5th joint small, inserted ventrally between 4th and 6th joints; sensory bristle with broad proximal part reaching distal end of

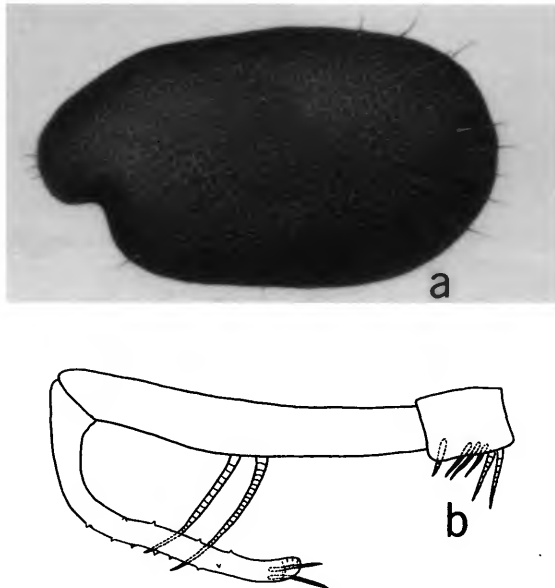


FIGURE 9.—*Altemochelata sikorai*, new species, USNM 158935, paratype, adult male, length 1.38 mm: a, lateral view of complete specimen; b, endopodite of left 2nd antenna, medial view.

6th joint; broad part with abundant, long, thin filaments along the ventral three-fourths; stem of sensory bristle distal to broad part with minute filament just distal to broad part, and with bifurcate tip. Medial bristle of long 6th joint spinous, almost as long as 6th joint, and located near dorsal margin. 7th joint: a-bristle spinous, slightly shorter than bristle of 6th joint; b-bristle stout, about twice length of a-bristle, with 3 short filaments just proximal to middle, a minute distal spine (bristle narrower distal to spine), and a minute process at tip; c-bristle extremely long, reflexed laterally, with 13 marginal filaments. 8th joint: d- and e-bristles bare, about twice length of b-bristle, with blunt tips; f-bristle similar to c-bristle but slightly shorter, with 12 marginal filaments; g-bristle slightly longer than d-bristle, with 1 short proximal filament and bifurcate tip.

**Second Antenna:** Protopodite bare. Endopodite 3-jointed (Figure 9b): 1st joint with 6 short bristles (5 proximal, 1 distal); 2nd joint elongate with 2 bristles near middle; 3rd joint elongate, roughly L-shaped, reflexed, with 2 short, bare, slender, subterminal bristles; central part of 3rd joint with about 18 small toothlike processes (not all shown on illustrated limb), and with faint serrations on rounded tip. Exopodite: elongate 1st joint with medial spines forming rows, and minute, terminal, medial bristle; joints 2–8 with short spines forming row along distal margin; bristle of short 2nd joint bare, reaching just past distal end of 8th joint; 3rd joint about twice length of 2nd; joints 4–9 smaller than 2nd joint; bristles of joints 3–8 long, with natatory hairs, no spines; 9th joint with 6th bristle (3 long and 1 medium with natatory hairs, 2 very short with long marginal hairs); joints 3–8 with basal spines of similar length; spine of 8th joint about same length as 9th joint; 9th joint without lateral spine.

**Mandible:** Coxale endite represented by minute bifurcate process near middle of coxale close to distal margin. Basale: medial side near ventral margin with 6 proximal bristles (2 long, 1 medium, 3 short), and 2 long spinous bristles distal to middle; dorsal margin with 1 spinous midbristle and 2 spinous subterminal bristles (smaller of

these about same length as midbristle, other about twice length of midbristle); medial surface with abundant spines forming short rows. Exopodite absent. 1st endopodial joint with 3 spinous ventral bristles (1 of these with base on medial side near ventral margin); medial surface with abundant spines forming rows; joint appearing divided by wrinkles into ventral and dorsal parts (dorsal part about one-fourth width of ventral part), proximal edge of base of dorsal part sclerotized; lateral side of joint with long spines forming few rows in dorsal part. 2nd endopodial joint: medial surface with abundant spines forming short rows; dorsal margin with proximal bulge bearing 7 bristles; ventral margin with bristles forming 2 groups (proximal group with 2 bristles, distal group with 1 long and 3 short bristles). 3rd endopodial joint with stout claw with spines along ventral margin, and 6 spinous bristles (longest of these slightly clawlike).

*Maxilla:* Limb reduced. Precoxale and coxale with dorsal fringe of long hairs; coxale with stout, hirsute, dorsal bristle. Endite I with 1 proximal lateral bristle and 4 or 5 terminal bristles; endite II with about 4 terminal bristles; endite III with about 6 terminal bristles. Basale with 1 spinous dorsal bristle, 1 spinous bristle near middle of medial margin (this bristle could be considered to be proximal on 1st endopodial joint), and 1 hirsute ventral bristle near base of exopodite. Exopodite short with 3 subequal hirsute bristles. Endopodite: 1st joint hirsute, with 1 alpha- and 1 beta-bristle; end joint with 7 bristles.

*Fifth Limb:* Epipodial appendage with 48 bristles. Endite I with 2-4 short bristles; endite II with 4 short bristles; endite III hirsute, with 1 stout bristle with long proximal hairs, and 4 shorter bristles. Exopodite: 1st joint with 1 short proximal bristle and 3 weak, unsegmented, terminal bristles; 2nd joint with about 6 bristles; 3rd joint with 2 hirsute bristles (1 ringed, 1 unringed) on inner lobe and 2 stout hirsute bristles on outer lobe; 4th and 5th joints fused, with 3 or 4 ringed bristles (1 long, 2 or 3 short); 3rd to 5th joints hirsute.

*Sixth Limb:* 2 hirsute bristles in place of epi-

podial appendage. Endite I with 3 short bristles (2 stout, with long proximal and short distal hairs; 1 slender, bare); endite II with 3 terminal bristles with long proximal hairs and short distal spines; endite III with 3 bristles (shortest bristle with long proximal and short distal spines, others bare or with short marginal spines; endite IV with 1 or 2 terminal bristles. End joint with 2 slender bristles (anterior of these with short marginal spines, other with long proximal and short distal spines) followed by 4 stout bristles (anterior 2 of these with long proximal hairs and short distal spines, others hirsute from base to tip); bases of anterior bristles of end joint not on projection.

*Seventh Limb:* 3 or 4 short bristles in proximal group, 1 or 2 on each side, each with 2 bells and marginal spines; 4 longer bristles in terminal group, 2 on each side, each with 1 or 2 bells and marginal spines. Terminus with comb of about 13 teeth opposite 2 short slender pegs.

*Furca:* Similar to that of female.

*Bellonci Organ:* Elongate with widened middle part, then tapering very slightly to rounded tip (striations on widened middle part visible when viewed at high magnification with  $\times 100$  objective).

*Eyes:* Lateral eyes unpigmented on USNM 158935, but with black pigment on USNM 158996, about same size as medial eye, with about 10 ommatidia. Medial eye unpigmented.

*Posterior of Body:* Similar to that of female.

*Genitalia:* Consisting of copulatory limb on each side of body each with 3 distal lobes, each lobe with few bristles, 1 with sclerotized process.

*Y-Sclerite:* Ventral branch very faint, better developed on right side of specimen examined; dorsal branch curving dorsally.

*Gut Content:* USNM 158935 packed with unpigmented globules.

**COMPARISON.**—The new species *A. sikorai* is closely related to *Alternochelata nealei* Kornicker and Caraion (1978:66), having the claws of the furca similarly distributed and the carapace having a similar shape. It differs from that species in having the reticulations of the carapace being

formed by rows of minute but distinct pustules. The distribution of furcal claws differs from that of *Alternochelata polychelata* Kornicker (1958:237), and the posteroventral corner of the shell is more rounded.

REMARKS.—*A. sikorai* is the third reported species of the Rutidermatidae, in which some exopodial bristles are broken off the adult female, presumably after having been fertilized by the male. The phenomenon was previously reported for *A. nealei* by Kornicker and Caraion (1978:73) and for *A. lizardensis* by Kornicker (1982:801).

**Rutiderma Brady and Norman, 1896**

This genus is represented in the study area by *R. dinochelatum* Kornicker (1958:236), *R. mollitum* Darby (1965:29), *R. mortenseni* Poulsen (1965:38), *R. sterreri* Kornicker (1981b:5), and 7 new species, *R. cohenae*, *R. licinum*, *R. darbyi*, *R. arcuatile*, *R. gyre*, *R. kalkei*, and *Rutiderma* species B (the last species is cited in open nonmenclature because it is being

described by Anne C. Cohen (in prep.) based on specimens from Belize).

TYPE-SPECIES.—*Rutiderma compressa* Brady and Norman, 1896:673.

DISTRIBUTION.—Species of *Rutiderma* are widespread between latitudes of 45°N and 50°S and depths of 1–260 m (Kornicker and Caraion, 1978:54). In the western Atlantic the northernmost locality from which the genus has been reported previously is Bermuda (latitude about 32°20'N) (Kornicker, 1981a:5) and the southernmost locality is the Virgin Islands (latitude about 18°20'N) (Poulsen, 1965:38). An adult male, *Rutiderma* species indeterminate (USNM 171462), from Barbados (latitude about 13°15'N) extends the known range in the western Atlantic a few degrees south; additional collections will no doubt extend the range much farther south along the coast of South America. The northern range in the western Atlantic is extended herein to 34°37'54"N on the continental shelf off North Carolina (Figures 1–4; Table 1).

**Key to Species of *Rutiderma* in the Study Area**

(*R. mortenseni* Poulsen, 1965, which is known only from a single male, is not included in this key. Its caudal process is similar to that of *R. dinochelatum* but it bears more bristles on the infold of the rostrum: 10–12 compared to 8.)

- 1. Each lamella of furca with 3 large claws followed by 3 small claws . . . . 2
  - Each lamella of furca with 4 large claws followed by 2 small claws . . . . 3
- 2. List of caudal process strongly concave posteriorly (visible through outside of valve) [Figure 13*b,c*]; tip of terminal claw of 2nd endopodial joint of female mandible not upturned [Figure 14*a*] . . . . . ***R. mollitum***
  - List of caudal process indistinct, represented by small bristles forming row parallel to ventral edge of caudal process [Figure 26*c,d*]; tip of terminal claw of 2nd endopodial joint of female mandible upturned [Figure 26*h*] . . . . . ***R. licinum***, new species
- 3. List of caudal process of left valve serrate along anterior and ventral margins (usually visible through outside of valve) [Figure 19*e*] . . . . . ***R. darbyi***, new species
  - List of caudal process of left valve not serrate . . . . . 4
- 4. Tip of main claw of 2nd endopodial joint of female and juvenile mandible slender, prolonged [Figures 37*g*, 50*g*] . . . . . 5
  - Tip of main claw of 2nd endopodial joint of female and juvenile mandible not slender or prolonged . . . . . 6

5. Prolonged tip of main claw of 2nd endopodial joint of female and juvenile mandible upturned [Figure 50g]; caudal process of left valve broadly rounded [Figure 50a] ..... **Rutiderma species B**  
 Prolonged tip of main claw of 2nd endopodial joint of female and juvenile mandible linear [Figure 37g]; caudal process of left valve triangular [Figure 37c] ..... **R. cohenae**, new species
6. Middle of posterior edge of left valve with small triangular process ..... 7  
 Middle of posterior edge of left valve without small triangular process . 8
7. Middle of arcuate list of caudal process facing ventral margin of valve [Figure 40b,c] ..... **R. arcuatile**, new species  
 Middle of arcuate list of caudal process facing posterior margin of valve or tip of caudal process ..... 9
8. List of caudal process forming arc facing posterior margin of valve [Figure 31b] ..... **R. gyre**, new species  
 List of caudal process forming arc facing ventral margin of valve [Figure 45a,d,e] ..... **R. kalkei**, new species
9. Surface of female valves with 2 ribs between lower main rib and ventral margin of valve [Figure 41] ..... **R. sterreri**  
 Surface of female valves without ribs between lower main rib and ventral margin of valve, or at most with 1 faint rib along edge of ventral margin [Figure 10] ..... **R. dinochelatum**

***Rutiderma dinochelatum* Kornicker, 1958**

FIGURES 10, 11

*Rutiderma (Rutiderma) dinochelata* Kornicker, 1958:236, figs. 46:8A-B, 57A-F, 58A-D, 86B,F,J.

*Philomedes loma*.—Kornicker, 1958:233, figs. 46:7A-B, 52A-E, 53A-D, 86A,E,I.—Poulsen, 1965:17 [recognized specimens as male *Rutiderma*].

*Rutiderma dinochelata*.—Poulsen, 1965:17.—McKenzie, 1965:66.—Kornicker, 1975:65, 74.

*Rutiderma dinochelatum*.—Kornicker, 1981a:8.

Not *Rutiderma dinochelata*.—Darby, 1965:28, pl. 13, 14 [= *R. darbyi*, new species, herein].

**HOLOTYPE**.—USNM 122907, adult female, dry specimen softened and now in alcohol, partly dissected.

**TYPE-LOCALITY**.—Bimini, Bahamas, sta 57.

**MATERIAL**.—Bahamas: holotype; USNM 158525, paratype, 1 juvenile female, Bimini, sta 247; USNM 158620, 2 juveniles, Andros Island, sta 91.

**DISTRIBUTION**.—Bahama Islands (Figure 2; Table 1).

**SUPPLEMENTARY DESCRIPTION OF HOLOTYPE** (Figure 11a-f).—Carapace with slightly over-

hanging rostrum and projecting caudal process. (Carapace of adult female paratype is illustrated in Figure 10).

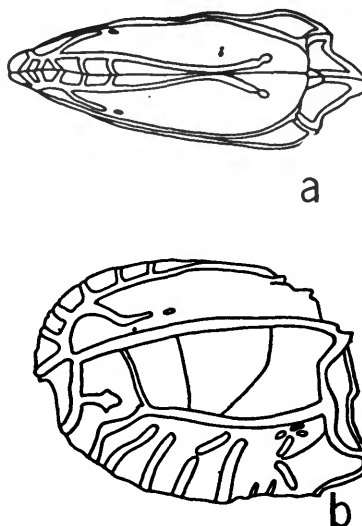


FIGURE 10.—*Rutiderma dinochelatum* Kornicker, paratype, dorsal and lateral views of adult female, length 1.18 mm (from Kornicker, 1958, fig. 86B,F).



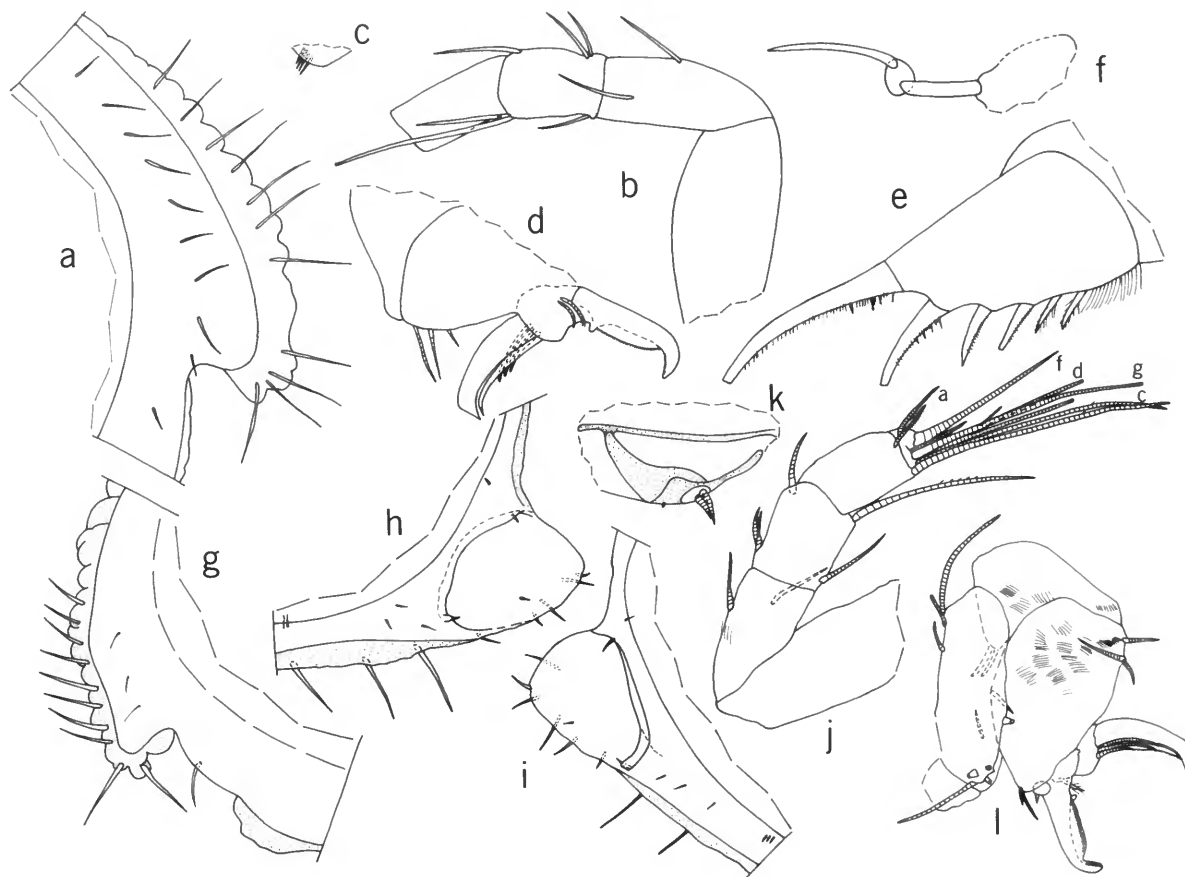


FIGURE 11.—*Rutiderma dinochelatum* Kornicker. USNM 122907, holotype, adult female, length 1.15 mm: *a*, anterior of left valve, inside, view; *b*, part of left 1st antenna, lateral view; *c*, endopodite of left 2nd antenna, lateral view; *d*, distal part of left mandible, lateral view; *e*, left lamella of furca, lateral view; *f*, medial eye and bellonci organ. USNM 158525, instar III, length 0.79 mm: *g*, anterior of right valve, inside view; *h*, *i*, caudal processes of right and left valves, inside views; *j*, left 1st antenna, medial view; *k*, endopodite and distal part of protopodite of left 2nd antenna, medial view; *l*, part of left mandible, medial view.

**Ornamentation:** Carapace with well-developed horizontal and radial ribs (Kornicker, 1958, fig. 46:8A,B [on 8B the caudal process has been cropped off the photograph]). Small process in middle of posterior margin of left valve. Surface with abundant shallow fossae.

**Infold:** Rostral infold with 8 bristles in row parallel to anterior margin, and 1 small bristle near inner edge of incisur; 1 small bristle near middle of infold ventral to incisur (Figure 11a).

**Size:** Length 1.22 mm, height 0.87 mm (from

Kornicker, 1958:237). Present dimensions: length 1.15 mm, height 0.82 mm.

**First Antenna:** 2nd joint with 2 bristles, 1 dorsal, 1 lateral; 3rd and 4th joints fused; 3rd joint with 3 bristles, 1 ventral, 2 dorsal; 4th joint with 3 bristles, 2 ventral, 1 dorsal (Figure 11b).

**Second Antenna:** Endopodite 1-jointed, with 4 short anterior bristles (Figure 11c). Exopodite: bristles of joints 2–5 without natatory hairs; long bristles of joints 6–9 with natatory hairs.

**Mandible (Figure 11d):** Terminal claw of 2nd

endopodial joint with rounded tip neither protracted nor upturned; claw with proximal tooth on inner margin; terminal claw of 3rd endopodial joint with truncate tip.

*Furca* (Figure 11e): Each lamella with 4 stout pectinate claws followed by 2 weaker spinous claws; claw 1 of right lamella anterior to claw 1 of left lamella.

*Bellonci Organ* (Figure 11f): Broadening in middle, then tapering to pointed tip. (Broad mid-bulge on illustrated organ probably partly result of twisting of organ.)

**SUPPLEMENTARY DESCRIPTION OF JUVENILE FEMALE.**—Instar III?, from Bimini, USNM 158525 (Figure 11g-l). Similar in shape to that of adult female, but softened specimen distorted. Small process near middle of posterior edge of left valve.

*Infold*: Rostral infold obscure but with at least 3 bristles (Figure 11g). List of caudal process forming about 45° angle with ventral margin of valve, with 2 small bristles, 1 at each end; 1 small bristle in pocket between list and posterior end of caudal process (Figure 11h,i); posterior infold with 1 small bristle dorsal to caudal process; ventral margin anterior to caudal process with several bristles.

*Size*: USNM 158525, length 0.79 mm, height 0.54 mm.

*First Antenna* (Figure 11j): 1st joint bare. 2nd joint with 2 bristles, 1 dorsal, 1 lateral. 3rd and 4th joints fused; 3rd joint with 2 or 3 bristles, 1 ventral, 1 or 2 dorsal; 4th joint with 2 bristles, 1 ventral, 1 dorsal. Sensory bristle of 5th joint with 2 minute marginal filaments. 6th joint minute, fused to 5th, with 1 short medial bristle. 7th joint: a-bristle about one-third longer than bristle of 6th joint; b-bristle about same length as a-bristle, with minute filament near middle; c-bristle same length as sensory bristle of 5th joint, with 2 minute marginal filaments. 8th joint: d- and e-bristles bare with blunt tips, about three-fourths as long as c-bristle; f-bristle slightly longer than d-bristle; g-bristle about same length as c-bristle, with fairly long proximal filament and minute distal filament.

*Second Antenna*: Protodipite bare. Endopodite 1-jointed, with 2 small anterior bristles and 1

minute posterior process (Figure 11k). Exopodite: distal medial margin of elongate 1st joint with minute, straight, tubular bristle; bristles of joint 2-8 short with row of blunt, closely spaced, spines along ventral margin, no natatory hairs; 9th joint with 4 short bristles (ventral of these longer than others and with blunt ventral spines); joints 3-8 with slender spines forming row along distal margin, no basal spines.

*Mandible* (Figure 11l): Terminal claws of 2nd and 3rd endopodial joints similar to those of adult. Except for having only 1 lateral bristle, bristles of 3rd endopodial joint similar to those of adult female.

*Maxilla, Fifth and Sixth Limbs*: Well developed.

*Seventh Limb*: Elongate, without bristles; tip rounded bare.

*Furca*: Similar to that of adult female, with 4 stout claws followed by 2 weaker claws.

*Bellonci Organ*: Similar to that of female but with middle part not as broad and tip less pointed. Tip similar to organ illustrated by Kornicker (1958, fig. 57D).

#### ***Rutiderma mortenseni* Poulsen, 1965**

*Rutiderma mortenseni* Poulsen, 1965:38, fig. 11.

**HOLOTYPE.**—Unique specimen, adult male, length 1.07 mm; Zoological Museum, University of Copenhagen.

**TYPE-LOCALITY.**—Virgin Islands, West Indies, 29 Dec 1913.

**DIAGNOSIS.**—Infold of rostrum with 10-12 bristles (Poulsen, 1965, fig. 11b); infold of caudal process with concave ridge forming about 50° angle with ventral margin of valve (Poulsen, 1965, fig. 11c).

*Sixth Limb*: Anterior 3 bristles of end joint on distinct projection (Poulsen, 1965, fig. 11i).

*Furca*: Each lamella with 4 stout claws followed by 2 secondary claws (Poulsen, 1965, fig. 11k).

#### ***Rutiderma mollitum* Darby, 1965**

FIGURES 12-17

*Rutiderma mollita* Darby, 1965:29, pl. 15: figs. 1, 2

**HOLOTYPE.**—UMMP 48791, female on 11 glass

slides, Museum of Paleontology, The University of Michigan.

**TYPE-LOCALITY.**—Continental shelf off Sapelo Island, Georgia, depth 19.8 m.

**MATERIAL.**—Holotype; paratype, UMMP 48792 (2 slides, 1 with whole specimen with 1 valve removed, other with 4 eggs).

South Carolina continental shelf: USNM 158203, 1 juvenile female, sta 0177-2 (3E). USNM 158204, 1 adult female, sta 0177-4 (3E).

Georgia continental shelf: USNM 158207, 1 adult female, sta 0215-1 (5B). USNM 158205, 1 adult female, USNM 158001, 158004, 2 ovigerous females, sta 0215-3 (5B). USNM 158202, 1 juvenile male, sta 0230-3 (5E). USNM 158206, 1 juvenile female, sta 0243-2 (5H). USNM 158802, 1 specimen, sta 0220-5 (5C). USNM 158804, 2 specimens, sta 0220-6 (5C). USNM 158811, 2 specimens, sta 0531-4 (5F). USNM 158818, 4 specimens, sta 0531-6 (5F). USNM 158812, 1 specimen, sta 0540-5 (5H).

Florida continental shelf (Atlantic): USNM 158209, 1 adult male, sta 0265-3 (6E). USNM 158210, 1 juvenile male, sta 0269-2 (6F). 2 other specimens returned to D.K. Camp, collector.

Florida continental shelf (Gulf of Mexico), transect I: USNM 158708, 1 male, sta 2101.



FIGURE 12.—*Rutiderma mollitum* Darby, USNM 158001, adult female, length 1.46 mm, lateral view of complete specimen.

USNM 158781, 2 specimens, USNM 158723, 1 specimen, sta 2104. USNM 158729, 158731–158735, 8 specimens, sta 2105. Transect II: USNM 158772, 158774, 158783, 3 specimens, sta 2207. USNM 158700, 158701, 158661, 158655, 158659, 158736, 13 specimens, sta 2211. USNM 158715, 1 specimen, sta 2212. Transect IV: USNM 158760, 158761, 158766, 3 specimens, sta 2423. Transect V: USNM 158765, 158762, 2 specimens, sta 2531. Transect VII: USNM 158794, 1 specimen, sta 2747. USNM 158790, 158775, 158740, 3 specimens, sta 2748. USNM 158738, 1 male, sta 2749. Off Panama City: USNM 158832, 1 specimen.

Florida continental shelf (Southwest Florida): returned to James K. Culter, 16 specimens, sta 4; 40 specimens, sta 5; 2 specimens, sta 16; 6 specimens, sta 18; 1 specimen, sta 20; 1 specimen, sta 24; vial C; 1 specimen, vial E; 1 adult female, vial L.

Alabama continental shelf, transect VI: USNM 158746, 1 specimen, sta 2643.

**DISTRIBUTION.**—Continental shelf off South Carolina, Georgia, Florida (Atlantic and Gulf of Mexico), and Alabama. Known depth range 5.4–190 m (Figure 3; Table 1).

**SUPPLEMENTARY DESCRIPTION OF ADULT FEMALE** (Figures 12–14).—Carapace oval in lateral view with minute incisur and no rostral overhang; posterior margin straight dorsal to small caudal process (Figure 12); posterodorsal margin truncate; anterodorsal and ventral margins convex; posterior lateral side of each valve with bulge having fairly well-defined posterior edge.

**Ornamentation:** 2 low, poorly to well-defined lateral ribs present, (1 dorsal and 1 ventral to central adductor muscle attachments) (Figure 12); vertical posterior rib joining posterior end of upper rib but may or may not connect with end of lower rib. Surface of each valve with numerous well-defined unusually small fossae; surface between fossae with abundant minute pits. Anterior outline of valve with small scallops. Bristles numerous along anteroventral, anterior, and ventral margins, and sparsely distributed on lateral surface.

**Infold:** Infold of rostrum with 8–12 bristles

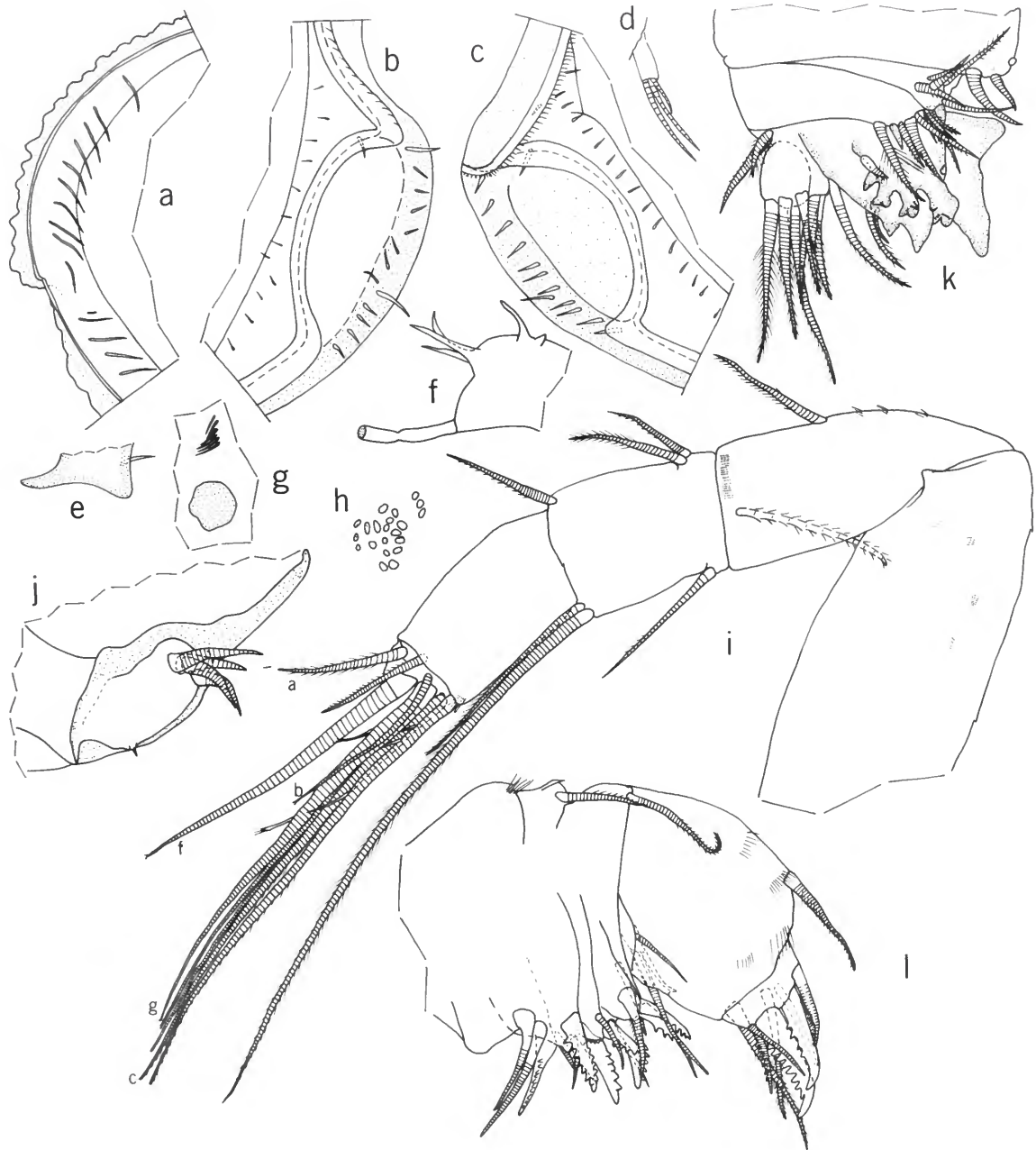


FIGURE 13.—*Rutiderma mollitum* Darby. UMMP 48791, holotype, adult female, length 1.44 mm: *a*, anterior of right valve, inside view; *b*, caudal process of right valve, inside view; *c*, caudal process of left valve, inside view; *d*, exopodite of left maxilla; *e*, distal end of 2nd exopodial joint of left 5th limb, anterior view; *f*, medial eye and proximal part of bellonci organ; *g*, brushlike organ and genitalia on right side, anterior to right. USNM 158004, adult female, length 1.42 mm: *h*, central adductor muscle attachments of right valve, inside view, anterior towards left; *i*, right 1st antenna, medial view; *j*, endopodite and distal end of protopodite of left 2nd antenna, medial view; *k*, right 5th limb, anterior view; *l*, left maxilla, medial view.

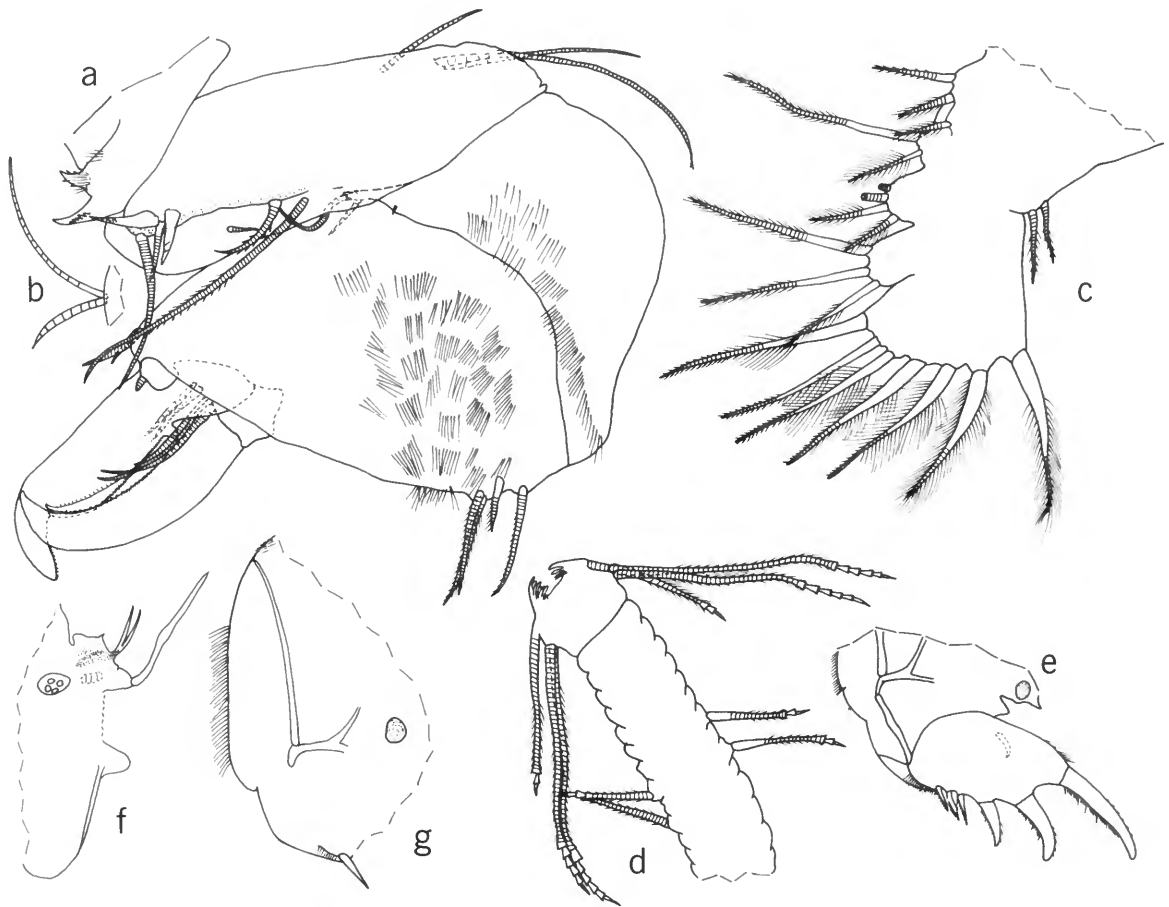


FIGURE 14.—*Rutiderma mollitum* Darby, USNM 158004, adult female, length 1.42 mm: *a*, left mandible, medial view; *b*, ventral bristles of 1st endopodial joint of left mandible, medial view; *c*, 6th limb; *d*, 7th limb; *e*, posterior of body showing right lamella of furca, right Y-sclerite, and right genital process (stippled); *f*, anterior of body showing lateral eye, medial eye with dorsal filaments, bellonci organ, and upper lip; *g*, posterior of body showing posterior claw of right lamella of furca, Y-sclerite, girdle, and oval genital process (stippled).

forming row parallel to anterior margin (Figure 13*a*); anteroventral infold with 10–13 bristles and about 8 ridges paralleling valve margin; posterior end of ventral infold continuing along infold of caudal process; posterior infold anterior to caudal process with 20–26 small bristles mostly close to and paralleling inner margin of infold (all bristles not shown on Figure 13*b,c*).

**Caudal Process:** Unusual in having concave ridge anterior to “pocket” of caudal process forming edge of valve and bearing lamellar prolon-

gation of selvage (part of caudal process posterior to concave anterior ridge is outside selvage of valve); outer edge of concave ridge with single bristle near dorsal end (bristle lateral to selvage); posterior end of caudal process with 11–13 bristles forming row along inner edge (Figure 13*b,c*).

**Selvage:** Wide lamellar prolongation along anterodorsal, anterior, and ventral margins, narrower along posterior margin and anterior ridge of caudal processes (Figure 13*a–c*); lamellar prolongation faintly divided at inner end of small

incisur; outer edge of lamellar prolongation with stout fringe along anterior and anteroventral valve margin; fringe becoming weaker and shorter posteriorly along the ventral valve margin, along the posterior valve margin dorsal to the caudal process, and along the anterodorsal valve margin; fringe absent on lamellar prolongation along anterior ridge of caudal process.

*Central Adductor Muscle Attachment Scars* (Figure 13h): Consisting of about 21 individual attachments.

*Marginal Pore Canals*: Branching, well developed.

*Size*: UMMP 48791, length 1.44 mm, height 1.02 mm; UMMP 48792, length 1.45 mm, height 1.05 mm (from Darby, 1965:29). USNM 158001, length 1.46 mm, height, 1.12 mm; USNM 158004, length 1.42, height 1.07 mm; USNM 158204, length 1.40 mm, height 1.03 mm; USNM 158207, length 1.46 mm, height 1.08 mm.

*First Antenna* (Figure 13i): 1st joint with few medial hairs and lateral spines. 2nd joint with spinous lateral bristle, spinous dorsal bristle, lateral spines forming row along distal margin, and few proximal spines forming rows along dorsal margin. 3rd and 4th joints fused; 3rd joint short with 3 spinous bristles (1 ventral, 2 dorsal); 4th joint long with 3 spinous bristles (2 ventral, 1 dorsal). Sensory bristle of long 5th joint with 3 or 4 short proximal filaments, 1 or no short filament near middle, faint short hairs along distal half, and spine at tip; long lateral hairs forming row at base of bristle. 6th joint minute, fused with 5th joint, with short spinous medial bristle. 7th joint: a-bristle spinous, reaching slightly past tip of bristle of 6th joint; b-bristle about 1½ times length of a-bristle, with 2 minute spines at tip; c-bristle about same length as sensory bristle of 5th joint, with 1 or no proximal filament, faint hairs along distal half and 2 minute spines at tip. 8th joint: d- and e-bristles bare with blunt tips, only slightly shorter than c-bristle; f-bristle stout, about two-thirds length of c-bristle, with 1 or no proximal filament, and with minute spine and hair at tip; g-bristle about same length as d-bristle, with 2 or 3 proximal filaments and spine at tip.

*Second Antenna* (Figure 13j): Protopodite bare. Endopodite 1-jointed with 4 proximal anterior bristles and a minute ventral spine on small node (node could be interpreted as small 2nd joint). Exopodite: long 1st joint with small blunt medial bristle on distal margin; bristles of joints 2–5 fairly short, with ventral teeth, no natatory hairs; bristles of joints 6–8 with natatory hairs, no ventral teeth; 9th joint with 6 bristles (3 long and 1 medium with natatory hairs, 2 small bare); joints 6–8 with few faint, minute spines along distal lateral margins.

*Mandible* (Figures 14a,b): Coxale endite bifurcate, pectinate, and hirsute. Basale: dorsal margin with 3 distal bristles; medial side with 4 bristles in proximal ventral corner (2 short pectinate, unringed), and 3 bristles (2 short, 1 long) near middle of ventral margin. 1st endopodial joint with 2 ventral bristles, 1 minute spinelike bristle, and medial spines forming rows. 2nd endopodial joint: dorsal margin with 4 short proximal bristles; ventral margin with 2 short distal bristles followed by minute medial bristle on broad base, and then a stout terminal claw (stout claw with proximal dorsal peg, minute teeth along dorsal margin, and without upturned tip); medial side of joint spinous. 3rd endopodial joint with stout terminal claw with teeth along ventral margin, 1 unringed bristle (with ventral teeth) ventral to stout claw, 3 short medial bristles near ventral corner of base of stout claw, and 2 short bristles located lateral to base of stout claw of 2nd joint.

*Maxilla* (Figure 13d,l): Precoxale with dorsal hairs. Coxale with spinous dorsal bristle. Endite I with 5 bristles (3 stout pectinate, 2 ringed, spinous); endite II with 5 bristles (2 stout pectinate, 3 slender); endite III with 5 bristles (3 stout pectinate, 1 stout with stout marginal spines, 1 slender). Basale with 2 or 3 distal bristles (1 dorsal, 1 lateral, 1 ventral and medial). Exopodite small but well defined, with 3 bristles (2 long, 1 short) (Figure 13d). Endopodite: 1st joint with 1 spinous alpha-bristle and 1 spinous beta-bristle; 2nd joint with 2 stout, pectinate, unringed, claw-like bristles, and 5 (4?) ringed bristles with either marginal spines or teeth (dorsal of these tending to be clawlike).

*Fifth Limb* (Figure 13e,k): Endite I with 3 bristles (1 missing on illustrated limb); endite II with about 5 bristles; endite III with about 8 bristles (1 of these short, knifelike). Exopodite: 1st joint with 3 large teeth bearing secondary teeth followed by smooth tooth, and then a ringed bristle; a ringed bristle present on outer margin proximal to teeth; 2nd joint consisting of large flat tooth with 3 pointed lobes along inner margin; a ringed bristle present on inner margin proximal to teeth; posterior side with long proximal bristle, 2 bristles near proximal inner lobe, and a small bristle near distal outer corner; 3rd joint with 3 bristles on inner lobe and 2 on outer lobe; 4th and 5th joints fused, with total of 4 spinous bristles. (On 2nd exopodial joint of right limb of USNM 158004, the 3 bristles are on posterior side set back considerable distance from edge).

*Sixth Limb* (Figure 14c): Endite I with 3 bristles (proximal bristle with short spines, others with long hairs); endite II with 1 long spinous bristle and 1 short bristle with very long hairs; endite III with 4 bristles; endite IV with 3 bristles; end joint with 5 anterior bristles with long proximal hairs and short distal spines followed by 2 bristles with only long hairs; 2 short hirsute bristles in place of epipodial appendage.

*Seventh Limb* (Figure 14d): Each limb with 4 proximal bristles (2 on each side), and 6 terminal bristles (3 on each side); each bristle with up to 5 or 6 bells and marginal spines; terminus with opposing combs, one with about 11 teeth, other with about 7.

*Furca* (Figure 14e): Each lamella with 3 strong claws followed by 3 weak claws; all claws with teeth along posterior margin; teeth of strong claws consisting of long teeth between several smaller teeth; distal hairs present along anterior margins of strong claws; hairs present medially at bases of claws and following claws.

*Bellonci Organ* (Figures 13f 14f): Elongate, with broad middle part and pointed tip bearing few faint hairs.

*Eyes*: Medial eye tapering anteriorly, pigmented; dorsal margin of medial eye of USNM 158004 with short proximal process and pair of

long distal bristle-like processes (Figure 14f); dorsal margin of medial eye of UMMP 48791 with total of 5 processes (Figure 13f). Lateral eyes small, unpigmented, each with 4 ommatidia (Figure 14f).

*Posterior of Body* (Figure 14e,g): Hirsute dorsal to furca; spines on surface of posterodorsal corner.

*Upper Lip* (Figure 14f): Simple, helmet-shaped.

*Y-Sclerite* (Figure 14e,g): Typical for family.

*Genitalia* (Figures 13g, 14e,g): Consisting of small oval on each side of body anterior to Y-sclerite.

*Brushlike Organ* (Figure 13g): Consisting of 7 minute bristles forming row near genitalia.

*Eggs*: UMMP 48791, 48972, each with 4 eggs (from Darby, 1965:29). USNM 158001 with 3 eggs. USNM 158004 with 4 eggs in marsupium.

**DESCRIPTION OF ADULT MALE** (Figures 15–17).—Carapace more elongate than that of female and with well-developed rostrum extending well past incisur (Figure 15).

*Ornamentation* (Figure 15): 2 poorly defined lateral ribs as on carapace of female. Anterior outline of rostrum with small scallops. Surface of each valve with numerous small round fossae and minute pits. Long bristles present along anterior and anteroventral margins and sparsely distributed over valve surface.

*Infold*: Infold of rostrum with 11 bristles forming irregular row parallel to valve edge; smaller

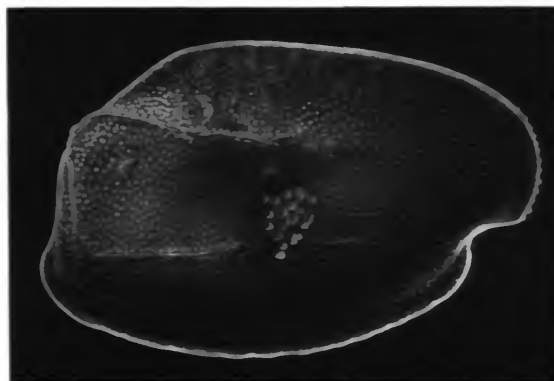


FIGURE 15.—*Rutiderma mollitum* Darby, USNM 158209, adult male, length 1.47 mm, lateral view of complete specimen.



FIGURE 16.—*Rutiderma mollitum* Darby, USNM 158209, adult male, length 1.47 mm: a, left 1st antenna, medial view; b, endopodite, of right 2nd antenna, medial view; c, left mandible, medial view; d, right maxilla, lateral view.



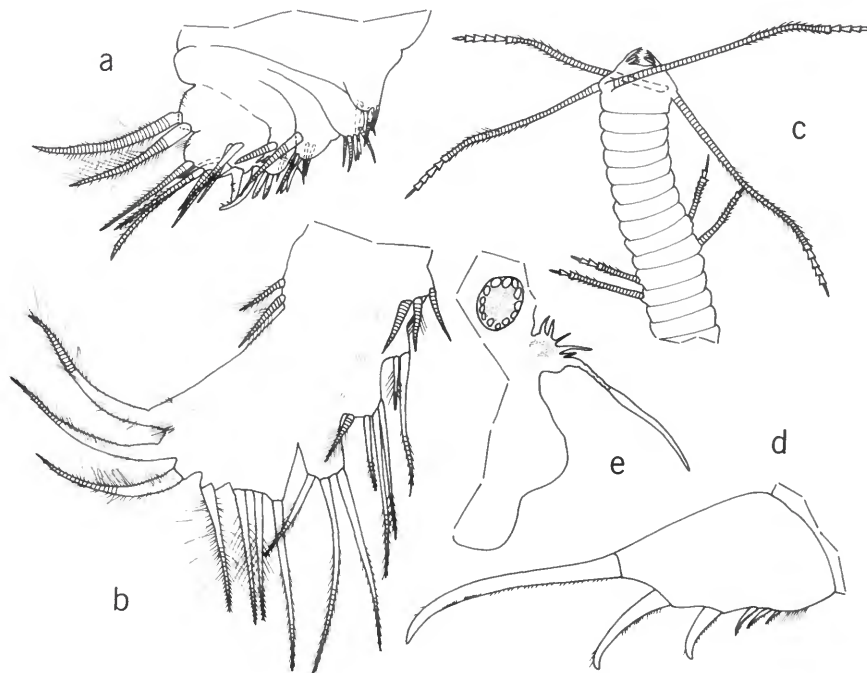


FIGURE 17.—*Rutiderma mollitum* Darby, USNM 158209, adult male, length 1.47 mm; *a*, 5th limb; *b*, 6th limb; *c*, 7th limb; *d*, left lamella of furca; *e*, anterior of body showing lateral eye (not all ommatidia shown), medial eye with dorsal filaments, bellonci organ, and upper lip.

bristles present along anteroventral infold; posterior end of ventral infold continuing along infold of caudal process, and posterior infold dorsal to caudal process with many small bristles mostly close to and paralleling inner margin of infold.

**Caudal Process:** Similar to that of female in medial view.

**Size:** USNM 158209, length 1.47 mm, height 0.91 mm. USNM 158708, length 1.41 mm, height 0.86 mm. Returned to Mote Marine laboratory: sta 4E, length 1.43 mm, height 0.89 mm.

**First Antenna** (Figure 16*a*): 1st joint with distal medial spines forming rows. 2nd joint spinous, with 2 bristles (1 dorsal, 1 lateral). 3rd joint short, with dorsal hairs and lateral spines, and 3 bristles (2 dorsal, 1 ventral). 4th joint about twice length of 3rd, spinous, with 4 bristles (1 dorsal, 3 ventral). 5th joint minute, inserted ventrally between 4th and 6th joints; sensory bristle with numerous filaments at distal end of broad proximal part;

stem of sensory bristle with minute proximal filament and spine at tip (stem becoming narrower just past end of 8th joint). 6th joint slightly longer than 4th, with 1 medial bristle near dorsal margin. 7th joint: a-bristle about same length as bristle of 6th joint; b-bristle stout, slightly longer than twice length of a-bristle, with 2 proximal filaments, 1 spine distal to middle, and 1 spine at tip; c-bristle extremely long, with 11 filaments with 2 spines at tip. 8th joint: d- and e-bristles longer than b-bristle, bare with blunt tips; f-bristle similar to c-bristle, also with 11 filaments with 2 minute spines at tip; g-bristle stout, longer than d- and e-bristles, with 2 proximal filaments and minute spine at tip.

**Second Antenna:** Protopodite bare. Endopodite 3-jointed (Figure 16*b*): 1st joint short, with 5 bristles (4 proximal, 1 near middle); 2nd joint elongate with 2 spinous ventral bristles; 3rd joint elongate, reflexed on 2nd, with 1 short proximal

bristle and 2 small bristles at tip (tip with ridges). Exopodite: elongate 1st joint with spines forming rows along ventral margin and small blunt medial bristle on distal margin; bristle of short 2nd joint about same length as combined lengths of 3rd and 4th joints, with ventral closely spaced spines (proximal spines stouter than distal spines); bristle of long 3rd joint long with natatory hairs, no spines; bristles of short joints 4–8 similar to bristle of 3rd joint; 9th joint with 5 bristles (3 long, 1 medium, all with natatory hairs, and 1 minute with few short marginal spines); joints 3–8 each with small basal spine; 9th joint with small lateral spine about one-half length of joint (spine about same length as basal spine of 8th joint); 2nd joint with long hairs forming 2 rows along distal lateral margin; joints 3–8 with spines along part of distal lateral margin.

*Mandible* (Figure 16c): Coxale endite represented by 2 or 3 minute weakly developed processes. Basale: medial side spinous with 6 bristles on or near ventral margin (1 of these without rings); dorsal margin with 3 bristles either proximal to middle (right limb, USNM 158209) or near it (left limb, USNM 158209). Exopodite well developed, hirsute distally. 1st endopodial joint with medial spines and 2 ventral bristles. 2nd endopodial joint: medial side spinous; dorsal margin with 1 short and 3 long proximal bristles; ventral margin (or close to it) with 6 short distal bristles. End joint with 1 stout claw and 4 slender bristles.

*Maxilla* (Figure 16d): Limb reduced. Endites I to III with faint bristles, hirsute. Precoxale and coxale dorsal fringe of hairs; coxale with stout hirsute dorsal bristle. Basale with 1 spinous medial bristle near dorsal margin and 1 spinous ventral bristle. Exopodite with 3 spinous bristles. Endopodite: 1st joint hirsute ventrally, with 1 bare alpha-bristle and 1 beta-bristle with long proximal hairs; end joint with 7 bristles.

*Fifth Limb* (Figure 17a): Endite I with 4 bristles; endite II with 5 bristles; endite III with about 7 bristles. Exopodite: joints 1 and 2 each with about 5 bristles, some unringed, flattened, and with few minute spines; joint 3 with 2 stout hirsute bristles on outer lobe, and about 2 slender

bristles on inner lobe; remaining joints fused, with total of 4 bristles. Epipodial appendage with about 38 bristles.

*Sixth Limb* (Figure 17b): 2 short hirsute bristles in place of epipodial appendage. Endite I with 3 short bristles; endite II with 2 bristles (1 long, 1 short); endite III with 4 bristles (2 long, 2 short); endite IV with 3 bristles (2 long, 1 short). End joint with 1 slender anterior bristle with short marginal spines followed by 3 slender bristles with long proximal hairs and short distal spines and then 3 stouter hirsute bristles.

*Seventh Limb* (Figure 17c): 4 short proximal bristles, 2 on each side, and 4 longer terminal bristles, 2 on each side; proximal bristles with 2 or 3 bells and marginal spines; terminal bristles with 4 or 5 bells and marginal spines. Terminus with opposing combs having 2 teeth on 1 comb and 3 on other.

*Furca* (Figure 17d): Similar to that of female except for main claws and especially the 1st claw being more elongate, and teeth along claw 1 being of similar size.

*Bellonci Organ* (Figure 17e): Edges crinkled in part proximal to weak suture near broad middle part; distal part tapering to pointed tip.

*Eyes*: Lateral eye pigmented black, with about 30 ommatidia (exact number difficult to determine because of black pigment) (Figure 17e, only ommatidia along unpigmented edge shown). Medial eye with brown pigment, only slightly smaller than lateral eye; USNM 158209 with 5 elongate processes along dorsal margin (Figure 17e).

*Posterior of Body*: With short spines along middle part.

REMARKS.—The species differs from other species in the genus in having the lamellar prolongation of the selvage continuing along the anterior ridge of the caudal process. In other species the selvage and lamellar prolongation are present along the outer edge of the caudal process.

### *Rutiderma darbyi*, new species

FIGURES 18–24; PLATE 1

*Rutiderma dinochelata*.—Darby, 1965:28, pl. 13: figs. 1–9, pl. 14: figs. 1–7 [not *Rutidermata dinochelata* Kornicker, 1958].

*Rutiderma darbyi* Kornicker.—Bradford, 1980:141, fig. 2 [deliberate nomen nudum].

**ETYMOLOGY.**—The species is named for Dr. David G. Darby.

**HOLOTYPE.**—USNM 158003, ovigerous female on slides and in alcohol.

**TYPE-LOCALITY.**—Georgia continental shelf, 31°05'N, 80°35'W, water depth 26 m (Bureau of Land Management southeast coastal study, sta 0225-3 (5D), 25 Feb 1977).

**PARATYPES.**—North Carolina continental shelf, Cruise E-8-77: USNM 158566, 1 specimen, sta 005-1; USNM 158567, 1 specimen, sta 006-1. USNM 158185, 1 juvenile, sta 0114-1 (1E). USNM 158186, 2 specimens, sta 0114-3 (1E). USNM 158807, 5 specimens, sta 0118-5. USNM 158831, 1 specimen, sta 0720-5 (1C).

South Carolina continental shelf: USNM 158192, 2 ovigerous females, sta 0131-3 (2B). USNM 158195, 1 ovigerous female, sta 0140-2 (2D). USNM 158182, 1 ovigerous female and 2 juveniles, sta 0146-1 (2E). USNM 158194, 1 ovigerous female; + 1 specimen returned to Linda H. Pequegnat, sta 0170-3 (3C). USNM 158109, 1 specimen with chonistomatid parasite, sta 0177-4 (3E). USNM 158806, 3 specimens, sta 0136-3 (2C). USNM 158805, 2 specimens, sta 0136-5 (2C). USNM 158815, 2 specimens, sta 0136-6 (2C). USNM 158809, 2 specimens, sta 0140-6 (2D). USNM 158799, 1 juvenile, sta 0150-5 (2F). USNM 158796, 2 specimens, sta 0170-4 (3C). USNM 158800, 3 specimens, sta 0170-5 (3C).

Georgia continental shelf: UMMP 48787 (not seen by me but illustrated by Darby, 1965, pl. 13:5; 14:7); UMMP 48788, appendages and valves on 2 slides. USNM 158183, 1 juvenile, sta 0194-3 (4D). USNM 158193, 1 ovigerous female, sta 0194-1 (4D). USNM 158184, 1 juvenile, sta 0215-1 (5B). USNM 158190, 1 juvenile male; USNM 158199, 1 specimen with female chonistomatid parasite; + 2 specimens returned to Linda H. Pequegnat, sta 0215-3 (5B). USNM 158196, 1 ovigerous female + 1 juvenile, sta 0225-2 (5D). USNM 158002, 1 ovigerous female, sta 0225-3 (5D). USNM 158200, 1 ovigerous female,

sta 0238-2 (5G). USNM 158830, 1 specimen, sta 0234-5 (5F). USNM 158801, 1 specimen, sta 0220-5 (5C); USNM 158803, 1 specimen, sta 0220-6 (5C). USNM 158816, 1 specimen, sta 0527-1 (5E). USNM 158810, 1 specimen, sta 0531-4 (5F). USNM 158817, 4 specimens, sta 0531-6 (5F). USNM 158813, 1 specimen, sta 0540-5 (5H).

Florida continental shelf (Atlantic): USNM 158188, 1 juvenile; USNM 158191, 1 ovigerous female + 5 juvenile males, sta 0258-1 (6C). USNM 158197, 1 specimen, sta 0258-2 (6C). USNM 158187, 1 specimen, sta 0265-1 (6E). USNM 158198, 1 juvenile male, sta 0265-3 (6E). USNM 158201, 1 specimen, sta 0269-3 (6F). USNM 158797, 4 specimens, sta 0258-4 (6C). USNM 158795, 4 specimens, sta 0258-5 (6C). USNM 158798, 3 specimens, sta 0258-6 (6C). USNM 158814, 3 specimens, sta 0556-6 (7C). USNM 152851, 1 male, Biscayne Key, sta 1. USNM 158189, 1 juvenile male, Biscayne Bay, Rickenbacker Causeway, opposite entrance to Marine Stadium. USNM 156737, 2 juveniles, Virginia Key, northeast shore. USNM 156741, 1 adult male, Biscayne Bay, north end of Virginia Key. USNM 158618, 1 adult female, mouth of Florida Bay.

Florida continental shelf (Gulf of Mexico), transect I: USNM 158678, 158664, 158663, 158707, 158706, 158709, 158785, 158786, 158780, 9 specimens, sta 2101. USNM 158677, 158676, 158705, 158710, 158704, 158770, 158789, 158779, 158777, 14 specimens, sta 2102. USNM 158668, 158673, 158667, 158674, 158670, 158665, 8 specimens, sta 2103. USNM 158782, 158722, 2 specimens, sta 2104. USNM 158679, 9 specimens, sta 2106. Transect II: USNM 158703, 158714, 158773, 158784, 6 specimens, sta 2207. USNM 158712, 158711, 2 specimens, sta 2208. USNM 158716, 1 male, sta 2209. USNM 158718, 158660, 158653, 158658, 5 specimens, sta 2211. Transect III: USNM 158792, 1 juvenile, sta 2316. Transect IV: USNM 158758, 158754, 158755, 7 specimens, sta 2419. Transect V: USNM 158759, 158763, 2 specimens, sta 2528. Transect VII: USNM 158787, 1 specimen, sta 2748. Transect IX: USNM 158793,

158776, 158778, 158737, 158739, 7 specimens, sta 2960. Supplemental transect: USNM 158819, 1 adult male, sta 2851. USNM 158828, 158822, 158826, 158820, 158821, 10 specimens, sta 2852.

Florida Continental Shelf (Southwest): USNM 158768, 1 ovigerous female, sta 2853. USNM 158628A,B, 2 specimens, sta 2. Returned to James K. Culter: 1 specimen, sta 14; 6 specimens, sta 16; 87 specimens, sta 20; 5 specimens, sta 22; 1 specimen, sta 28; 15 specimens, vial C; 29 specimens, vial E; 3 specimens, vial L.

Bahama Islands: USNM 158616, 4 juveniles, San Salvador Island. USNM 158617, 1 juvenile, Andros Island, sta 72.

**NON-TYPES.**—I have examined the appendages of Darby's specimens UMMP 48789 and 48790 and although I refer them here to *R. darbyi*, I do not consider them paratypes because I have not seen the infold of the caudal process of either specimen; I also refer Darby's UMMP 48786 to *R. darbyi* but do not consider it to be a paratype because I have not examined it, and the infold of the caudal process of the specimen was not illustrated by Darby, 1965.

**DISTRIBUTION.**—Continental shelf off North and South Carolina, Georgia, and Florida (Atlantic and Gulf of Mexico); also, Bahama Islands (Figure 1). Known depth range intertidal to 168 m (Table 1).

**DESCRIPTION OF ADULT FEMALE** (Figures 18–21).—Carapace ovoid in lateral view, with prominent caudal process and small rostrum with tip projecting ventrally past valve edge (Figure 18, 19a):

**Ornamentation:** A horizontal rib present above and below central adductor muscle attachments forming alar process on each valve; and additional rib paralleling dorsal border; faint radial riblets along anteroventral margin; additional faint riblets present in vicinity of central adductor muscle attachments and in anterodorsal part of valve (Figure 18); riblets more easily visible on some specimens than on others; some specimens with triangular process in middle of posterodorsal margin (Figure 19a); surface of valves with abundant shallow fossae (Figure 18); anterior margin



FIGURE 18.—*Rutiderma darbyi*, new species, USNM 158002, paratype, adult female, lateral view of complete specimen, length 1.28 mm.

of rostrum and ventral margin of valve with small scalloped edge (Figure 18); long bristles along anterior and ventral margins and scattered over valve surface.

**Infold:** Rostral infold of USNM 158003 with 7 bristles paralleling valve edge; rostral infold of USNM 158002 with only 4 bristles on left valve (Figure 19d) and none on right (specimen probably aberrant in having so few rostral bristles); inner edge of incisur with a pair of short bristles; anteroventral infold with 3 or 4 bristles forming row parallel to valve edge; anterior half of ventral infold with 4 bristles parallel to valve edge; ventral infold anterior to caudal process with about 12 bristles forming row parallel to inner margin of infold; infold of caudal process of right valve with pocket having 5 small bristles along anterior edge (Figure 19f); infold of caudal process of left valve with pocket having along anterior edge a narrow skirt or ruffle having a pleated appearance (Figure 19e); posterior edge of skirt with low processes along upper part becoming longer and forming flat spines at lower part; ventral edge of pocket with 4–6 broad flat spines; left valve with 2 minute bristles just anterior to skirt, 1 near middle, 1 near ventral edge; both valves with several small bristles both dorsal and ventral to anterior edge of pocket and near inner edge of



FIGURE 19.—*Rutiderma darbyi*, new species. USNM 158628A, paratype, adult female, length 1.09 mm: *a*, camera lucida drawing of carapace showing pointed posterodorsal process not present on all specimens. UMMMP 48788, paratype, adult female: *b*, Y-sclerite and brushlike organ, anterior of animal towards left. USNM 158002, paratype, adult female, length 1.28 mm: *c*, central adductor muscle attachment scars of left valve, anterior towards right, inside view; *d*, anterior of left valve, inside view; *e*, caudal process of left valve, inside view; *f*, caudal process of right valve, inside view; *g*, right 1st antenna, medial view; *h*, endopodite and distal part of protopodite of right 2nd antenna, medial view; *i*, left mandible, lateral view; *j*, right maxilla lateral view; *k*, left 5th limb, anterior view.

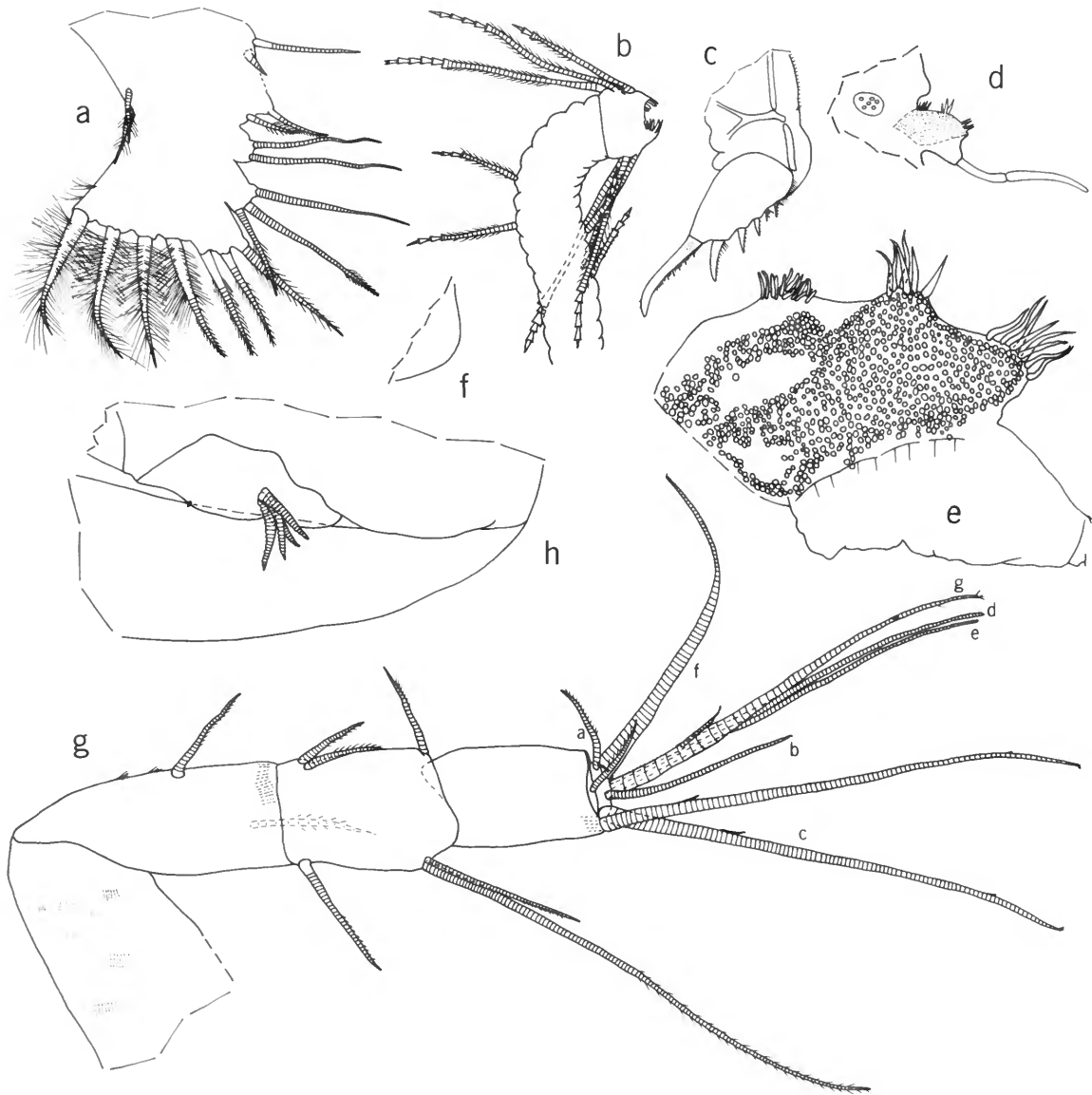


FIGURE 20.—*Rutiderma darbyi*, new species. USNM 158002, paratype, adult female, length 1.28 mm: *a*, 6th limb; *b*, 7th limb; *c*, posterior of body showing left lamella of furca and Y-sclerite; *d*, right lateral eye, medial eye with dorsal filaments, and bellonci organ; *e*, detail of medial eye shown in *d*; *f*, profile of upper lip, anterior towards right. USNM 158003, holotype, adult female, length 1.34 mm: *g*, left 1st antenna, medial view; *h*, endopodite, distal part of protopodite, and proximal part of 1st joint of exopodite of left 2nd antenna, medial view.

infold; 1 small bristle present on infold near posterior edge of caudal process.

*Selvage*: Wide lamellar prolongation with marginal fringe present along free margins; fringe

longest along rostral and anteroventral margins of valves; prolongation divided at inner end of incisur but not along caudal process.

*Central Adductor Muscle Attachment Scars* (Figure

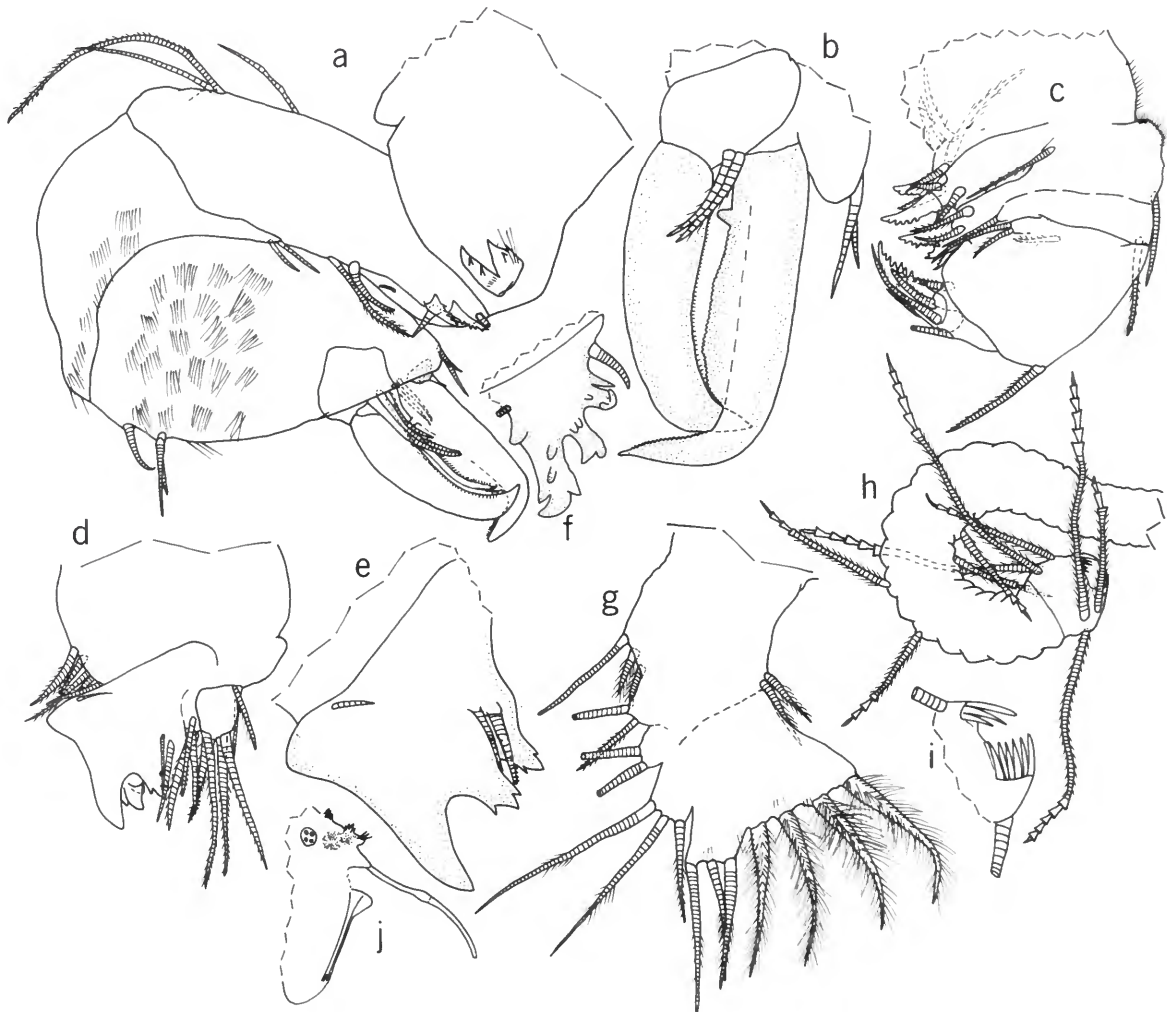


FIGURE 21.—*Rutiderma darbyi*, new species, USNM 158003, holotype, adult female, length 1.34 mm: *a*, right mandible, medial view; *b*, tip of left mandible, lateral view; *c*, right maxilla, lateral view; *d*, left 5th limb, posterior view; *e*, detail of 2nd exopodial joint, from *d*; *f*, 1st exopodial joint of right 5th limb, anterior view; *g*, 6th limb; *h*, 7th limb; *i*, tip of 7th limb opposite that shown in *h*; *j*, anterior of body showing right lateral eye, medial eye with dorsal filaments, bellonci organ, upper lip, and outline of elongate internal muscle.

19*c*): Consisting of about 13 individual oval scars.

*Size*: USNM 158002, length 1.28 mm, height 0.88 mm; USNM 158003, length 1.34 mm, height 0.89 mm; USNM 158193, length 1.30 mm, height 0.90 mm; USNM 158194, length 1.26 mm, height 0.85 mm; USNM 158200, length 1.31 mm, height 0.87 mm; USNM 158618, length 1.11 mm, height

0.79 mm; USNM 158628A, length 1.09 mm, height 0.74 mm.

*First Antenna* (Figures 19*g*, 20*g*): 1st joint with faint medial and lateral spines forming rows. 2nd joint with spines along dorsal margin and distally on lateral surface, and with 2 spinous bristles, 1 dorsal, 1 lateral, 3rd and 4th joints fused; 3rd joint with 3 spinous bristles, 2 dorsal, 1 ventral;

4th joint with 3 spinous bristles, 1 dorsal, 2 ventral. 5th joint with lateral spines forming row at base of sensory bristle; sensory bristle with 2 minute marginal filaments and few spines at tip. 6th joint minute, with short spinous medial bristle. 7th joint: a-bristle spinous, about same length as bristle of 6th joint but slightly stouter, b-bristle about 2½ times the length of a-bristle, bare except for spine at tip; c-bristle about same length as sensory bristle of 5th joint, with 2 minute marginal filaments and spines at tip. 8th joint: d- and e-bristles bare with blunt tips, slightly shorter than c-bristle; f-bristle about two-thirds length of c-bristle, with minute spine at tip; g-bristle about same length as d- and e-bristles, with short-ringed proximal filament with slender spine at tip, and with several minute spines at tip and 1 minute spine just proximal to tip.

*Second Antenna* (Figures 19h, 20h): Protopodite bare. Endopodite 1-jointed with 4 short anterior bristles (a minute posterior process observed on some limbs (Figure 19h). Exopodite: distal end of 1st joint with distinct small bristle with blunt tip (open?); bristle of 2nd joint reaching past 9th joint, ventral margin with blunt teeth forming row; bristles of joints 3–5 not much longer than bristle of 2nd joint, with blunt teeth forming row along ventral margin; bristles of joints 6–8 long, with natatory hairs; 9th joint with 6 bristles (3 long and 1 medium with natatory hairs, 2 minute, medial, bare).

*Mandible* (Figures 19i, 21a,b): Coxale endite with 2 pectinate prongs. Basale: medial side near ventral margin with 4 proximal bristles (2 pectinate unringed, 2 ringed; longer of the ringed bristles broken off illustrated limb), 1 small bristle proximal to middle, and 2 bristles near middle; dorsal margin with 3 bristles (1 near middle, 2 distal to middle). 1st endopodial joint with 2 short ventral bristles, and medial spines forming rows. 2nd endopodial joint: dorsal margin with 3 short proximal bristles; medial surface with abundant spines; ventral margin with 2 small distal bristles, and small sclerotized process with minute bristle at base of stout terminal claw; dorsal margin of terminal claw with proximal tooth,

serrate margin; tip of terminal claw with small recurved extension (broken off on right limb of USNM 158003 (Figure 21a)). 3rd endopodial joint with stout terminal claw with short curved tip and serrate ventral margin, 3 slender medial bristles near ventral end of base of stout claw, 1 unringed flat bristle (with serrate ventral margin) ventral to stout claw, and 2 short spinous bristles located lateral to stout terminal claw of 2nd joint.

*Maxilla* (Figures 19j, 21c): Dorsal margin of precoxale and coxale with hairy fringe; dorsal margin of coxale also with terminal bristle. Endite I with 3 stout pectinate bristles and 3 bristles with slender marginal spines; endite II with 2 stout pectinate bristles and 3 bristles with slender marginal spines; endite III with 3 stout pectinate bristles, 2 slender, distal, spinous bristles, and 1 slender, proximal, spinous bristle. Basale with 2 bristles (1 ventral, 1 dorsal). Exopodite small with 2 bristles. 1st endopodial joint with 1 alpha-bristle, 1 beta-bristle, and 1 proximal medial bristle (possibly this bristle is on basale). 2nd endopodial joint with 2 stout pectinate unringed bristles and 4 ringed bristles, mostly with marginal spines.

*Fifth Limb* (Figures 19k, 21d–f): Endite I with 3 or 4 bristles; endite II with about 5 bristles; endite III obscure, but with about 5 or 6 bristles. Exopodite: 1st joint with 3 stout teeth with secondary teeth followed by 1 smooth tooth and 1 short ringed bristle; outer edge of joint with 1 proximal bristle (Figure 21f). 2nd joint with large 3-lobed tooth; proximal 2 of the lobes with secondary teeth; posterior side of joint with minute bristle near outer corner, and with 2 bristles near proximal lobes (Figure 21e). 3rd joint with 2 bristles on outer lobe (at least 1 with spines) and 3 bristles on inner lobe (2 with spines, 1 denticulate). 4th and 5th joints fused, with total of 4 spinous bristles.

*Sixth Limb* (Figures 20a, 21g): Endite I with 3 bristles; endites II and III each with 2 bristles; endite IV with 3 bristles; end joint with anterior projection with 3 bristles with short marginal spines followed by 4 hirsute bristles; posterior edge of limb with 2 spinous epipodial bristles.

*Seventh Limb* (Figures 20b, 21h,i): Each limb



with 4 proximal bristles, 2 on each side, and 6 terminal bristles, 3 on each side; each bristle with up to 5 bells and marginal spines; terminus with opposing combs with about 10 teeth on one comb and 4 on other (Figure 21i).

*Furca* (Figure 20c): Each lamella with 4 stout primary claws followed by 2 small secondary claws; primary claws with teeth along posterior edge; claw 1 with large and small teeth forming groups along posterior edge and with long medial spines forming row near base; secondary claws with posterior spines (proximal of these stout); right lamella with hairs along anterior margin; claws 1 and 2 with few distal anterior hairs; long lateral hairs present along each lamella following claw 6.

*Bellonci Organ* (Figures 20d, 21j): Elongate, widening near middle, then tapering to either rounded or pointed tip, weak suture may be present near middle.

*Eyes* (Figures 20d,e, 21j): Medial eye with brown or black pigment; dorsal margin of medial eyes of USNM 158002 and 158003 with several groups of short filaments, which appear to be outgrowths of the medial eye, but origin in doubt. Lateral eyes unpigmented, smaller than medial eye, with 4–6 small ommatidia.

*Upper Lip* (Figures 20f, 21j): Rounded.

*Y-Sclerite* (Figures 19b, 20c): Typical for genus.

*Brushlike Organ* (Figure 19b): 6 minute bristles forming row anterior to Y-Sclerite.

*Eggs*: USNM 158002, 158194 each with 3 eggs in marsupium; USNM 158003, 158193 each with 4 eggs; USNM 158200 with 2 eggs.

*Parasites*: USNM 158003 with female and juvenile choniostomatid copepods inside postero-dorsal part of carapace. Copepods sent to Dr. Janet Bradford, New Zealand, for study (Bradford, 1980:141). Choniostomatids also present in USNM 158109 and 158199.

**DESCRIPTION OF ADULT MALE** (Figures 22–24; Plate 1).—Carapace elongate with prominent rostrum and caudal process; incisur forming right-angle (Figure 22; Plate 1a,b); tip of rostrum projecting slightly past valve edge (Figure 23a).

*Ornamentation*: Posterior half of each valve

with 2 horizontal ribs forming alar process (Figure 22); surface with abundant shallow fossae (Figure 22; Plate 1a,b,d); minute pits present between fossae (Plate 1c); bristles present along anterior and ventral margins of valves and scattered over valve surface (Plate 1a–c,f); 1 long and several short bristles present at posterior end of caudal process (Figure 23b).

*Infold*: Infold of rostrum with 8 long bristles forming row parallel to edge of rostrum (Figure 23a); 2 short bristles present at inner corner of incisur; anterior infold below rostrum with 3 or 4 short bristles; anterior part of ventral margin with 8 or 9 short bristles forming row; posterior part of ventral margin anterior to caudal process with 8 or 9 short bristles. Infold of caudal process of left valve with “pocket” having along the anterior edge a narrow skirt or ruffle having a pleated appearance (Figure 23b,c); posterior edge of skirt with low processes along upper part and broad, flat spines along lower part; ventral edge of pocket with 5 similar broad, flat spines; left valve with 2 minute bristles anterior to skirt, 1 posterior to skirt, and 1 dorsal to skirt. Infold of caudal process of right valve also with pocket, but without skirt or broad, flat spines (Figure 23e); anterior edge of pocket with 4 short bristles; 1 short bristle on infold dorsal to caudal process.

*Selvage*: Wide lamellar prolongation with marginal fringe present along free margins (Plate



FIGURE 22.—*Rutiderma darbyi*, new species, USNM 152851, paratype, adult male, length 1.12 mm. lateral view of complete specimen.

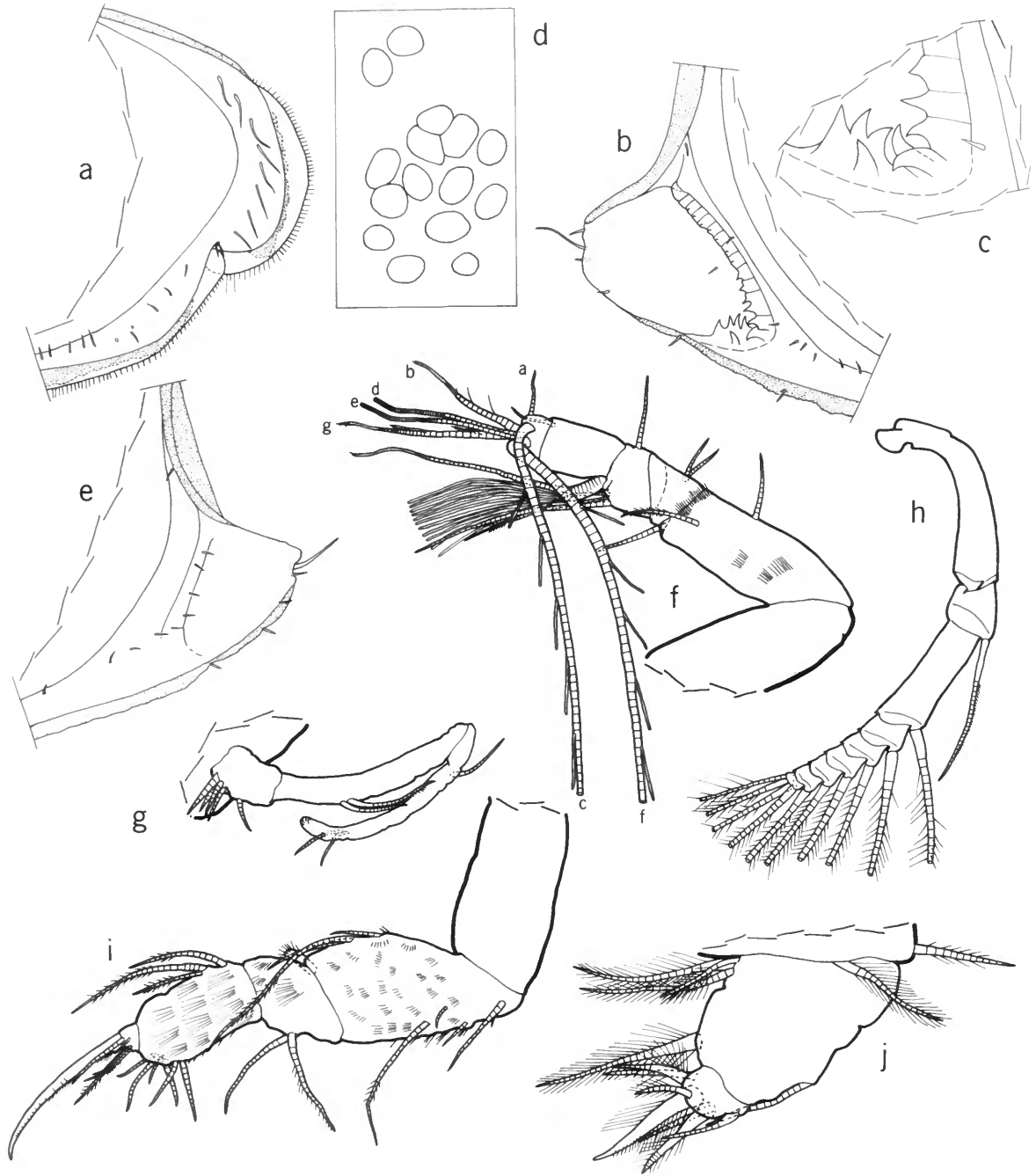


FIGURE 23.—*Rutiderma darbyi*, new species, USNM 152851, paratype, adult male, length 1.12 mm: a, anterior of left valve, inside view; b, caudal process of left valve, inside view; c, detail of serrate margin of lower corner of infold, from b; d, central adductor muscle attachment scars of left valve, inside view, anterior towards right; e, caudal process of right valve, inside view; f, left 1st antenna, lateral view; g, endopodite of right 2nd antenna, medial view; h, exopodite of left 2nd antenna, medial view (only proximal parts of bristles of joints 3–9 shown); i, right mandible, medial view; j, distal part of maxilla.

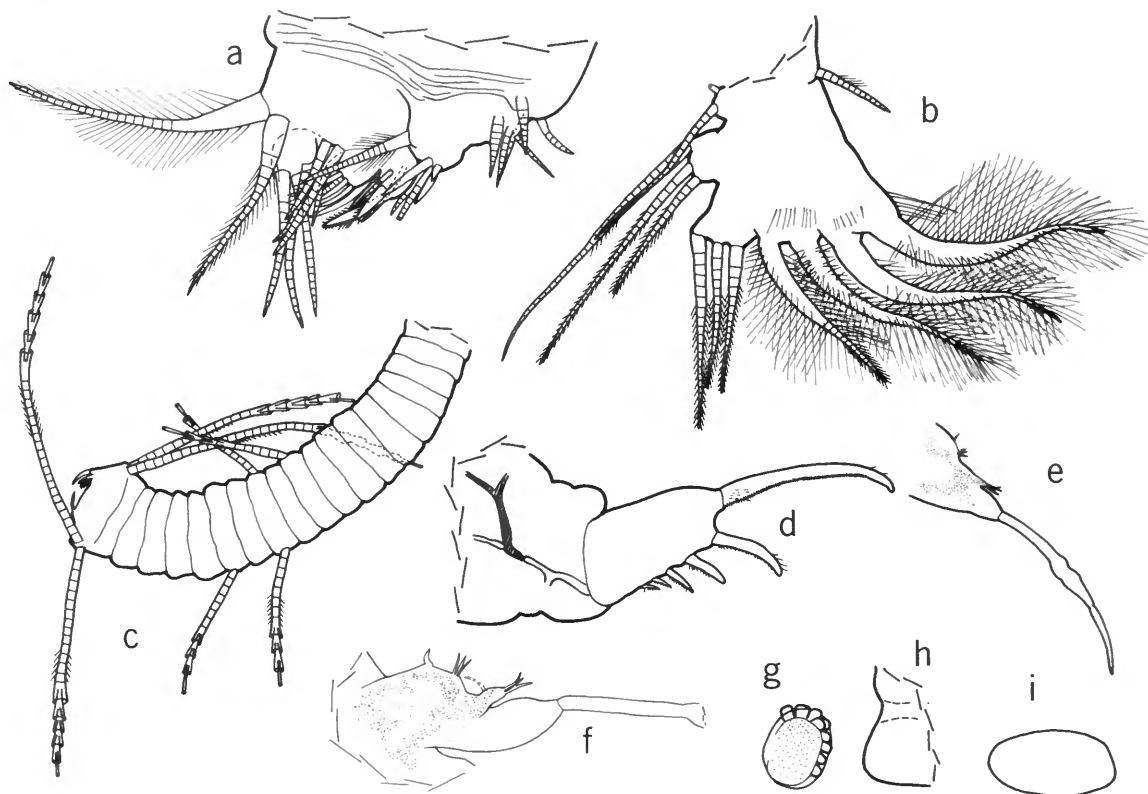


FIGURE 24.—*Rutiderma darbyi*, new species, USNM 152851, paratype, adult male, length 1.12 mm: *a*, 5th limb; *b*, 6th limb; *c*, 7th limb; *d*, posterior of body showing right lamella of furca and Y-sclerite (with lined pattern); *e*, medial eye with dorsal filaments, and bellonci organ; *f*, detail of medial eye and proximal part of bellonci organ; *g*, lateral eye (not all ommatidia shown); *h*, lateral outline of upper lip, anterior towards left; *i*, lateral outline of heart.

1*a,b,e*); prolongation divided at inner corner of incisur.

**Central Adductor Muscle Attachment Scars** (Figure 23*d*): Consisting of about 15 individual ovoid scars.

**Size:** USNM 1528551, length of 1.12 mm, height 0.68 mm; USNM 156741, length 1.21 mm, height 0.71 mm.

**First Antenna** (Figure 23*f*): 1st joint bare; 2nd joint with hairs on medial surface, spines on lateral surface, and 2 bristles: 1 midbristle on dorsal margin and 1 distal lateral bristle; 2nd joint triangular, with 3 bristles: 1 ventral, 2 dorsal; 3rd joint short with 4 bristles: 1 dorsal, 3 ventral; 5th joint small, triangular, wedged ven-

trally between 4th and 6th joints; sensory bristle of 5th joint with stout proximal part with abundant long filaments; main stem of sensory bristle with minute annulated bristle just distal to base of long filaments and with minute spine at tip; long 6th joint with short, terminal, medial bristle near dorsal margin. Seventh joint: a-bristle about same length as bristle of 6th joint, length about equal to width of joint; b-bristle about 2½ times length of a-bristle, with 2 short proximal filaments, 1 minute spine near middle, and spine at tip; c-bristle very long, with 10 marginal filaments with 2 minute spines at tip, stem with 1 minute spine at tip. Eighth joint: d- and e-bristles bare with blunt tips, slightly longer than b-bristle;

f-bristle longer than c-bristle, with 10 marginal filaments, filaments with 2 minute spines at tip, stem with 1 minute spine at tip; g-bristle slightly longer than d- and e-bristles, with 1 marginal filament with minute spine at tip, stem with minute spine at tip and another near tip.

*Second Antenna* (Figure 23g,h): Protopodite bare. Endopodite 3-jointed: 1st joint short with 5 short anterior bristles, 4 proximal, 1 near middle; 2nd joint elongate with 2 bristles at middle of ventral margin; 3rd joint elongate, reflexed, with 1 proximal and 2 short subterminal bristles, tip with about 4 faint ridges. Exopodite: 1st joint elongate with medial spine just proximal to terminal margin, and second smaller medial spine on terminal margin, ventral margin of joint with few hairs; lateral side with spines forming short rows near dorsal margin and longer spines near distal margin; 2nd joint short; ventral margin of bristle of joint with 2 spines followed by shorter spines forming 5 groups, each group with slightly smaller spines than the more proximally located group, bristle reaching distal end of 4th joint; 3rd joint elongate, 4th to 9th joints short; bristles of joints 3-8 long, with natatory hairs; 9th joint with 4 bristles with natatory hairs (3 long, 1 medium) and 1 minute bare bristle; lateral side of joint 2 with long spines forming rows near distal margin; lateral side of joints 3-8 with shorter terminal spines forming row, and with minute basal spines; ventral edge of joints 3-8 may have minute spines.

*Mandible* (Figure 23i): Coxale endite not observed. Basale: medial surface with numerous spines forming rows and 5 bristles near ventral margin; dorsal margin with 3 midbristles; dorsal and ventral margins and lateral surface near dorsal margin with hairs forming rows. Exopodite: hirsute, reaching about half way up dorsal margin of 1st endopodite joint. Endopodite: 1st joint with long medial hairs and 2 ventral midbristles; 2nd endopodite joint with long medial hairs, lateral spines along distal margin, 3 proximal bristles on dorsal margin, and 6 distal bristles on ventral margin; end joint with long claw and 5 bristles, longest of these about one-half length

of claw; claw with short, faint spines along ventral margin.

*Maxilla* (Figure 23j): Limb very small; endite I with 4 minute unringed bristles; endites II and III obscure on specimen examined, but one of these with a long, ringed, spinous bristle; coxale with long plumose dorsal bristle and dorsal fringe of long hairs (not shown on Figure 23j); basale with 2 distal spinous bristles. Exopodite small with 2 long spinous terminal bristles and 1 short spinous proximal bristle (the latter could be on the distal margin of basale and not part of exopodite). Endopodite: 1st joint with bare, slender, alpha-bristle and stout, plumose, beta-bristle; end joint with 7 bristles; 4 slender, either bare or with short marginal spines, 3 stout with long marginal hairs.

*Fifth Limb* (Figure 24a): Epipodial appendage with 37 bristles; endite I with 3 short bare bristles; endite II with 4 short bare bristles; endite III with 6 bristles: 5 short, either bare or with few short marginal spines, 1 long with long proximal hairs. Exopodite: 1st joint with 1 ringed, proximal, anterior bristle, 1 ringed, proximal, posterior bristle, and 3 flat, unringed, terminal bristles with marginal hairs; 2nd joint with 1 long unringed proximal bristle, 1 short proximal bristle, and 2 ringed and 2 unringed terminal bristles; outer lobe of 3rd joint with 2 long hirsute bristles, inner lobe with 3 bristles: 2 bare, 1 with long marginal hairs; fused 4th and 5th joints with 4 bare, ringed bristles.

*Sixth Limb* (Figure 24b): Endites I and II fragmented during dissection; endite III with 2 bristles; endite IV with 3 bristles; end joint with projecting proximal part with 3 spinous bristles and 4 posterior hirsute bristles; 1 limb with 1 epipodial bristle, other limb 2.

*Seventh Limb* (Figure 24c): Each limb with 8 bristles: 4 proximal with 3 bells, 4 terminal with 5 bells; bristles with short, faint, distal marginal spines; terminus with comb of 3 recurved teeth opposite 2 recurved teeth.

*Furca* (Figure 24d): Each lamella with 4 stout main claws followed by 2 small secondary claws; claws 1 and 2 with teeth forming lateral and

medial row along posterior margin (teeth smaller distally), and with hairs distally along anterior margins and medially near claw base; claw 3 with medial hairs near base; medial hairs present on lamella near base of claw 1; claws 3–6 with teeth along posterior margins; proximal tooth on claws 2–6 longer than others.

*Bellonci Organ* (Figure 24e,f): Elongate with broad middle part and pointed tip.

*Eyes*: Medial eye elongate, pigmented in proximal half; dorsal margin with 4 soft bristle-like processes, and distally a lobe with 2 short unringed bristle-like processes, one of these bifurcate (Figure 24e,f). Lateral eye about same size as medial eye, pigmented, with about 18 divided ommatidia (Figure 24g; only ommatidia along edge illustrated).

*Upper Lip* (Figure 24h): Rounded without hairs or spines.

*Y-Sclerite* (Figure 24d): Posterior end bending ventrally, anterior end forming 2 branches.

*Heart* (Figure 24i): Well-developed, oval, longer than lateral eye.

**COMPARISONS.**—The carapace of the new species *Rutiderma darbyi* differs from known species in the study area in having several flat spine-like processes along the ventral edge of “pocket” in the caudal process of the left valve. They are absent on the right valve. The spine-like processes are generally visible when the whole specimen is viewed using transmitted light and an objective lens having a magnification of  $\times 10$  or  $\times 20$ . The spine-like processes are present on juveniles and adults of both sexes.

### ***Rutiderma licinum*, new species**

FIGURES 25–29; PLATE 2

**ETYMOLOGY.**—The specific name from the Latin *licinus* (bent or turned upward) in reference to the upturned tip of the terminal claw of the 2nd endopodial joint of the mandible of the females and juveniles of this species.

**HOLOTYPE.**—USNM 154186, ovigerous female in alcohol.

**TYPE-LOCALITY.**—R/V *Gyre*, cruise 11, sta 7, Gulf of Mexico off Galveston, Texas, 53 m.

**PARATYPES.**—North Carolina continental shelf, Cruise E-5-77: USNM 158569, 1 specimen; + 3 specimens returned to Donald Weston, sta 015-1.

Florida continental shelf (Gulf of Mexico), transect I: USNM 158671, 158727, 158720, 4 specimens, sta 2103. USNM 158672, 158666, 158669, 158726, 158728, 5 specimens, sta 2104. Transect II: USNM 158702, 158791, 2 specimens, sta 2207. USNM 158662, 1 male, sta 2211. Transect III: USNM 158767, 158769, 158752, 4 specimens, sta 2316. USNM 158771, 1 specimen, sta 2318. Transect IV: USNM 158757, 1 specimen, sta 2423. Transect V: USNM 158742, 158756, 2 specimens, sta 2528. Supplemental transect: USNM 158823, 158827, 158829, 4 ovigerous females, sta 2851. USNM 158825, 2 specimens, sta 2852. USNM 158764, 2 specimens, sta 2855.

Florida continental shelf (Southwest): USNM 158629, 7 specimens, sta 2. Returned to James K. Culter: 10 specimens, sta 2; 8 specimens, sta 4; 42 specimens, sta 6; 5 specimens, sta 8; 62 specimens, sta 14; 24 specimens, sta 16; 4 specimens, sta 20; 12 specimens, sta 22; 15 specimens, sta 28.

Alabama continental shelf, transect VI: USNM 158751, 158750, 2 specimens, sta 2640. USNM 158749, 158744, 158745, 158743, 158748, 7 specimens, sta 2643.

Texas continental shelf, cruise 10: USNM 157983, 1 specimen; USNM 157996, 4 specimens; sta 8. USNM 157876, 4 specimens; USNM 157989, 1 adult female; USNM 157990, 1 specimen; sta 16. Cruise 11: USNM 157987, 1 adult female, sta 1. USNM 157982, 1 ovigerous female; USNM 157985, 1 specimen, USNM 157986, 1 specimen; USNM 157998, 1 specimen; sta 2. USNM 157981, 1 juvenile male; USNM 157992, 1 specimen; sta 5. USNM 154187, 1 adult female; USNM 157874, 4 specimens; USNM 157877, 5 specimens; USNM 157878, 1 adult male; USNM 157879, 1 ovigerous female; USNM 157980, 7 specimens; USNM 157984, 1 juvenile; USNM 157995, 5 specimens; sta

7. USNM 157997, 1 specimen, sta 8. Stetson Bank: USNM 158632, 6 specimens, sta STB-2C. USNM 158637, 1 specimen, sta STB-2E. USNM 158631. 1 specimen, sta STB-3C. South Texas, transect IV: USNM 159054-6, 1 adult male, sta 6.

**DISTRIBUTION.**—North Carolina continental shelf (rare); Florida continental shelf (Gulf of Mexico); Alabama continental shelf; Texas continental shelf; Stetson Bank off Texas (Figure 2). Known depth range 17–68 m (Table 1).

**DESCRIPTION OF ADULT FEMALE** (Figures 25–27; Plate 2).—Carapace convex dorsally and ventrally; posterior margin truncate with very narrow caudal process; rostrum overhanging fairly deep incisur (Figures 25, 26a; Plate 2a,b). Posterior margin of left valve with small process just dorsal to middle on some specimens.

**Ornamentation:** Surface with horizontal rib above and below central adductor muscle attachment area (Figure 25); vertical rib extending ventrally from posterior end of upper horizontal rib and then curving anteriorly just below posterior end of lower horizontal rib; the vertical rib usually with 2 protuberances, 1 just ventral to upper horizontal rib, and 1 just dorsal to lower horizontal rib; anterodorsal margin including rostral margin with minute scallops; these less well defined along anteroventral valve margin; surface with abundant shallow fossae (Plate 2a–e); bristles widely scattered over valve surface and forming row along anterior and ventral margins and along margin of caudal process (Plate 2a,b,f).

**Infold:** Infold of rostrum with 6 or 7 bristles forming row parallel to anterior margin (Figure 26b); anteroventral infold with 4 or 5 bristles and about 7 ridges paralleling margin; posteroventral infold including caudal process with 10 to 12 bristles mostly paralleling inner margin of infold (Figure 26c,d).

**Selvae:** Wide lamellar prolongation fringed along anterior and anteroventral margins, possibly elsewhere; selvae divided at inner end of incisur (Plate 2b) and at minute bristle on edge of caudal process (Figure 26c,d).

**Size:** USNM 154186, length 1.02 mm, height

0.74 mm; USNM 154187, length 1.04 mm, height 0.75 mm; USNM 157879, length 1.09 mm, height 0.77 mm; USNM 157982, length 1.07 mm, height 0.75 mm; USNM 157987, length 1.01 mm, height 0.72 mm; USNM 158569, length 1.10 mm, height 0.77 mm.

**First Antenna** (Figure 26e): 1st joint with medial spines forming short rows. 2nd joint with 2 bristles (1 lateral, 1 dorsal), and spines on dorsal margin and forming lateral row near distal dorsal corner. 3rd joint small, fused to 4th joint, with 3 bristles, 1 ventral, 2 dorsal. 4th joint with 3 bristles, 2 ventral, 1 dorsal. Long 5th joint with lateral spines forming row at distal ventral corner; sensory bristle bare except for terminal spine. Medial bristle of 6th joint short, with marginal spines. 7th joint: a-bristle spinous, extending just past tip of bristle of 6th joint; b-bristle about same length as a-bristle, bare except for spine at tip; c-bristle about same length as sensory bristle of 5th joint, with 1 short proximal filament. 8th joint: d- and e-bristles bare with blunt tips, bristles about same length as sensory bristle; f-bristle stout, shorter than sensory bristle, bare except for spine at tip; g-bristle about same length as sensory bristle, with 1 short proximal filament and spine at tip.

**Second Antenna** (Figure 26f): Protopodite bare. Endopodite 1-jointed with 4 short bristles. Exo-

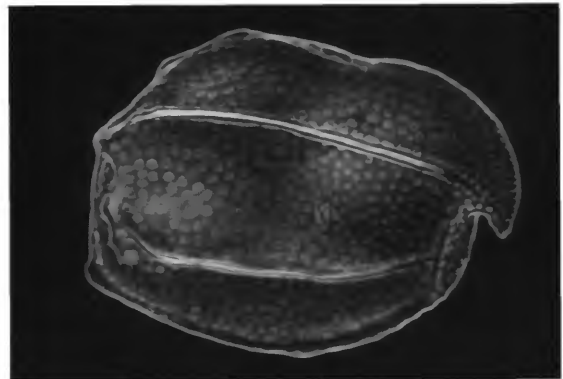


FIGURE 25.—*Rutiderna licinum*, new species, USNM 154186, holotype, adult female, length 1.02 mm, lateral view of complete specimen.

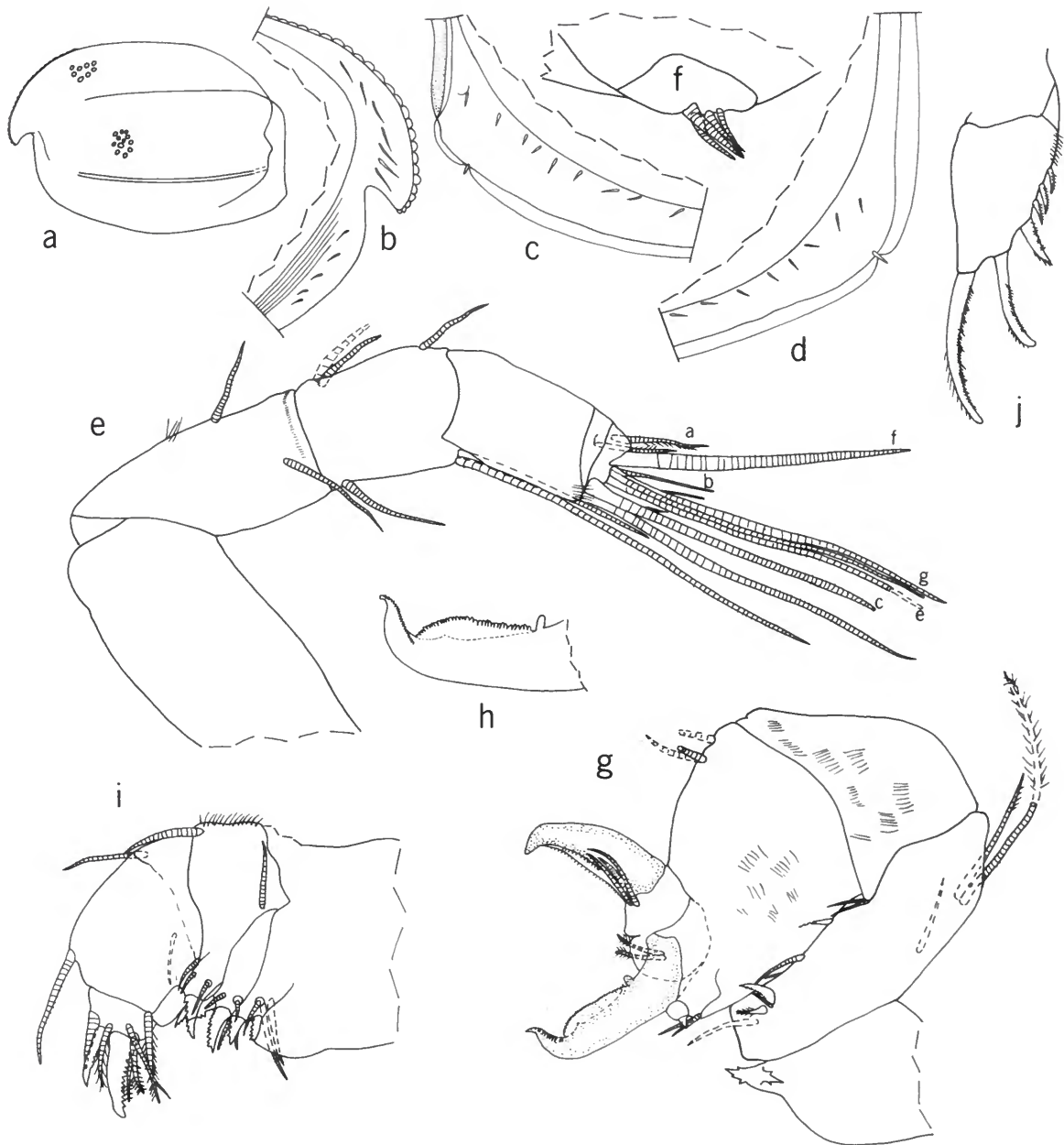


FIGURE 26.—*Rutiderma licinum*, new species. USNM 158569, paratype, adult female, length 1.10 mm; a, outline of complete specimen showing some fossae and central adductor muscle attachments. USNM 154186, holotype, adult female, length 1.02 mm; b, anterior of left valve, inside view; c, caudal process of left valve, inside view; d, caudal process of right valve, inside view. USNM 154187, paratype, adult female, length 1.04 mm; e, right 1st antenna, lateral view; f, endopodite of left 2nd antenna, medial view; g, right mandible, medial view; h, claw of 3rd joint of left mandible, lateral view; i, maxilla (not all endite bristles shown); j, left lamella of furca, lateral view.

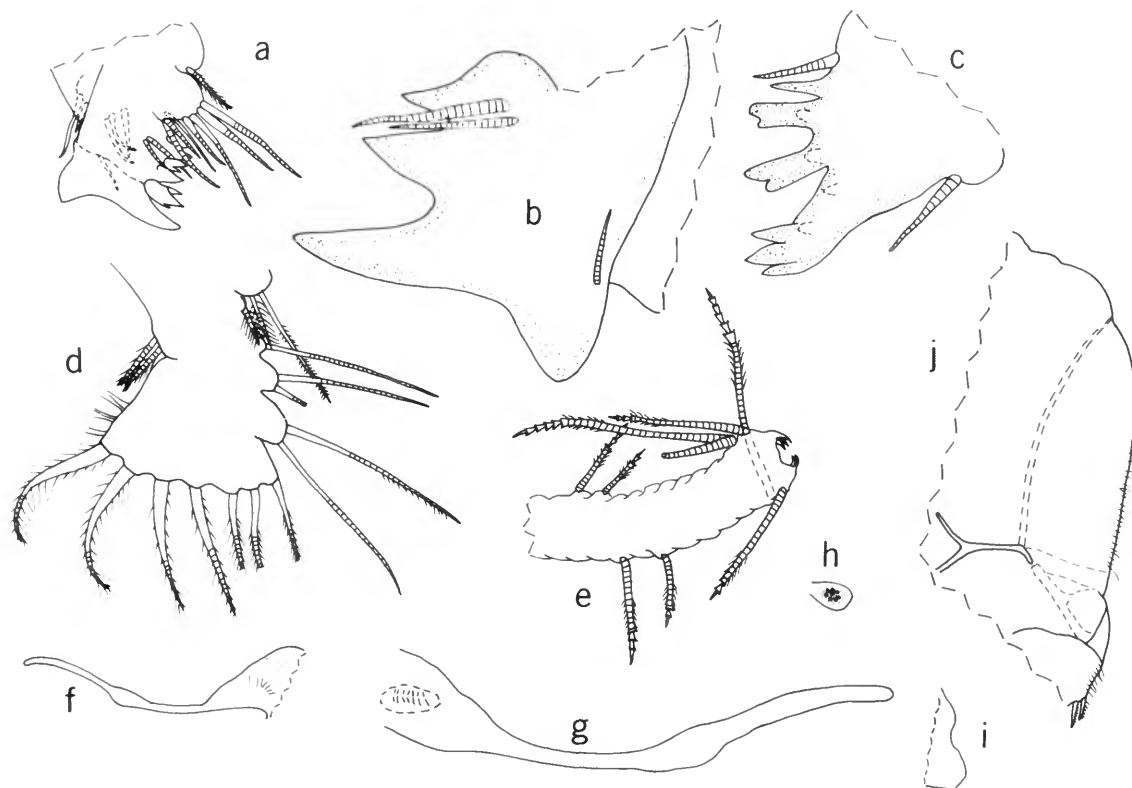


FIGURE 27.—*Rutiderma licinum*, new species, USNM 154187, paratype, adult female, length 1.04 mm; *a*, left 5th limb, posterior view (not all bristles shown); *b*, 2nd exopodial joint of right 5th limb, posterior view; *c*, 1st exopodial joint of right 5th limb as seen through 2nd exopodial joint, posterior view; *d*, 6th limb; *e*, 7th limb; *f*, *g*, medial eye and bellonci organ (*g* drawn with organ beneath cover slip and at higher magnification than *f*); *h*, right lateral eye; *i*, lateral outline of lower part of anterior of body showing upper lip; *j*, posterior of body showing posterior 2 claws of left lamella of furca and Y-sclerite (girdle and other sclerites are dashed).

podite: 1st joint with short distal medial bristle; bristles of joints 2–5 fairly short, with ventral spines but no natatory hairs; bristles of joints 6–8 with long bristles with natatory hairs, but no ventral spines; 9th joint with 6 bristles (3 long with natatory hairs; 1 short, bare, or with few short hairs; and 2 minute near dorsal edge); joints 2–7 with short spines forming row along distal margin; basal spines not present.

**Mandible** (Figure 26*g,h*): Coxale endite with 2 pectinate prongs. Basale: dorsal margin with 1 short midbristle and 2 distal bristles (1 about twice length of other); medial side with 4 bristles

in proximal ventral corner (2 short pectinate, unringed); ventral margin with 2 or 3 short bristles. 1st endopodial joint with 2 short ventral bristles, and spines on medial surface. 2nd endopodial joint: dorsal margin with 3 short bristles; ventral margin with 2 short distal bristles followed by minute bristle on broad base, and then a stout terminal claw (stout claw with proximal dorsal peg, minute teeth along dorsal margin, and upturned tip); medial side of joint spinous. 3rd endopodial joint with stout terminal claw with teeth along ventral margin, 1 unringed bristle (with ventral teeth) ventral to stout claw, 3



short medial bristles near ventral corner of base of stout claw, and 2 short spinous bristles located lateral to base of stout claw of 2nd joint.

*Maxilla* (Figure 26i): Endite I with 6 bristles (3 stout pectinate, 3 ringed, spinous); endite II with 5 bristles (2 stout pectinate, 3 ringed, spinous); endite III with 1 proximal bristle and 7 terminal bristles (3 stout pectinate, 4 ringed, spinous). Dorsal margin of coxale with 1 bristle and a fringed lamellar prolongation. Basale with 2 distal bristles. Exopodite not observed on specimen examined (possibly obscured). Endopodite: 1st joint with 1 alpha-bristle and 1 spinous beta-bristle. 2nd joint with 2 stout, unringed, pectinate, clawlike bristles, and 5 ringed bristles, all with either marginal spines or teeth.

*Fifth Limb* (Figure 27a-c): Endite I with 3 bristles; endite II with about 5 bristles; endite III with about 6 bristles. Exopodite: 1st joint with 3 large teeth bearing secondary teeth, followed by single pointed tooth, and then a ringed bristle; a ringed bristle present on outer margin proximal to teeth; 2nd joint consisting of large flat tooth with 3 pointed lobes along inner margin; a ringed bristle present on inner margin proximal to teeth; posterior side with 3 bristles (2 near proximal inner lobe, 1 near proximal outer corner of joint); 3rd joint with 3 bristles on inner lobe and 1 or 2 on outer lobe; 4th and 5th joints fused, with total of 4 spinous bristles.

*Sixth Limb* (Figure 27d): Endite I with 3 bristles (1 long spinous; 2 short hirsute); endite II with 1 bristle; endites III and IV each with 2 or 3 spinous bristles; end joint with 3 anterior spinous bristles followed by 4 hirsute bristles (anterior of these with short distal spines); 2 short hirsute bristles in place of epipodial appendage.

*Seventh Limb* (Figure 27e): Each limb with 4 proximal bristles, 2 on each side, and 5 or 6 (usually 6) terminal bristles, 2 or 3 on one side, 3 on other; each bristle with up to 5 bells and distal marginal spines; terminus with opposing combs, 1 with about 9 teeth, other with about 5.

*Furca* (Figure 26j): Each lamella with 3 strong claws followed by 3 weak claws; all claws with teeth along posterior margin; teeth of strong claws

consisting of long teeth between several smaller teeth; hairs present medially at bases of claws and following claws; distal hairs present along anterior margin of strong claws.

*Bellonci Organ* (Figure 27f,g): Elongate, with broad middle part and rounded tip; weak suture may be present on either side of broad middle part.

*Eyes*: Medial eye tapering anteriorly, lightly pigmented dorsoposteriorly (Figure 27f,g). Lateral eye (not seen on all specimens) small, about one-fourth size of medial eye, with several minute cells (ommatidia?) (Figure 27h).

*Posterior of Body* (Figure 27j): Hirsute dorsal to furca.

*Upper Lip* (Figure 27i): Simple, helmet-shaped.

*Y-Sclerite* (Figure 27j): End posterior to posterior socket bent ventrally; dorsal and ventral branches well developed, forming equal angles with middle segment.

*Eggs*: USNM 154187 with 2 well-developed eggs in marsupium; USNM 157879 with 1 egg; USNM 157982 with 3 eggs; USNM 158569 with 3 eggs.

**DESCRIPTION OF ADULT MALE** (Figures 28, 29).—Carapace elongate with small but distinct caudal process, projecting rostrum, and incisor

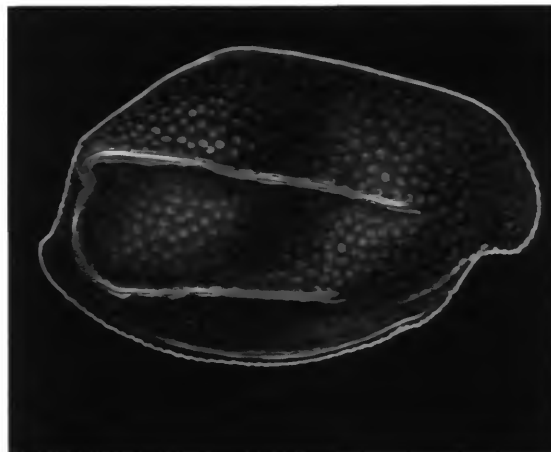


FIGURE 28.—*Rutiderma licinum*, new species, USNM 157878, paratype, adult male, length 1.08 mm, lateral view of complete specimen.



FIGURE 29.—*Rutiderma licinum*, new species, USNM 157878, paratype, adult male, length 1.08 mm; *a*, caudal process of right valve, inside view; *b*, left 1st antenna, medial view (1st joint not shown); *c*, endopodite of right 2nd antenna, medial view; *d*, right mandible, medial view; *e*, left maxilla, lateral view; *f*, 5th limb; *g*, 6th limb; *h*, 7th limb; *i*, posterior of body showing left lamella of furca, copulatory limbs, Y-sclerite, and anal tube (stippled); *j*, distal end of medial eye and bellonci organ; *k*, right lateral eye; *l*, lateral outline of upper lip, anterior towards left; *m*, lateral outline of heart, anterior towards left.

forming obtuse angle in lateral view (Figure 28).

*Ornamentation* (Figure 28): Surface with horizontal rib above and below central adductor muscle area; vertical rib extending ventrally from posterior end of upper horizontal rib and intersecting posterior end of lower horizontal rib; vertical rib with indentation just ventral to posterior end of upper horizontal rib; surface of each valve with abundant shallow fossae; anterior margin of rostrum with scallops along edge; long bristles present along anterior, anteroventral and ventral margins, and along margin of caudal process; bristles very sparse on lateral surface of each valve.

*Infold*: Infold of rostrum with 6 bristles forming row parallel to anterior margin; anteroventral infold with 5 bristles forming row; infold of caudal process with 5 bristles forming row paralleling inner margin of infold; additional ventral bristles along inner edge of infold anterior to caudal process (Figure 29a).

*Selva*: Wide lamellar prolongation fringed along anterior and anteroventral margin, possibly elsewhere; selva divided at inner end of incisur.

*Size*: USNM 157878, length 1.08 mm, height 0.68 mm. Returned to Mote Marine Laboratory, sta 6 D, 1 May 1981, length 1.03 mm, height 0.66 mm; sta 16 D, 2 May 1981, length 1.08 mm, height 0.70 mm; sta 2 C, 2 May 1981, length 1.11 mm, height 0.68 mm; sta 20 C, May 1981, length 1.07 mm, height 0.66 mm.

*First Antenna* (Figure 29b): 1st joint with medial spines forming rows. 2nd joint with long slender medial and lateral spines along ventral and dorsal margins, shorter medial spines forming rows near dorsal margin, short lateral spines forming rows, some near distal margin, and 2 bristles (1 dorsal, 1 lateral). 3rd joint short, separated by well-defined suture from 4th joint, with 3 bristles (2 dorsal, 1 ventral); 3rd joint longer on lateral side than on medial side. 4th joint with 4 bristles (1 dorsal, 3 ventral). 5th joint wedged medially between 4th and 6th joints; sensory bristle with stout proximal part with numerous filaments at distal end. Long 6th joint with short spinous

medial bristle near dorsal margin. 7th joint: a-bristle about same length as bristle of 6th joint; b-bristle with 2 proximal filaments and spine at tip; c-bristle extremely long, with 11 marginal filaments. 8th joint: d- and e-bristles bare, longer than b-bristle, with blunt tips; f-bristle extremely long, with 10 marginal filaments; g-bristle about same length as d- and e-bristles, with short proximal filament and spine at tip.

*Second Antenna* (Figure 29c): Protopodite bare. Endopodite 3-jointed: 1st joint short, with 5 small bristles (4 proximal, 1 distal); 2nd joint elongate, with 2 distal ventral bristles; 3rd joint elongate, reflexed on 2nd, with 1 short proximal bristle, 2 short subterminal bristles, and ridged tip. Exopodite: 1st joint elongate with minute straight medial bristle at distal end; 2nd joint short with bristle reaching past distal end of long 3rd joint; bristle of 2nd joint with short, slender ventral spines near middle; bristles of joints 3–8 long, with natatory hairs, no ventral spines; 9th joint missing on both limbs of specimen studied; distal margins of joints 2–8 with lateral spines along distal margins (spines longest on 2nd joint).

*Mandible* (Figure 29d): Coxale endite consisting of faint bifurcate spine (or 2 closely spaced spines) with hairs near base. Basale: dorsal margin with small bristle near middle and 2 longer distal bristles; medial surface spinous, and with 6 bristles near ventral margin (3 short, 2 medium, 1 long). Exopodite elongate, hirsute tip reaching half way up dorsal margin of 1st endopodial joint. Endopodite: 1st joint with medial spines and 2 ventral bristles; 2nd joint with medial spines, 3 proximal dorsal bristles, 5 distal ventral bristles forming 2 groups (2 in proximal group, 3 in distal group); 3rd joint with 1 long, stout claw and 5 slender ringed bristles.

*Maxilla* (Figure 29e): Limb weakly developed. 3 endites with few spinous bristles (not all shown on illustrated limb). Coxale with 1 spinous dorsal bristle. Basale with 1 slender bristle near dorsal margin. Exopodite small with 2 hirsute bristles, one about twice length of other. Endopodite: 1st joint with 1 hirsute alpha-bristle and 1 hirsute

beta-bristle; end joint with 7 bristles (2 long hirsute, 5 shorter, mostly bare).

*Fifth Limb* (Figure 29f): Limb weakly developed. Endite I with 2 small bristles; endite II with 3 small bristles; endite III with 5 bristles. Exopodite: 1st and 2nd joints with few weakly developed bristles, some without rings; 3rd joint with 2 hirsute bristles on outer lobe, inner lobe obscure but with at least 1 and possibly 3 bristles; fused 4th and 5th joints with 3 bristles.

*Sixth Limb* (Figure 29g): Endite I with 3 short bristles; endite II with 1 bristle; endites III and IV each with 2 bristles. End joint with 3 bristles with short marginal spines followed by 4 or 5 hirsute bristles (the 3 anterior spinous bristles with bases on prominent projection). 2 bristles in place of epipodial appendage.

*Seventh Limb* (Figure 29h): Each limb with 4 proximal bristles, 2 on each side, and 4 terminal bristles, 2 on each side; each bristle with up to 4 bells and distal marginal spines; terminus with opposing combs, each with 2 or 3 spinous teeth.

*Furca* (Figure 29i): Each lamella with 3 stout claws followed by 3 secondary claws; claw 1 with greater curvature than that of female.

*Bellonci Organ* (Figure 29j): Similar to that of female, with rounded tip.

*Eyes*: Medial eye tapering anteriorly, without pigment (Figure 29j). Lateral eye about same size as medial eye, with black pigment and about 16 ommatidia (Figure 29k).

*Upper Lip* (Figure 29l): Simple, helmet-shaped.

*Genitalia* (Figure 29i): Elongate process with sclerotized hooklike tip and several bristles present on each lobe (details and all bristles not shown in illustrated copulatory lobes).

*Y-Sclerite* (Figure 29i): Same as on female.

*Heart* (Figure 29m): Oval in lateral view.

COMPARISONS.—All the following bear 3 strong claws on each lamella of the furca. The new species *R. licinum*, however, differs from *R. tridens* Kornicker and Caraion, 1978, *R. mollitum* Darby, 1965, and *R. compressum* Brady and Norman, 1896, in the female having a fairly deep incisur with overhanging rostrum, not a right angle forming the incisur as in the other 3 species.

### *Rutiderma gyre*, new species

FIGURES 30-35; PLATE 3

ETYMOLOGY.—The species is named for the ship from which specimens were collected, R/V *Gyre*.

HOLOTYPE.—USNM 157988, 1 ovigerous female in alcohol (body partly removed from carapace; valves separated).

TYPE-LOCALITY.—Gulf of Mexico off Galveston, Texas, R/V *Gyre*, cruise 10, sta 16, 53.5 m.

PARATYPES.—Florida continental shelf (Atlantic): USNM 158363, 1 ovigerous female, from "Jeff's Reef". Returned to John E. Miller, 2 juveniles from off Pepper State Park.

Florida continental shelf (Gulf of Mexico), transect I: USNM 158675, 159721, 2 specimens, sta 2104. Transect II: USNM 158717, 158719, 158656, 158654, 158657, 158741, 7 specimens, sta 2211. Transect VII: USNM 158824, 1 ovigerous female, sta 2748.

Southwest Florida; returned to James K. Culter, 18 specimens, sta 4; 3 specimens, sta 16; 2 specimens, sta 20; 6 specimens, sta 22; 21 specimens, sta 28; 1 specimen, sta 37.

Alabama continental shelf, transect VI: USNM 158747, 1 specimen, sta 2643.

Louisiana Continental Shelf, Sonnier Bank: USNM 157999, 1 ovigerous female; USNM 158000, 1 adult, male; sta THR-1. USNM 158850, 1 specimen, sta THR-2.

Texas continental shelf, East Flower Garden: USNM 158841, 1 adult male, sta EFG-4; USNM 158833, 1 ovigerous female, sta 902-3. "28 Fathom Bank": USNM 158646, 3 specimens, sta 3-1. USNM 158647, 2 specimens, sta 3-2. USNM 158644, 1 specimen, sta 3-3. USNM 158649, 2 specimens, sta 3-4. Southwest peak: USNM 158652, 1 specimen, sta 2 D. Cruise 10: USNM 157875, 2 specimens; USNM 157991, 1 ovigerous female; sta 16. Cruise 11: USNM 157420, 1 juvenile; USNM 154185, 1 adult female, sta 5. USNM 157993, 1 adult male, sta 7. Stetson Bank: USNM 158641, 3 specimens, sta STB-1A. USNM 158639, 2 specimens, sta STB-1B. USNM 158640, 2 specimens, sta STB-2B. USNM 158633, 1 spec-

imen, sta STB-2C. USNM 158638, 4 specimens, sta STB-2D. USNM 158636, 1 specimen, sta STB-2E. USNM 158635, 8 specimens, sta STB-2F. USNM 158643, 1 specimen, sta STB-4A. USNM 158634, 4 specimens, sta STB-4B. USNM 158642, 2 specimens, sta STB-4C.

South Texas shelf, transect HR, sta 1: USNM 159034-1, 1 specimen; USNM 159043-2, 1 adult female; USNM 159044-2, 1 adult female; USNM 159024-2, 1 juvenile male; USNM 159033-3, 1 juvenile; USNM 159031-4, 5 specimens; USNM 159030-5, 1 adult male + 2 juveniles; USNM 159027-6, 2 juveniles; USNM 159053-6, 1 adult female; USNM 159050-2, 1 ovigerous female + 1 adult female; USNM 159051-4, 1 adult female + 1 juvenile male; USNM 159057-4, 1 adult male; USNM 159067-5, 1 juvenile male; USNM 159049-6, 2 juveniles. Sta 2: USNM 159048-3, 1 adult male.

South Texas, transect SB, sta 3; USNM 159037-6, 1 ovigerous female + 1 juvenile; USNM 159029-1, 1 juvenile; USNM 159040-3, 1 juvenile; USNM 159026-4, 1 adult male + 1 juvenile male; USNM 159028-5, 4 specimens; USNM 159036-6, 6 specimens; USNM 159056-2, 1 adult male; USNM 159018-3, 1 adult male; USNM 159061-4, 1 adult male; USNM 159051-5, 1 adult female + 1 juvenile; USNM 159052-6, 1 juvenile.

**DISTRIBUTION.**—Continental shelves of Florida (Atlantic and Gulf of Mexico), Alabama, Louisiana, and Texas (Figure 4). Known depth range 6.1–148.0 m (Table 1).

**DESCRIPTION OF ADULT FEMALE** (Figures 30–32; Plate 3).—Carapace with well-defined incisur, overhanging rostrum, and well-developed, triangular caudal process. Ventral margin with slight concavity just anterior to tip of caudal process.

**Ornamentation:** 2 well-developed longitudinal ribs present, 1 above and 1 below the central adductor muscle attachments (Figure 30, Plate 3a); posterior end of each rib with small process; rarely with vertical rib anterior to central adductor muscle; minute scallops along margin of rostrum and ventral margin of valve; small process present on posterodorsal margin of valve dorsal

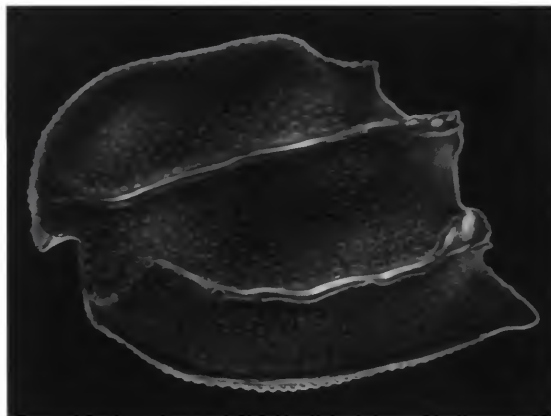


FIGURE 30.—*Rutiderma gyre*, new species, USNM 154185, paratype, adult female, length 1.10 mm, lateral view of complete specimen.

to posterior end of upper rib; surface of valve with shallow fossae with narrow peripheral rim (Plate 3b–d); bristles widely scattered on valve surface and forming row along anterior and ventral margins (Plate 3f).

**Infold:** Rostral infold with 7–9 bristles parallel to anterior margin; 2 minute bristles at inner end of incisur (Figure 31a); anteroventral infold with 9 bristles forming row, and 6 ridges paralleling inner edge of infold; posterior end of ventral infold near caudal process with 10 small bristles forming row along faint list; anterior part of caudal process with crescentic list having small bristle at upper and lower end (Figure 31b); pocket posterior to list of caudal process with 2 or 3 small bristles; infold of caudal process similar on left and right valves; inner edge of infold dorsal to list of caudal process with small slender bristle.

**Selvage:** Broad lamellar prolongation with marginal fringe present along anterior and ventral valve margins; narrow bare lamellar prolongation along margin of caudal process; lamellar prolongation divided at inner end of incisur.

**Size:** USNM 154185, length only 1.10 mm; USNM 157988, length 1.08 mm, height 0.76 mm; USNM 157999, length 1.09 mm, height 0.75 mm; USNM 158363, length 1.15 mm, height 0.86 mm.



FIGURE 31.—*Rutiderma gyre*, new species, USNM 154185, paratype adult female length 1.10 mm: *a*, anterior of right valve, inside view; *b*, posterior of right valve, inside view; *c*, left 1st antenna, medial view; *d*, endopodite and proximal part of protopodite of right 2nd antenna, medial view; *e*, right mandible, medial view; *f*, 6th limb; *g*, posterior of body showing right lamella of furca, Y-sclerite, and genital openings.



FIGURE 32.—*Rutiderma gyre*, new species, USNM 154185, paratype adult female, length 1.10 mm: a, maxilla, lateral view; b, left 5th limb, posterior view; c, right 5th limb, anterior view; d, 7th limb; e, lateral eye, medial eye and bellonci organ; f, distal part of medial eye and bellonci organ (viewed under cover slip).

Returned to Mote Marine Laboratory, sta 28F, length 1.16 mm, height 0.78 mm.

*First Antenna* (Figure 31c): 1st joint with spines forming few rows on medial and lateral surfaces. 2nd joint with spines on dorsal margin and on distal lateral surface, and with 2 spinous bristles, 1 dorsal, 1 lateral. 3rd and 4th joint fused; 3rd joint with 3 bristles, 1 ventral, 2 dorsal; 4th joint with 3 bristles, 1 dorsal, 2 ventral (longer of these about 3 times length of other). Long 5th joint with faint lateral hairs in distal ventral corner; sensory bristle with 1 small proximal filament and bifurcate tip, each with terminal spine. Bristle of minute 6th joint small spinous. 7th joint: a-bristle spinous, about one-fourth longer than bristle of 6th joint; b-bristle slightly longer than a-bristle, with spine at tip; c-bristle slightly shorter than sensory bristle of 5th joint, with minute proximal filament, and bifurcate tip. 8th joint: d- and e-bristles bare with blunt tips, bristles about same length as c-bristle; f-bristle stout, more than twice length of b-bristle, with bifurcate tip; g-bristle about same length as c-bristle, with fairly long proximal filament and bifurcate tip.

*Second Antenna* (Figure 31d): Protopodite bare. Endopodite 1-jointed with 4 small anterior bristles. Exopodite: 1st joint with 1 minute medial bristle on terminal margin; bristles of joints 2-5 fairly short, with ventral spines but no natatory hairs; bristles of joints 6-8 long, with natatory hairs but no ventral spines; 9th joint with 5 bristles (3 long with natatory hairs, 1 medium with natatory hairs, 1 minute and bare).

*Mandible* (Figure 31e): Coxale endite bifurcate, pectinate. Basale: ventral margin with 4 proximal bristles (2 pectinate, unringed), and 2 bristles proximal to middle; dorsal margin with 3 bristles distal to middle; lateral side with 1 small proximal bristle near ventral margin. 1st endopodial joint with 2 short ventral bristles, and medial spines forming rows. 2nd endopodial joint: dorsal margin with 3 short proximal bristles; medial surface with abundant spines; ventral margin with 2 minute distal bristles, and small oval sclerotized process with minute bristle at base of stout terminal claw; dorsal margin of

terminal claw with proximal tooth, serrate margin, and short curved tip. 3rd endopodial joint with stout terminal claw with truncate tip and serrate ventral margin, 3 slender medial bristles near ventral end of base of stout claw, 1 unringed flat bristle (with serrate ventral margin) ventral to stout claw, and 2 short spinous bristles located lateral to stout terminal claw of 2nd joint.

*Maxilla* (Figure 32a): Dorsal margin of coxale with 1 bristle and fringed lamellar prolongation. Endites I to III each with 3 stout pectinate, unringed bristles, and several ringed spinous bristles. Basale with 1 dorsal bristle and 1 medial bristle near ventral margin. 1st endopodial joint with 1 alpha-bristle, 1 spinous beta-bristle, and 1 proximal medial bristle (possibly this bristle is on basale). 2nd endopodial joint with 2 stout pectinate unringed bristles and 5 spinous ringed bristles. Exopodite small with 2 bristles.

*Fifth Limb* (Figure 32b,c): Endite I with 2 or 3 short bristles; endite II with 5 bristles; endite III with 8 bristles. Exopodite: 1st joint with 3 stout teeth with secondary teeth distal to 1 smooth smaller tooth and 1 spinous bristle; outer edge of joint with 1 proximal bristle. 2nd joint with large 3-lobed tooth; proximal 2 of the lobes with secondary teeth; posterior side of joint with minute faint bristle near outer corner; inner margin of joint with 2 proximal bristles. 3rd joint with 2 bristles on outer lobe and 3 on inner lobe. 4th and 5th joints fused, with total of 4 or 5 bristles. Epipodial appendage with about 35 bristles.

*Sixth Limb* (Figure 31f): Endite I with 3 bristles; endites II and II each with 2 bristles; endite IV with 2 or 3 bristles; end joint with 3 anterior bristles with spines and hairs and 4 or 5 stouter hirsute posterior bristles; posterior edge of stem with 1 or 2 spinous epipodial bristles.

*Seventh Limb* (Figure 32d): Each limb with 4 proximal bristles, 2 on each side, and 6 terminal bristles, 3 on each side; each bristle with up to 4 bells and distal marginal spines; terminus with opposing combs, each with several teeth.

*Furca* (Figure 31g): Each lamella with 4 stout primary claws followed by 2 small secondary claws; claw 1 with anterior distal hairs and both



long and short posterior teeth; anterior margin of lamellae with slender spines; long hairs on lamellae following claws and medially at bases of claws.

*Bellonci Organ* (Figure 32e,f): Elongate, widening near middle, with tip tapering to point.

*Eyes*: Medial eye tapering distally, with brown pigment (Figure 32e,f). Lateral eye smaller than medial eye, with 4 small ommatidia (Figure 32e, all ommatidia not shown in illustrated eye).

*Genitalia* (Figure 31g): Consisting of small sclerotized oval on each side of body.

*Y-Sclerite* (Figure 31g): Typical for genus.

*Eggs*: USNM 154185 and 157988, each with 1 well-developed egg in marsupium; USNM 157991 with 2 eggs; USNM 157999 with 4 eggs.

**DESCRIPTION OF ADULT MALE** (Figures 33–35).—Carapace elongate with prominent rostrum and caudal process with narrowly rounded tip; tip of rostrum slightly overhanging valve edge (Figures 33, 34a,e,f).

*Ornamentation*: Posterior half of each valve with 2 horizontal ribs forming alar process; surface with abundant shallow fossae (Figure 33); long bristles present along anterior and anteroventral margins and scattered over valve surface.

*Infold*: Infold of rostrum with 6–8 long bristles forming row parallel to edge of rostrum (Figure 34a); 2 short bristles present at inner corner of incisur; anterior infold below rostrum with 2 short bristles; anterior part of ventral margin with 5–7 short bristles forming row. Infold of caudal process with “pocket” having a well-defined anterior ridge with a small bristle at its ventral and dorsal ends (bristle at dorsal end very faint) (Figure 34b,g,h); infold posterior to ridge with 1 or 2 small bristles; infold along ventral margin of valve anterior to ridge with 8–10 bristles.

*Selva*: Wide lamellar prolongation along anterior and ventral margins becoming narrower posteriorly and on caudal process; prolongation fringed except in vicinity of caudal process; prolongation divided at inner end of incisur and on ventral margin near tip of caudal process where it is interrupted by a short bristle on valve edge (Figure 34g,h).

*Size*: USNM 158000, length 1.17 mm, height

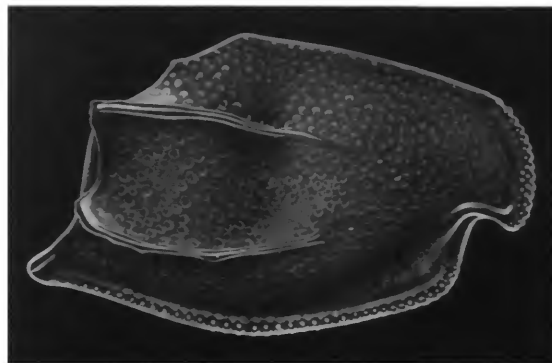


FIGURE 33.—*Rutiderma gyre*, new species, USNM 157993, paratype, adult male, length 1.12 mm, lateral view of complete specimen.

0.66 mm; USNM 157993, length 1.12 mm, height 0.68 mm. Specimens returned to the Mote Marine Laboratory, sta 22, length 1.19 mm, height 0.68 mm; sta 28 C: length 1.20 mm, height 0.68 mm; length 1.18 mm, height 0.68 mm.

*First Antenna* (Figure 34i): 1st joint with few spines forming rows on medial side. 2nd joint spinous, with 2 bristles (1 dorsal, 1 lateral). 3rd and 4th joints with separating suture only on medial side; 3rd joint with 3 bristles (1 ventral, 2 dorsal); 4th joint with 4 bristles (3 ventral, 1 dorsal). 5th joint small, wedged ventrally between 4th and 6th joints; sensory bristle with stout, cylindrical, proximal part with abundant distal filaments (not shown in illustrated limb), and distal stem with minute filament near middle and bifurcate tip. Elongate 6th joint with medial bristle at distal dorsal corner. 7th joint: a-bristle slightly longer than bristle of 6th joint; b-bristle about twice length of a-bristle, with 3 filaments near middle (2 short, 1 minute); c-bristle extremely long, with 12 marginal filaments, each with 2 spines at tip. 8th joint: d- and e-bristles bare with blunt tips, about same length as b-bristle; f-bristle similar to c-bristle; g-bristle slightly longer than b-bristle, with 2 marginal filaments and bifurcate tip.

*Second Antenna*: Protopodite bare. Endopodite 3-jointed (Figure 34j): 1st joint short with 5 bristles (4 proximal, 1 near middle); 2nd joint elon-



FIGURE 34.—*Rutiderma grye*, new species. USNM 157993, paratype, adult male, length 1.12 mm: *a*, anterior of left valve, inside view; *b*, caudal process of right valve, inside view; *c*, left lateral eye, medial eye, and bellonci organ; *d*, paired copulatory limbs. USNM 158000, paratype, adult male, length 1.17 mm: *e*, lateral view of complete specimen; *f*, left valve, inside view; *g*, caudal process of left valve, inside view; *h*, caudal process of right valve, inside view; *i*, left 1st antenna, lateral view; *j*, endopodite, distal part of protopodite, and proximal part of 1st exopodial joint of right 2nd antenna, medial view; *k*, anterior of body showing right lateral eye, medial eye, bellonci organ, and upper lip.

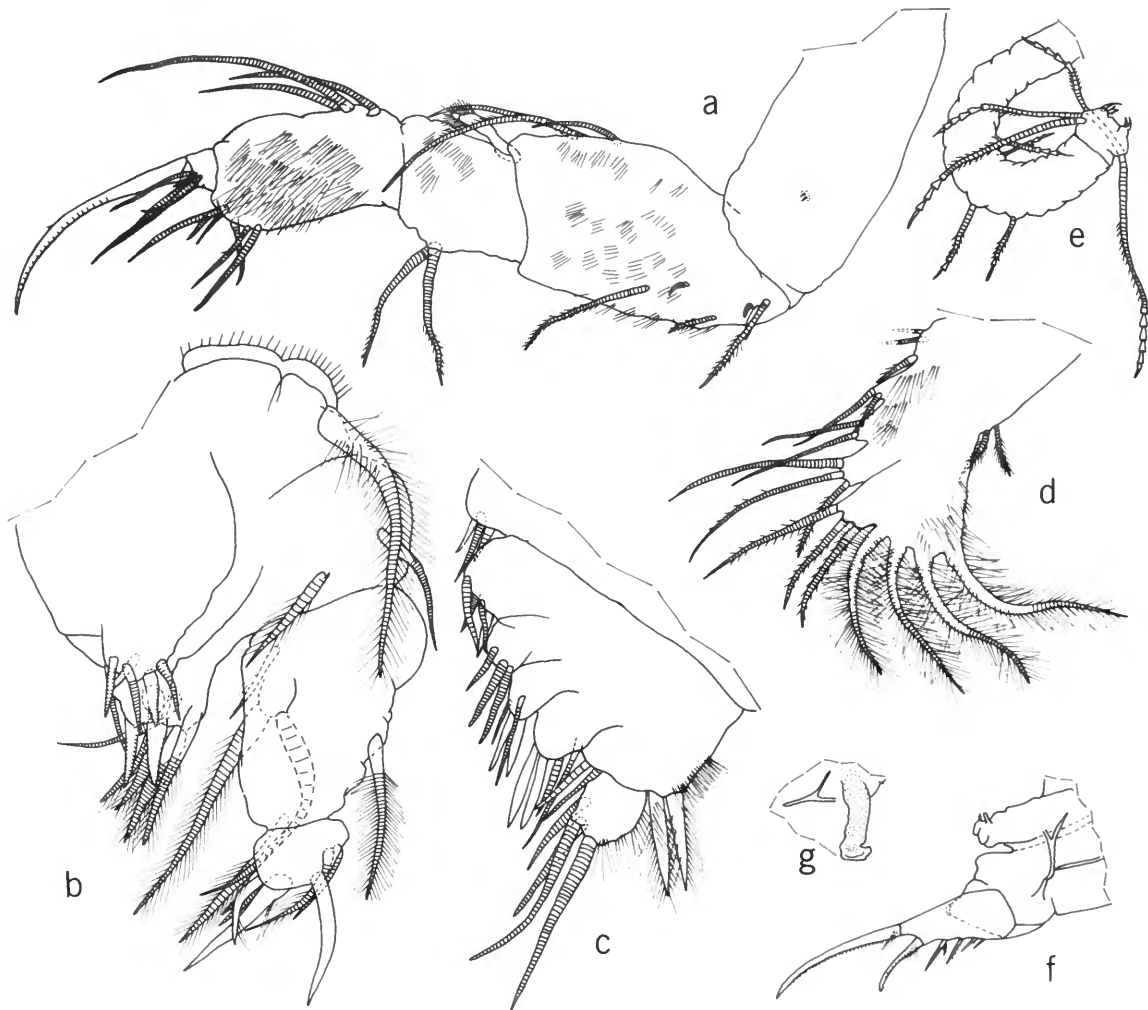


FIGURE 35.—*Rutiderma gyre*, new species, USNM 158000, paratype, adult male, length 1.17 mm: a, right mandible, medial view; b, left maxilla, medial view; c, 5th limb (not all bristles shown); d, 6th limb; e, 7th limb; f, posterior of body showing left lamella of furca, left copulatory limb, left Y-sclerite, and anus; g, right side of body showing right Y-sclerite and right copulatory limb, anterior towards right.

gate with 2 spinous bristles near middle; 3rd joint elongate, reflexed, with 1 short, spinous, proximal bristle and 2 small bristles near rounded tip (tip with faint ridges). Exopodite: 1st joint elongate with minute, faint, medial bristle at tip, and few distal hairs near ventral margin; 2nd joint short, with bristle having same length as combined length of 3rd and 4th joints, with minute ventral

spines and sharply pointed tip; 3rd joint elongate, with long natatory bristle without spines; joints 4–9 short, decreasing in size distally; joints 4–8 each with long bristle with natatory hairs; 9th joint with 5 bristles (3 long and 1 medium, all with natatory hairs, and 1 minute, bare); joints 2–8 with spines forming row along distal lateral edge.

**Mandible** (Figure 35a): Coxale with 2 or 3 minute medial spines representing endite. Basale: medial side spinous, with 5 or 6 bristles near ventral margin (one of the proximal bristles faint, unringed); dorsal margin with 3 bristles distal to middle. Exopodite well developed, hirsute distally. First endopodial joint with medial spines and 2 ventral bristles. Second endopodial joint: medial side spinous; dorsal margin with 3 proximal bristles; ventral margin (or close to it) with 6 short distal bristles. End joint with 1 stout claw and 5 slender bristles.

**Maxilla** (Figure 35b): Limb reduced. Endites I to III with faint bristles, some unringed, flattened, others ringed, hirsute. Precoxale and coxale with dorsal fringe of hairs; coxale with stout hirsute dorsal bristle. Basale with 1 bare dorsal bristle, 1 spinous posterior medial bristle, and 1 short lateral bristle near base of exopodite. Exopodite with 2 or 3 bristles (1 of these long hirsute). Endopodite: 1st joint with 1 spinous alpha-bristle and 1 spinous beta-bristle; end joint with about 7 weakly developed bristles.

**Fifth Limb** (Figure 35c): Endite I with 3 short bristles; endite II with 4 bristles; endite III with about 7 bristles (all bristles not shown on illustrated limb). Exopodite: joints 1 and 2 each with about 4 bristles, some unringed, flattened; joint 3 with 2 stout hirsute bristles, on outer lobe and about 2 slender bristles on inner lobe; remaining joints fused, with total of 4 bristles.

**Sixth Limb** (Figure 35d): 2 hirsute bristles in place of epipodial appendage. Endite I with 3 short bristles; endites II and III each with 2 bristles; endite IV with 3 bristles. End joint with 3 spinous bristles on anterior projection followed by 4 stout hirsute bristles.

**Seventh Limb** (Figure 35e): 4 proximal bristles, 2 on each side, and 4 longer terminal bristles, 2 on each side; proximal bristles with 2 or 3 bells and distal marginal spines; terminal bristles with 4 or 5 bells and distal marginal spines. Terminus with opposing combs having 2 or 3 teeth on one comb and 3 or 4 on other comb.

**Furca** (Figure 35f): Similar to that of adult female, except teeth along claw 1 about same

size, and main claws more slender.

**Bellonci Organ** (Figure 34c,k): Broadening near middle and then tapering to either pointed or rounded tip.

**Eyes** (Figure 34c,k): Lateral eye pigmented black, with about 16 ommatidia. Medial eye pigmented brown, about same size as lateral eye; without hairs but with minute dorsal protuberance.

**Upper Limb** (Figure 34k): Helmet-shaped, hirsute.

**Genitalia** (Figures 34d, 35g,f): Copulatory limbs well developed, each with several bristles and sclerotized process at tip.

**Y-Sclerite** (Figure 35g,f): Similar to that of female.

COMPARISONS.—The infold of the caudal process of the left valve of the new species *R. gyre* does not have the flat spines present on the left valve of *R. darbyi*. *R. mortenseni* Poulsen, 1965, is known only from a single adult male. The male of *R. gyre* differs from the male of *R. mortenseni* in having 6–8 rather than 10–12 bristles forming a row on the rostral infold. Other differences between the males of these 2 species, which I consider less reliable because they are more likely to be the result of variability or lack of observation, are as follows (data on *R. mortenseni* from Poulsen, 1965:38–40).

Character	<i>R. mortenseni</i>	<i>R. gyre</i>
Second antenna, bristle of 2nd exopodial joint bare (B) or with spines (S)	B	S
Mandible, total number of bristles and claws on end joint	5	6
Fifth limb, bristles on outer lobe of 3rd exopodial joint bare (B) or hirsute (H)	B	H

### *Rutiderma cohenae*, new species

FIGURES 36–38

ETYMOLOGY.—The new species is named for Anne C. Cohen, who collected most of the specimens.

HOLOTYPE.—USNM 158359, 1 ovigerous female.

TYPE-LOCALITY.—San Salvador, Bahamas.

PARATYPES.—Bahamas, San Salvador: USNM 158414, 1 ovigerous female; USNM 158615, 4 juveniles. Florida, Fleming Key, Key West: USNM 158213, 1 juvenile female, length 0.89 mm, height 0.61 mm.

DISTRIBUTION.—Collected only in 2 localities: San Salvador, Bahamas, and Key West, Florida (Figure 3). Known depth range subtidal to 4 m (Table 1).

DESCRIPTION OF ADULT FEMALE (Figures 36–38).—Each valve with distinct incisur and with lateral extension of rostrum overhanging incisur (Figure 37a); caudal process forming triangular backward projection (Figure 36).

*Ornamentation* (Figure 36): Each valve with 2 pronounced lateral ribs (1 above and 1 below central adductor muscle attachments); less distinct ribs lying just within ventral and dorsal margins; faint vertical ribs along ventral margin visible on some specimens (Figure 36); postero-dorsal margin of each valve with small triangular projection near middle (Figures 36, 38k); no projections on posterior margin of either valve. Surface with abundant well-defined oval fossae; long bristles along anterior and ventral margins and sparsely distributed on valve surface.

*Infold*: Rostral infold with 7 or 8 bristles forming row parallel to anterior margin (Figure 37a);

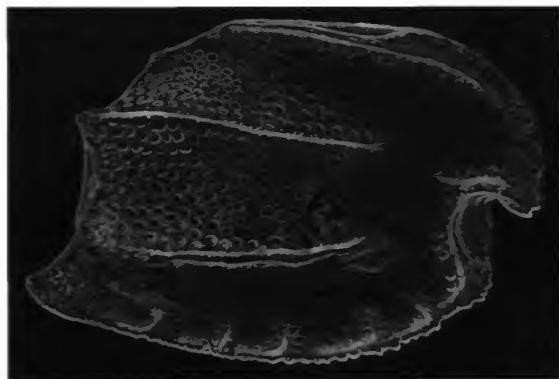


FIGURE 36.—*Rutiderma cohenae*, new species, USNM 158414, paratype, adult female, length 1.24 mm, lateral view of complete specimen.

a small bristle just ventral to inner end of incisur; anteroventral infold with 8 bristles forming row distal to about 6 faint parallel ribs; infold of caudal process with ridge forming about 20° angle with ventral margin and bearing about 8 bristles along edge (Figure 37b,c); shallow “pocket” ventral to ridge with 3 or 4 bristles; a single bristle on posterior infold just dorsal to caudal process.

*Selvage*: Anterior and ventral margins with wide lamellar prolongation with marginal fringe of long hairs; selvage divided at inner end of incisur; lamellar prolongation narrower and without fringe in vicinity of caudal process and along posterior half of ventral margin; small bristle in pit at posterior tip of caudal process (Figure 37c) may divide narrow lamellar prolongation, but prolongation obscure in that area on specimen examined.

*Size*: USNM 158359, length 1.29 mm, height 0.84 mm; USNM 158414, length 1.24 mm, height 0.83 mm.

*First Antenna* (Figure 37d): 1st joint bare. 2nd joint: medial side with long proximal hairs in rows near dorsal margin; lateral side with spines forming row near distal margin and 1 spinous distal bristle; dorsal margin with 1 spinous mid-bristle. 3rd joint fused with 4th joint and has 3 bristles (1 ventral, 2 dorsal); long 4th joint with 3 bristles (2 long, ventral, 1 short, dorsal; inner ventral bristle one-half to two-thirds as long as outer ventral bristle). Sensory bristle of long 5th joint with 4 short proximal filaments, 1 minute distal filament, and 2 minute processes at tip. 6th joint minute, fused to 5th joint, with spinous medial bristle about same length as 5th joint. 7th joint: a-bristle spinous, slightly longer than bristle of 6th joint; b-bristle about one-fourth longer than a-bristle, bare except for process at tip; c-bristle about same length as sensory bristle of 5th joint, with 1 short proximal filament, 1 minute distal filament, distal dorsal spines, and 2 minute processes at tip. 8th joint: d- and e-bristles slightly shorter than c-bristle, bare with blunt tips; f-bristle about two-thirds as long as c-bristle, with 2 short proximal filaments and bifurcate tip; g-

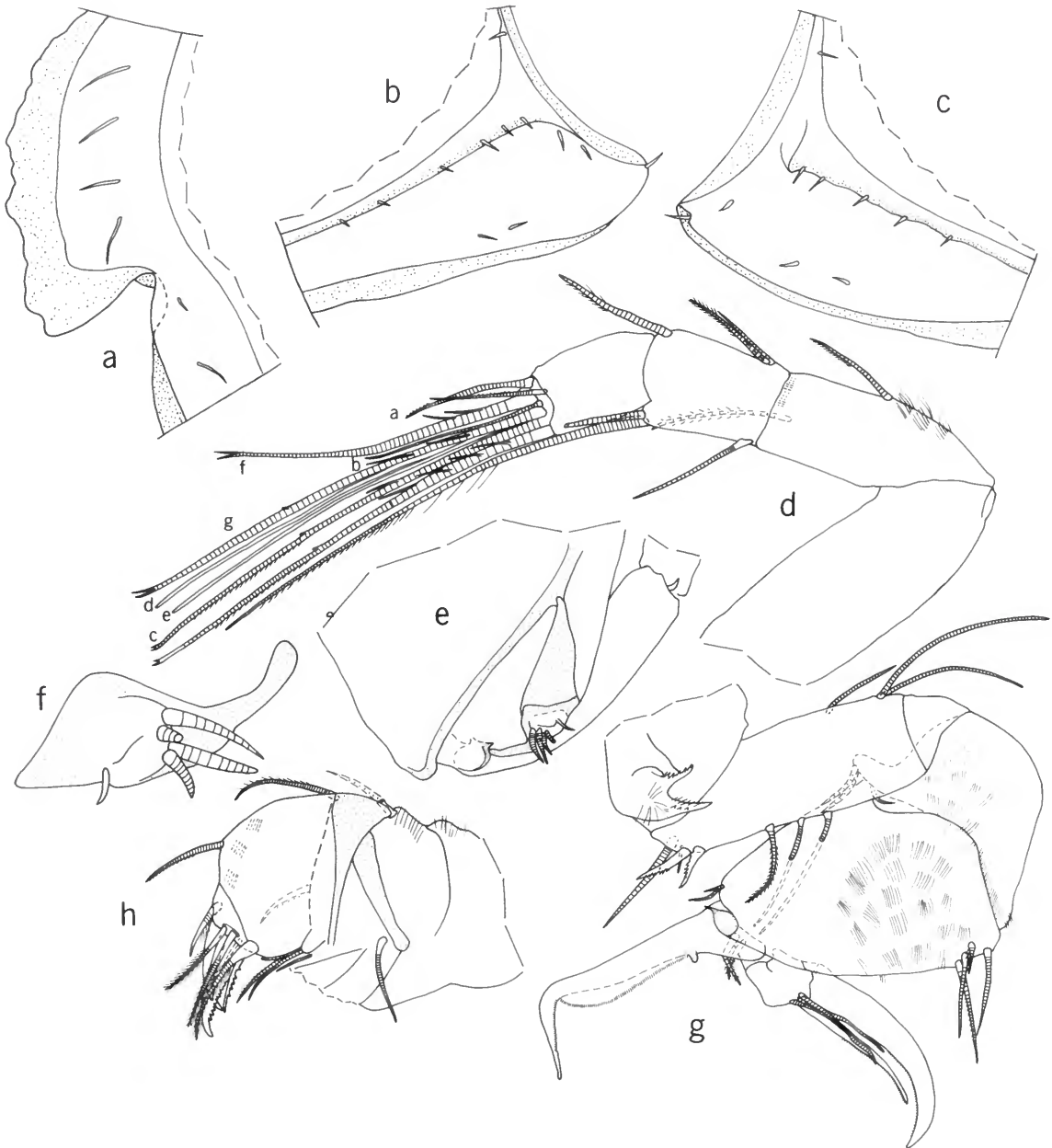


FIGURE 37.—*Rutiderma cohenae*, new species, USNM 158414, paratype, adult female, length 1.24 mm: *a*, anterior of right valve, inside view; *b*, caudal process of right valve, inside view; *c*, caudal process of left valve, inside view; *d*, right 1st antenna, medial view; *e*, endopodite, distal part of protopodite, 1st joint and part of 2nd joint of exopodite of right 2nd antenna; *f*, endopodite and distal part of protopodite of left 2nd antenna, medial view; *g*, left mandible, medial view; *h*, left maxilla, lateral view (certain sclerites stippled).



FIGURE 38.—*Rutiderma cohenae*, new species. USNM 158414, paratype, adult female, length 1.24 mm: *a*, distal end of right 5th limb, posterior view (endite bristles not shown); *b*, detail of 2nd exopodial joint of 5th limb, from *a*; *c*, detail of 3rd joint and fused 4th and 5th joints of 5th limb, from *a*; *d*, left 5th limb, anterior view; *e*, detail of 1st exopodial joint, from *d*; *f*, 6th limb; *g*, 7th limb; *h*, posterior of body showing left lamella of furca, genital process (oval), Y-sclerite, part of girdle, and sclerite (stippled) connecting posterior tip of Y-sclerite with proximal end of left furcal lamella; *i*, anterior of body showing right lateral eye, medial eye with dorsal

filaments, bellonci organ, upper lip, lower lip, and esophagus (dashed lines); *j*, medial eye and bellonci organ at higher magnification than in *i*, and viewed under cover slip. USNM 158359, holotype, adult female, length of 1.29 mm: *k*, lateral view of complete specimen showing some fossae on rostrum and some posterior to valve middle, the position of 3 eggs (dashed), the location of central adductor muscle attachments (dashed oval just anterior to valve middle), and edge of infold of caudal process (dashed line); *l*, anterior of body showing left lateral eye, medial eye with dorsal filaments, and bellonci organ.

bristle about same length as c-bristle, with 2 short proximal filaments, 1 minute distal filament, and bifurcate tip. All short marginal filaments with finely drawn-out pointed tip.

*Second Antenna* (Figure 37e,f): Protopodite bare. Endopodite single jointed, with 4 anterior ringed bristles and 1 small, slender, unringed, posterior bristle. Exopodite: 1st joint with minute, bent, medial bristle on distal margin; bristles of joints 2–5 fairly short, with blunt spines in groups along ventral margin (proximal spines larger than distal spines), and hookformed tip; bristles of joints 6–8 long, with natatory hairs, no spines; 9th joint with 6 bristles (3 long and 1 short with natatory hairs, 2 minute, bare or with few short hairs); joints 3–8 with faint minute spines on distal margin, no basal spines.

*Mandible* (Figure 37g): Coxale endite hirsute proximally and spinous distally, with bifurcate tip. Basale: ventral margin with 4 proximal bristles (2 ringed slender, 2 stout, pectinate), and 3 slender midbristles; some specimens with small medial bristle distal to proximal bristles; dorsal margin with 3 distal bristles. 1st endopodial joint: medial side with numerous spines and 1 small bristle near ventral margin; ventral margin with 2 short bristles. 2nd endopodial joint: medial side with abundant spines; ventral margin with 2 small terminal bristles; dorsal margin with 4 slender proximal bristles; terminal edge with stout claw; minute sclerotized process with terminal spine present at base of stout claw; ventral margin of terminal claw with proximal peg, serrate inner dorsal edge, and prolonged finger-like tip. 3rd endopodial joint with stout terminal claw with minute teeth along ventral edge, stout unringed bristle with teeth along ventral edge, 3 ringed medial bristles near ventral base of claw, and 2 short, ringed, spinous, lateral bristles (these being located lateral to terminal claw of 2nd joint).

*Maxilla* (Figure 37h): Endite I with 6 bristles (3 pectinate, 2 ringed spinous); endite II with 2 pectinate bristles and 2 ringed spinous bristles; endite III with 2 stout unringed pectinate bristles, 2 slender ringed pectinate bristles, 3 slender ringed spinous bristles, and 1 slender proximal

bristle. Precoxale and coxale with fringe of dorsal hairs; coxale with spinous dorsal bristle. Basale with 2 spinous bristles, 1 dorsal, 1 medial. Exopodite with 3 bristles (2 long, 1 short); 1 short lateral bristle near base of exopodite (may be on basale). Endopodite: 1st joint with 1 alpha-bristle with faint marginal spines and 1 beta-bristle with stouter marginal spines; medial surface near dorsal margin with hairs in rows; 2nd endopodial joint with 2 stout pectinate clawlike bristles, 1 shorter, slender, pectinate bristle on inner edge, 1 pectinate ringed bristle on outer edge, and 2 spinous a-bristles.

*Fifth Limb* (Figure 38a–e): Epipodial appendage with 37 bristles. Endite I with 5 bristles; endite II with 6 bristles; endite III with 10 bristles. 1st exopodial joint: main tooth consisting of 1 stout distal tooth with 4 prongs, 2 teeth with 2 prongs, and 1 smooth tooth; the 4-pronged tooth with 2 small anterior teeth near its base; 1 bristle on inner edge near smooth tooth, and 2 bristles on outer edge proximal to 4-pronged tooth (Figure 38e); 2nd exopodial joint with large 3-lobed tooth; posterior side with 2 bristles near inner edge proximal to proximal lobe of tooth; 2 bristles on inner margin or joint proximal to proximal lobe (Figure 38b). 3rd joint with 2 bristles on inner lobe and 2 bristles on outer lobe. 4th and 5th joints fused, with total of 4 bristles (Figure 38c).

*Sixth Limb* (Figure 38f): 2 short spinous bristles in place of epipodial appendage. Endites I and II each with 3 bristles; endite III with 2–4 bristles, endite IV with 3 bristles. End joint with 3 anterior bristles on protuberance and 4 hirsute bristles (anterior pair of these with short distal spines).

*Seventh Limb* (Figure 38g): Each limb with 4 proximal bristles, 2 on each side, and 6 terminal bristles, 3 on each side; each bristle with up to 6 bells and marginal spines. Terminus with opposing combs bearing 3-pronged teeth; one comb with 3 teeth, other with 5.

*Furca* (Figure 38h): Each lamella with 4 stout primary claws followed by 2 spinous secondary claws; primary claws with rounded tips and with



teeth along posterior margins; claws 1 and 2 with distal hairs along anterior margins; clusters of long medial hairs near bases of claws 1–3; hairs present along lamella following claw 6; claw 1 of right lamella anterior to claw 1 of left lamella.

*Bellonci Organ* (Figure 38*i,j,l*): Elongate, with short segment in middle, and narrowly rounded tip.

*Eyes*: Lateral eye small, unpigmented, with 4–6 small ommatidia (Figure 38*i,l*). Medial eye longer than diameter of lateral eye, tapering distally, with brown pigment and 4–7 filaments on dorsal margin (Figure 38*i,j,l*).

*Upper Lip* (Figure 38*i*): Lobate with ventral hairs.

*Genitalia* (Figure 38*h*): Consisting of oval ring on each side of body anterior to furca.

*Posterior of Body* (Figure 38*h*): Hirsute.

*Y-Sclerite*: Posterior end bent ventrally at right angle; tip of dorsal branch bifurcate (Figure 38*h*), or trifurcate (USNM 158359).

*Eggs*: USNM 158414 with 3 eggs in marsupium; USNM 158359 with 4 eggs.

**COMPARISONS.**—The elongate finger-like extension of the tip of the stout terminal claw of the 2nd endopodial joint of the mandible, and the small, slender, unringed, posterior bristle on the endopodite of the 2nd antenna of the adult female distinguishes *Rutiderma* from previously described species. A few species have one of the above characters but not both. The new species differs from *Rutiderma mortenseni* Poulsen (1965:38), of which only the male is known, in the morphology of the infold of the caudal process and in having fewer bristles on the rostral infold.

### *Rutiderma arcuatile*, new species

FIGURES 39, 40

**ETYMOLOGY.**—The specific name from the Latin *arcuatilis* meaning bowlike, in reference to the shape of the list on the infold of the caudal process of this species.

**HOLOTYPE.**—USNM 158212, adult female on slides and in alcohol.

**TYPE-LOCALITY.**—East side of Bolongo Bay, St. Thomas Island, U.S. Virgin Islands.

**PARATYPE.**—USNM 158886, 1 ovigerous female from outer reef Tague Bay, St. Croix, U.S. Virgin Islands.

**DISTRIBUTION.**—St. Thomas and St. Croix, U.S. Virgin Islands. Known depth range intertidal to 9 m (Table 1).

**DESCRIPTION OF ADULT FEMALE** (Figures 39, 40).—Carapace ovoid in lateral view, with prominent caudal process, and small rostrum forming acute angle with anterior margin of valve ventral to incisur when viewed laterally (Figure 39); edge of rostrum forming right angle with anterior edge of valve ventral to incisur when viewed medially (Figure 40*a*).

**Ornamentation** (Figure 39): A horizontal rib present above and below central adductor muscle attachments forming alar process on each valve; additional ribs paralleling dorsal and anteroventral borders; faint radial ribs along anterodorsal and anteroventral borders; some of the latter extending dorsally to intersect horizontal rib below central adductor muscle attachments; 1 or 2 small processes along posterior and posterodorsal valve margins (Figures 39, 40*c*); anterior margin of rostrum with scalloped edge (Figures 39, 40*a*); long bristles along anterior and ventral margins and scattered over valve surface; small, closely

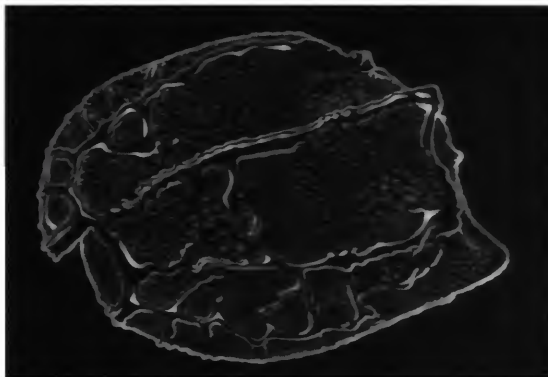


FIGURE 39.—*Rutiderma arcuatile*, new species, USNM 158212, holotype, adult female, length 1.02 mm, lateral view of complete specimen.

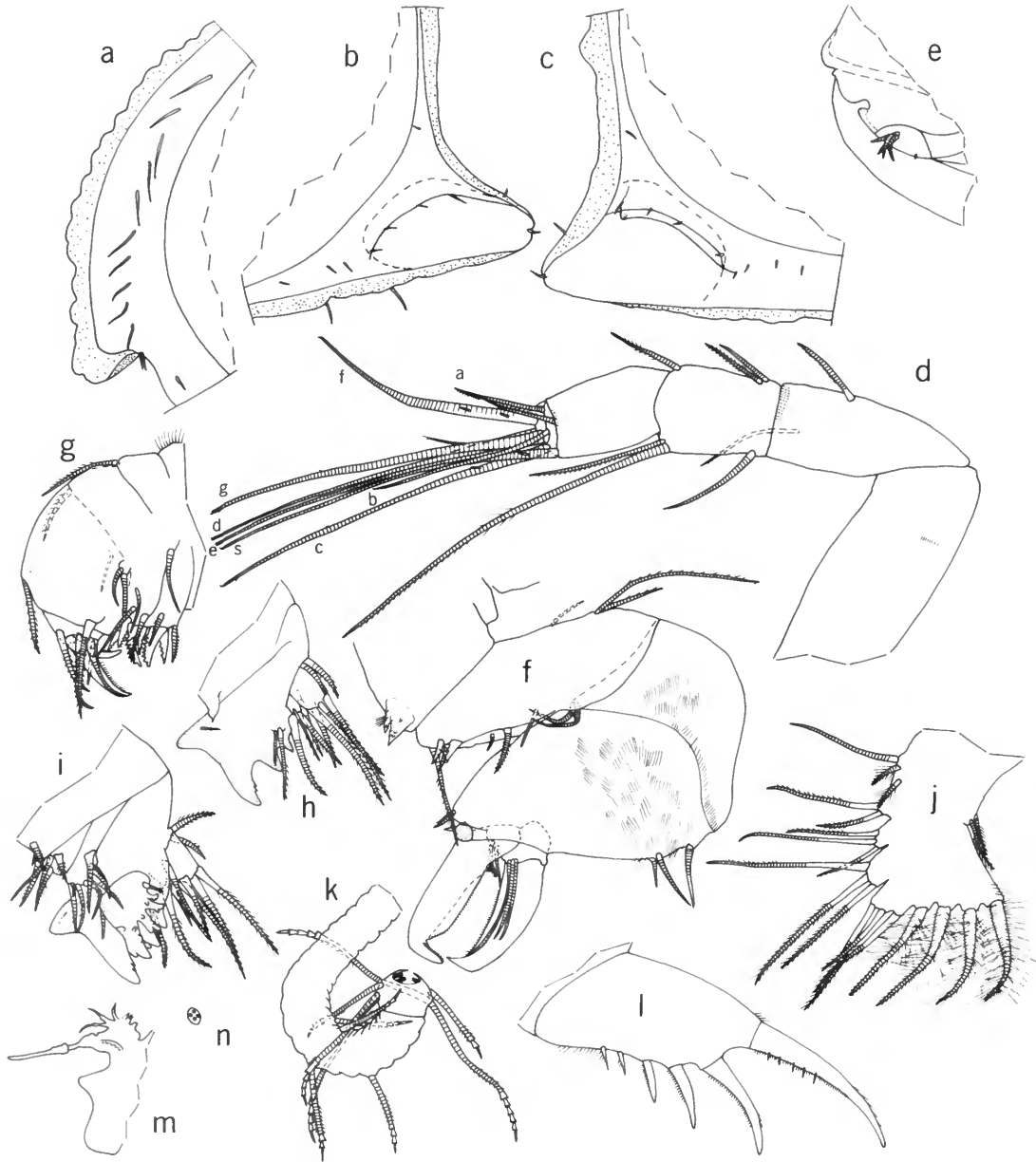


FIGURE 40.—*Rutiderma arcuatile*, new species, USNM 158212, holotype, adult female, length 1.02 mm: *a*, anterior of right valve, inside view; *b*, caudal process of right valve, inside view; *c*, caudal process of left valve, inside view; *d*, right 1st antenna, medial view; *e*, endopodite, distal part of protopodite, and proximal part of 1st exopodial joint of right 2nd antenna, medial view; *f*, left mandible, medial view; *g*, left maxilla, lateral view; *h*, left 5th limb, posterior view (endite bristles not shown); *i*, right 5th limb, anterior view; *j*, 6th limb; *k*, 7th limb; *l*, right lamella of furca; *m*, anterior of body showing medial eye with dorsal filaments, bellonci organ, and upper lip; *n*, lateral eye.

spaced fossae abundant on valve surface.

*Infold* (Figure 40a,c): Rostral infold with 10 bristles paralleling valve margin (Figure 40a); 2 additional smaller bristles at inner edge of incisur (these may be lateral to selvage); anteroventral infold with 1 short bristle just ventral to incisur and 5 or 6 fairly long bristles forming row parallel to valve edge; row of 6 similar or smaller bristles continuing onto anterior part of ventral infold; ventral infold anterior to caudal process with 7 or 8 bristles forming row; infold of caudal process of right valve with pocket having 4 small bristles along anterior edge (Figure 40b); infold of caudal process of left valve having along anterior edge a narrow skirt with 3 or 4 small bristles along its anterior edge (Figure 40c); 1 small bristle present on posterior infold just dorsal to caudal process (Figure 40b,c).

*Selvage*: Wide lamella prolongation with marginal fringe present along free margins; fringe longest along rostral and anteroventral margins of valves and may be absent in vicinity of caudal process; prolongation divided at inner end of incisur.

*Size*: USNM 158212, length 1.02 mm, height 0.72 mm; USNM 15886, length 0.92 mm, height 0.73 mm.

*First Antenna* (Figure 40d): 1st joint with faint medial spines forming row. 2nd joint with lateral spines forming row along distal margin, and 2 bristles (1 dorsal, 1 lateral). 3rd and 4th joints fused; 3rd joint short, with 3 bristles (1 ventral, 2 dorsal); 4th joint elongate, with 3 bristles (2 ventral, 1 dorsal). Bristle of long 5th joint with 1 small proximal filament and 1 or 2 minute processes at tip. 6th joint minute, fused with 5th joint, with short, spinous, medial bristle. 7th joint: a-bristle longer than bristle of 6th joint, with marginal spines; b-bristle about twice length of a-bristle, bare except for minute process at tip; c-bristle about same length as bristle of 5th joint, with 2 minute, distal, marginal spines, and minute process at tip. 8th joint: d- and e-bristles each about same length as c-bristle, bare with blunt tips; f-bristle about two-thirds length of c-bristle, with 2 small proximal filaments and mi-

nute process at tip; g-bristle about same length as c-bristle, with fairly long proximal filament with spinelike tip, 2 minute distal spines, and minute process at tip.

*Second Antenna* (Figure 40e): Protopodite bare. Endopodite 1-jointed with 4 small, proximal, anterior bristles and minute posterior process along edge. Exopodite: 1st joint elongate with small distal, medial bristle having open tubelike tip and bulbous base; bristles of joints 2-5 reaching well past 9th joint, with small teeth forming row along ventral margins, but without natatory hairs; bristles of joints 6-8 long, with natatory hairs, but without spines; 9th joint with 6 bristles (2 long with natatory hairs, 1 medium with natatory hairs, 1 short with natatory hairs, 2 minute bare); joints 3-5 with minute spines forming row along distal margins.

*Mandible* (Figure 40f): Coxale endite bifurcate with long hairs and stout spines. Basale: dorsal margin with 3 bristles; ventral margin with 4 bristles in proximal group (2 pectinate unringed, 2 slender ringed), and 3 separated distal bristles, all ringed. 1st endopodial joint with 2 ringed ventral bristles, and medial spines. 2nd endopodial joint: medial surface spinous; dorsal margin with 3 short proximal bristles; ventral margin with 1 or 2 small terminal bristles, 1 small sclerotized process (with minute spine at tip) at base of stout terminal claw; dorsal margin of terminal claw with small proximal tooth and minute serrations. 3rd endopodial joint: stout terminal claw having truncate tip and serrate ventral margin; 3 slender medial bristles near base of claw; 1 unringed flat bristle (with serrate ventral margin) ventral to claw; 2 small lateral bristles near base of claw of 2nd joint.

*Maxilla* (Figure 40g): Precoxale with fringe of long hairs along dorsal margin. Endites I, II, and III each with 2 or 3 terminal claws and several slender bristles. Coxale with 1 spinous dorsal bristle. Basale with 1 dorsal bristle and 1 medial bristle near ventral margin. Exopodite small with 2 bristles. 1st endopodial joint with few long spines, 1 spinous alpha-bristle, and 1 stouter, spinous, beta-bristle. End joint with 2 stout, un-

ringed, pectinate claws and 4 slender ringed bristles, some with marginal spines.

*Fifth Limb* (Figure 40*h,i*): Endite I with 3 bristles; endite II with 4 bristles; endite III with 8 bristles. Exopodite: 1st joint with 3 stout teeth followed by 1 smaller smooth tooth and 1 short ringed bristle; outer edge of joint with 1 short ringed bristle (Figure 40*i*). 2nd joint with large 3-lobed tooth (proximal 2 lobes without secondary teeth; distal lobe with 2 secondary teeth along inner edge); posterior side of joint with small bristle near outer corner and with 2 bristles near proximal lobes of 3-lobed tooth. 3rd joint with 3 bristles on inner lobe and 2 on outer lobe. 4th and 5th joints fused, with 1 proximal and 4 terminal bristles (the proximal bristle of fused 4th and 5th joints could be interpreted as being on 2nd joint).

*Sixth Limb* (Figure 40*j*): Endite I with 3 bristles; endite II with 2 bristles; endites III and IV each with 3 bristles; end joint with anterior projection with 3 bristles (with short marginal spines) followed by 4 bristles (anterior 2 of these with long proximal hairs and short distal spines, posterior 2 with long marginal hairs); 2 spinous bristles in place of epipodial appendage.

*Seventh Limb* (Figure 40*k*): Each limb with 4 proximal bristles (2 on each side) and 6 terminal bristles (3 on each side); each bristle with up to 5 bells and marginal spines; terminus with opposing combs, with about 5 alate teeth in one comb and 4 simple teeth in other.

*Furca* (Figure 40*l*): Each lamella with 4 strong claws followed by 2 weak secondary claws; long hairs along edge of lamella following claws and medially at bases of claws.

*Bellonci Organ* (Figure 40*m*): Elongate, broadening near middle, then tapering to rounded tip.

*Eyes* (Figure 40*m,n*): Medial eye with light amber pigment; dorsal margin with numerous filamentous growths (Figure 40*m*). Lateral eye minute with 4 ommatidia, and without pigment (Figure 40*n*).

*Upper Lip* (Figure 40*m*): Rounded

*Posterior of Body*: Hirsute.

*Eggs*: USNM 158212 with large unextruded eggs; USNM 158886 with 3 large eggs.

*Gut Content*: Large copepod fragments in USNM 158212.

COMPARISONS.—The new species *R. arcuatile* is closely related to *R. dinochelatum*. On *R. arcuatile* the curvature of the list of the caudal process has a low angle with the ventral margin. On both *R. dinochelatum* and *R. mortenseni* (only male known), the curvature of the list forms about a 45° angle with the ventral margin. Also, on both of these species, bristles are present on each end of the curved list, whereas, *R. arcuatile* bears several bristles along the list.

### *Rutiderma sterreri* Kornicker, 1981

FIGURES 41–43

*Rutiderma sterreri* Kornicker, 1981b:5, figs. 3–5.

HOLOTYPE.—USNM 158115, ovigerous female on slide and in alcohol.

TYPE-LOCALITY.—Station 630820, Harrington Sound, Bermuda.

MATERIAL.—Bermuda: Holotype; paratypes: USNM 106459, 5 ovigerous females and 1 juvenile. USNM 158573, 1 adult male (new material), sta Knot=B1.

DISTRIBUTION.—Bermuda, intertidal to 11 m (Table 1).

DIAGNOSIS OF ADULT FEMALE.—Carapace similar to that of female *R. dinochelatum* but with additional ribs paralleling ventral margin (compare Figures 10 and 41). Appendages similar to those of *R. dinochelatum*, except tip of bellonci organ of some specimens of *R. dinochelatum* are pointed, whereas tip of organ is rounded on *R. sterreri*.

DESCRIPTION OF ADULT MALE (Figures 42, 43).—Carapace elongate with prominent rostrum and caudal process.

*Ornamentation* (Figure 42): Each valve with rib along dorsal and ventral margins in addition to 2 stronger midribs (1 above and 1 below valve middle); upper midrib with process at posterior end; vertical rib connecting upper and lower midribs slightly broader near ventral end; rostrum deeper than that of female; anterodorsal



FIGURE 41.—*Rutiderma sterreri* Kornicker, USNM 158115, holotype, adult female, length 1.10 mm, lateral view of complete specimen (from Kornicker, 1981b, fig. 3).

and ventral radial riblets present on female carapace absent on adult male; surface with shallow fossae; each valve orange-red in strip paralleling dorsal margin and in posterodorsal region (Figure 43); color fades after several months in glycerine or alcohol.

**Infold** (Figure 43a,b): Rostral infold with 8 bristles forming row parallel to anterior margin (Figure 43a); 2 minute bristles at inner end of incisur; antroventral and posteroventral infolds similar to that of female; infold of caudal process similar to that of female except outer edge of list fairly linear (Figure 43b), not slightly convex as that of female (Kornicker, 1981, fig. 5).

**Size:** USNM 158573, left valve under cover slip, length 0.95 mm, height 0.57 mm.

**First Antenna** (Figure 43c): 1st joint with few spines forming rows on medial side. 2nd joint spinous, with 2 bristles (1 dorsal, 1 lateral). 3rd joint about one-half length of 4th joint on medial side and about same length on lateral side; medial suture separating 3rd and 4th joints well defined and more-or-less perpendicular to edges of limb; lateral suture weak and forming angle with limb edges resulting in 3rd joint with short ventral edge and longer dorsal edge; 3rd joint with 3 bristles (1 ventral, 2 dorsal); 4th joint with 4 bristles (3 ventral, 1 dorsal). 5th joint small,



FIGURE 42.—*Rutiderma sterreri* Kornicker, USNM 158573, adult male, length 0.95 mm, lateral view of complete specimen. Shaded area along top represents orange-red coloration of left valve.

wedged ventrally and medially between 4th and 6th joints; sensory bristle with short, stout, proximal part with abundant distal filaments (not all shown on illustrated limb), and distal stem with minute spine at tip. Elongate 6th joint with spinous medial bristle at distal dorsal corner. 7th joint: spinous a-bristle about same length as bristle of 6th joint; b-bristle more than twice length of a-bristle, stout with 2 filaments near middle (tip of filaments and tip of stem with minute bent spine); c-bristle extremely long (broken on both limbs of specimen examined, but with 9 filaments on remaining part; filaments with 2 minute spines at tip). 8th joint: d- and e-bristles bare with blunt tips, slightly longer than b-bristle; f-bristle similar to c-bristle; g-bristle longer than b-bristle, with 1 proximal filament (tip of filament and tip of bristle with minute spine).

**Second Antenna** (Figure 43d): Protodopodite without spines but may have minute unringed distal medial bristle (pore present but bristle not observed with certainty). Endopodite 3-jointed: 1st joint short with 5 bristles (4 proximal, 1 near middle); 2nd joint elongate with 2 bristles near middle; 3rd joint elongate, reflexed, with 1 short proximal bristle and 2 small bristles near rounded tip (tip with faint ridges). Exopodite: 1st joint elongate with minute, terminal, medial bristle,

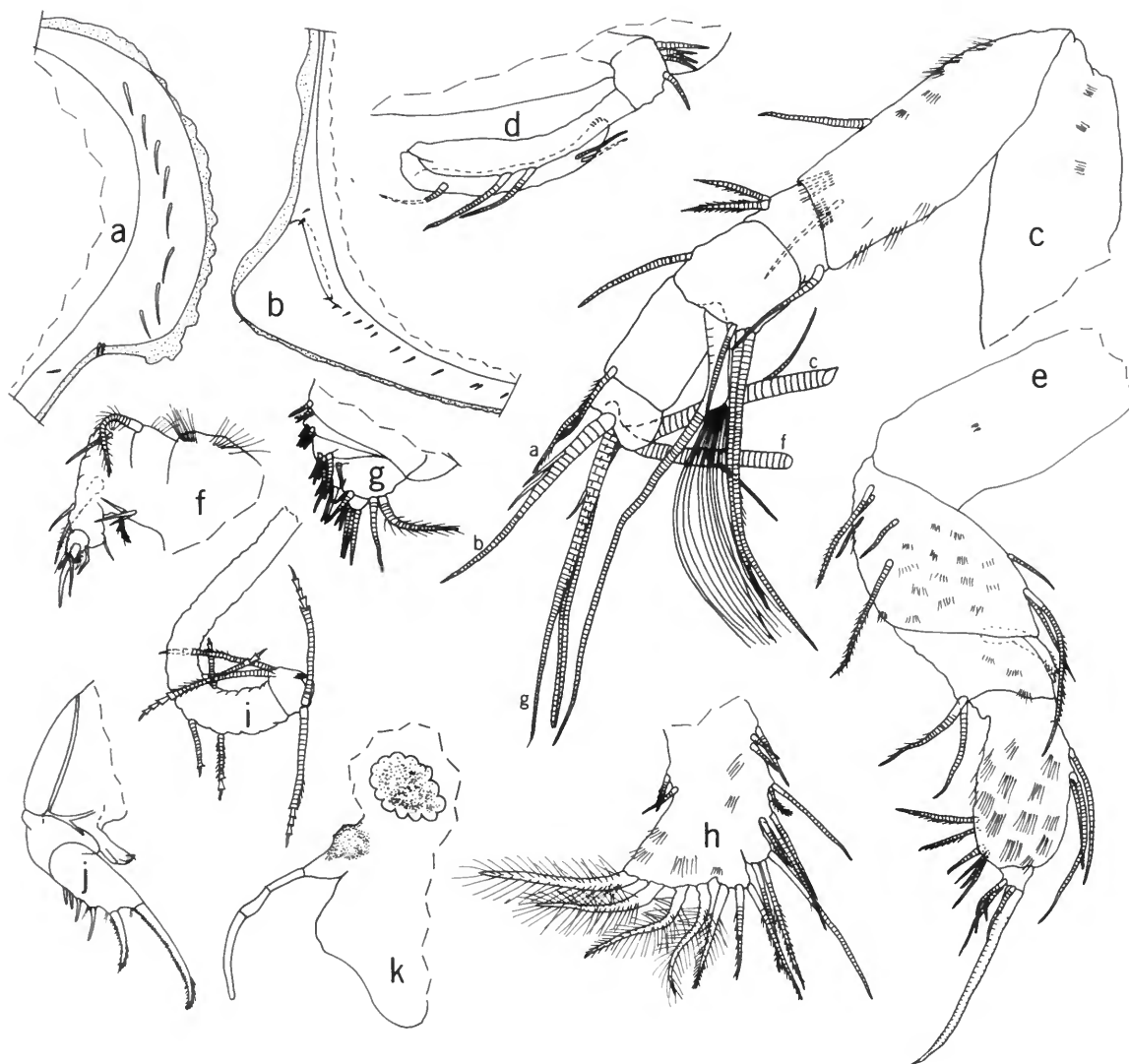


FIGURE 43.—*Rutiderma sterreri* Kornicker, USNM 158573, adult male, length 0.95 mm: *a*, rostrum of left valve, inside view; *b*, caudal process of left valve, inside view; *c*, right 1st antenna, medial view; *d*, endopodite and distal part of protopodite of left 2nd antenna, medial view; *e*, left mandible, medial view; *f*, right maxilla, medial view; *g*, 5th limb; *h*, 6th limb; *i*, 7th limb; *j*, right lamella of furca, right copulatory limb, right Y-sclerite, right segment of girdle; *k*, anterior of body showing medial eye, bellonci organ, lateral eye, and upper lip.

and distal hairs along ventral margin; 2nd joint short, with bristle having same length as combined length of joints 3 and 4, with minute ventral spines; 3rd joint elongate with undulating ventral margin and long natatory bristle without spines;

joints 4–9 short, decreasing in size distally along limb; joints 4–8 each with long bristle with natatory hairs; 9th joint with 5 bristles (3 long and 1 medium (all with natatory hairs), and 1 minute, bare, in medial distal corner); joint 2 with long

lateral spines on distal margin; joints 3–8 with short lateral spines on distal margin.

*Mandible* (Figure 43e): Coxale endite represented by 2 small spines. Basale: medial side spinous, with 5 bristles near ventral margin; dorsal margin with 3 bristles (1 short near middle, and 1 long and 1 short distal to middle). Exopodite well developed, hirsute distally. 1st endopodial joint with medial spines and 2 ventral bristles. 2nd endopodial joint: medial side with long spines; dorsal margin with 3 proximal bristles; ventral margin with 6 short distal bristles. End joint with 1 stout claw and 4 slender bristles.

*Maxilla* (Figure 43f): Limb reduced. Endites I–III with faint, weakly developed bristles (not all shown on illustrated limb). Precoxale and coxale with dorsal fringe of long hairs; coxale with stout hirsute dorsal bristle. Basale with short dorsal bristle, ventral bristles obscure on specimen examined. Exopodite obscure but with 1 long spinous bristle and 1 or 2 shorter bristles. Endopodite: 1st joint with 1 short alpha-bristle and 1 short beta-bristle; end joint with about 7 weakly developed bristles.

*Fifth Limb* (Figure 43g): Endite I with 3 short bristles; endite II with 4 faint bristles; endite III with 7 bristles (not all shown on illustrated limb). Exopodite: joints 1 and 2 each with about 4 bristles, some unringed, flattened; joint 3 with stout hirsute bristles on outer lobe and 2 or 3 bristles on inner lobe; remaining joints fused, with total of 4 bristles.

*Sixth Limb* (Figure 43h): 2 short bristles in place of epipodial appendage. Endite I with 3 short bristles; endite II with 2 bristles (1 long, 1 short); endite III with 3 bristles (2 long, 1 short); endite IV with 3 long bristles. End joint with 3 spinous bristles (one of these with long proximal hairs) on anterior projection followed by 4 stout hirsute bristles.

*Seventh Limb* (Figure 43i): 4 proximal bristles, 2 on each side, and 4 longer terminal bristles, 2 on each side; proximal bristles with 1 or 2 bells; terminal bristles with 4 bells; some bristles with distal marginal spines. Terminus with opposing combs having about 2 or 3 teeth.

*Furca* (Figure 43j): Each lamella of furca with 4 primary claws followed by 2 secondary claws; spines along posterior margins of claws 1 and 2 of equal length; long hairs medially at base of primary claws; claw 1 of right lamella anterior to claw 1 of left lamella.

*Bellonci Organ* (Figure 43k): Elongate with 2 sutures in middle part, and with rounded tip.

*Eyes* (Figure 43k): Medial eye with dark brown pigment; lateral eye well developed, larger than medial eye, with black pigment and numerous ommatidia (about 19).

*Body*: Without orange-red pigment present in valves.

*Upper Lip* (Figure 43k): Rounded.

*Genitalia*: (Figure 43j): Copulatory limbs well developed, with sclerotized process at tip.

### *Rutiderma kalkei*, new species

FIGURES 44–48

**ETYMOLOGY.**—The species is named for Richard D. Kalke, University of Texas Marine Science Institute, from whom I received the specimens.

**HOLOTYPE.**—USNM 159079, ovigerous female.

**TYPE-LOCALITY.**—South Texas continental shelf, off Port Isabel, R/V *Longhorn*, transect IV, sta 3, 27 Sep 1977; 26°10'N, 96°24'W; water depth 91 m.

**PARATYPES.**—All from same station as holotype. USNM 159045-5, 1 adult female; USNM 159038-4, 1 adult female; USNM 159035-2, 1 ovigerous female + 1 juvenile male; USNM 159032-3, 4 specimens including 2 adult females; USNM 159017-4, 1 adult female; USNM 159025-5, 2 juvenile males; USNM 159039-5, 1 adult male; USNM 159046-6, 5 specimens; USNM 159061-1, 2 adult females; USNM 159070-2, 1 ovigerous female + 1 adult female + 1 juvenile; USNM 159077-3, 1 ovigerous female + 1 juvenile; USNM 159075-4, 2 adult females + 10 juveniles; USNM 159073-5, 3 juveniles; USNM 159071-6, 1 adult female; USNM 159066-3, 1 ovigerous female; USNM 159069A,B-4, 2 adult males; USNM 159076-4, 3 juveniles; USNM 159064-5, 1 adult female; USNM 159072-6, 1

adult male; USNM 159074-6, 5 adult females + 3 juveniles; USNM 159047-1, 1 juvenile; USNM 159055-2, 2 adult females + 2 juveniles; USNM 159062-3, 13 specimens; USNM 159065-4, 2 juveniles; USNM 159058-5, 1 adult female + 6 juveniles; USNM 159063-6, 3 juveniles.

**DISTRIBUTIONS.**—All material from type-locality (Figure 3; Table 1).

**DESCRIPTION OF ADULT FEMALE.** (Figures 44–46).—Carapace with well-defined incisur formed by lateral overhang of rostrum (Figures 44, 45a–c); well-developed caudal process with rounded tip (Figure 45d,e).

**Ornamentation** (Figure 44): 2 well-developed horizontal ribs present, 1 above and 1 below the central adductor muscle attachment scars; posterior end of each rib extending past posterior edge of valve; margin between posterior ends of ribs concave; each valve with triangular projection on anteroventral margin, and another near middle of linear segment of posterodorsal margin; no triangular process on posterior edge of valves. Surface of valves with abundant round fossae; anterior margin of rostrum and ventral margin of valves scalloped; bristles present on ventral and anterodorsal margins and sparsely distributed on lateral surface.

**Infold** (Figure 45b,d,e): Rostral infold with 7 or 8 bristles parallel to anterior margin; 2 minute

bristles at inner end of incisur (Figure 45b); anteroventral infold with 9 or 10 bristles forming row, and 6 ridges paralleling inner edge of infold; list extending from posterior end of ventral margin near valve edge to point near middle of upper edge of caudal process (Figure 45d,e); middle of slightly concave list of caudal process facing ventral margin of valve; edge of list with 3 or 4 minute bristles near ventral end, and 2 or 3 in vicinity of caudal process (Figure 45d,e); 4 or 5 small bristles present between the list and posterior part of ventral margin of valve; a small bristle may be present at inner edge of infold near ventral end of the list.

**Selvage** (Figure 45c): Broad lamellar prolongation of selvage along anterior edge of rostrum with stout, closely spaced hairs forming fringe (Figure 45c); selvage divided at inner end of incisur and at upper part of posterior edge of caudal process; lamellar prolongation along anteroventral and ventral margins with fringe of hairs becoming shorter posteriorly; lamellar prolongation in vicinity of caudal process narrow, without marginal fringe.

**Size:** USNM 159079, length 1.08 mm, height 0.93 mm; USNM 159055, 2 specimens, length 1.06 mm, height 0.75 mm, length 1.11 mm, height 0.72 mm; USNM 159045, length 1.04 mm, height 0.70 mm; USNM 159038, length 1.06 mm, height 0.72 mm; USNM 159017, length 1.02 mm, height 0.72 mm.

**First Antenna:** 1st joint with spines forming few rows on medial and lateral surfaces. 2nd joint with faint hairs on dorsal margin, lateral spines forming row along distal margin, and 2 spinous bristles (1 dorsal, 1 lateral). 3rd and 4th joints fused; short 3rd joint with 3 spinous bristles, 1 ventral, 2 dorsal; long 4th joint with 3 spinous bristles, 1 dorsal with abundant long spines, 2 ventral (longer of these 2 or 3 times length of other). Long 5th joint with spines on distal ventral corner; sensory bristle with 1 short proximal filament, and minute spine and process at tip. Bristle of minute 6th joint short, spinous (length of bristle about same as width of 5th joint). 7th joint: a-bristle hirsute, about twice length of bristle of 6th joint; b-bristle about two-thirds length



FIGURE 44.—*Rutiderma kalkei*, new species, USNM 159079, holotype, adult female, length 1.08 mm, lateral view of left valve.



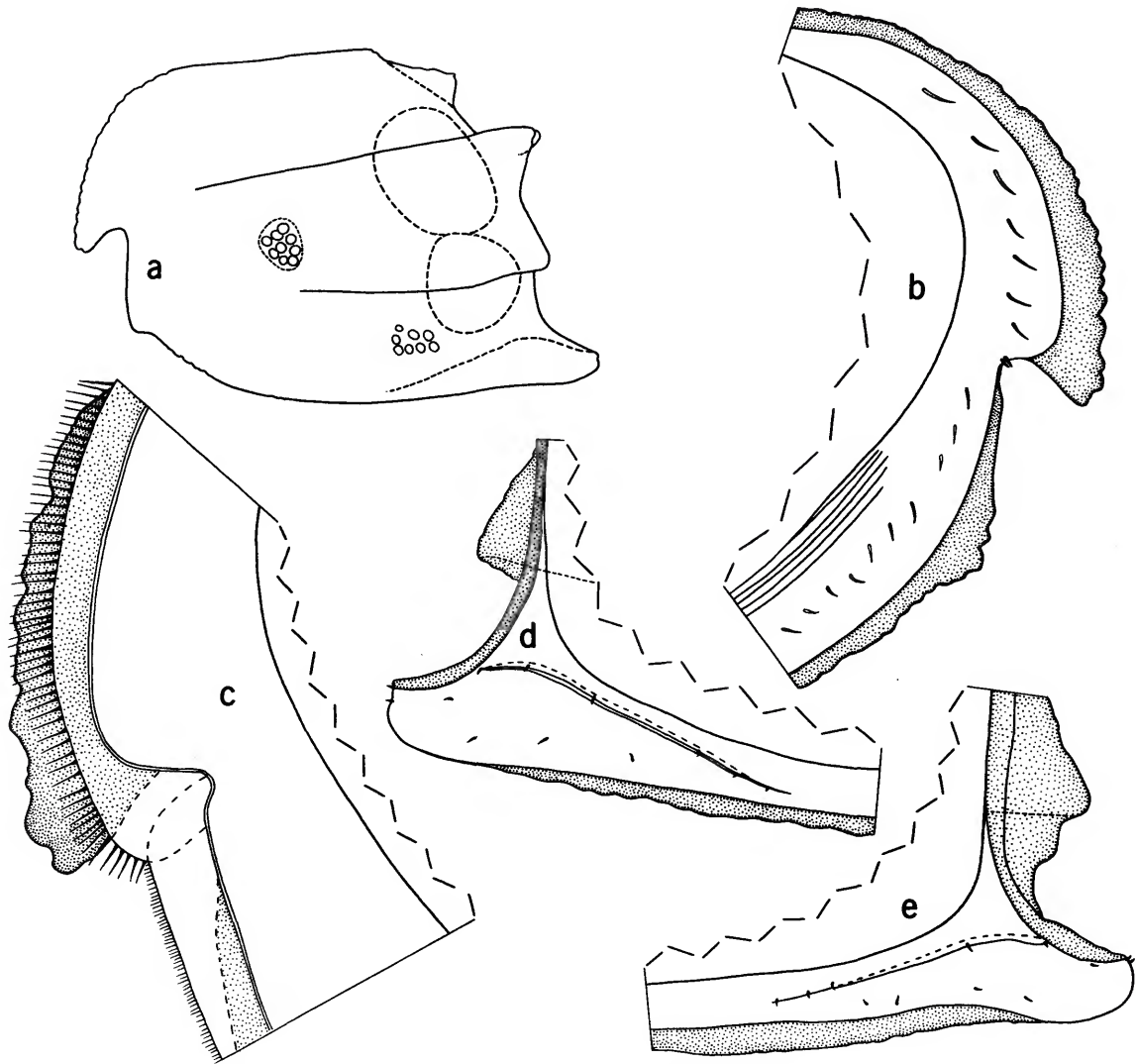


FIGURE 45.—*Rutiderma kalkei*, new species, USNM 159079, holotype, adult female, length 1.08 mm: *a*, lateral outline of complete specimen showing central adductor muscle scars, 2 eggs, and alar process; *b*, inside view of anterior of left valve (lamellar prolongation of selvage not shown); *c*, inside view of anterior of right valve showing lamellar prolongation of selvage with marginal fringe (medial bristles of rostral and anteroventral infolds not shown); *d*, *e*, inside views of caudal process of left and right valves (lamellar prolongation of selvage not shown).

of a-bristle; c-bristle slightly longer than sensory bristle of 5th joint, with small proximal filament and minute process and spine at tip. 8th joint: d- and e-bristles bare with blunt tips, bristles slightly shorter than sensory bristle of 5th joint; f-bristle stout, less than twice length of a-bristle, with

minute spine and process at tip; g-bristle about same length as c-bristle, with fairly long proximal filament with hairlike distal part, tip of bristle with minute spine and process at tip. Sensory bristle, and c- and g-bristles with few minute, faint spines forming row near middle.

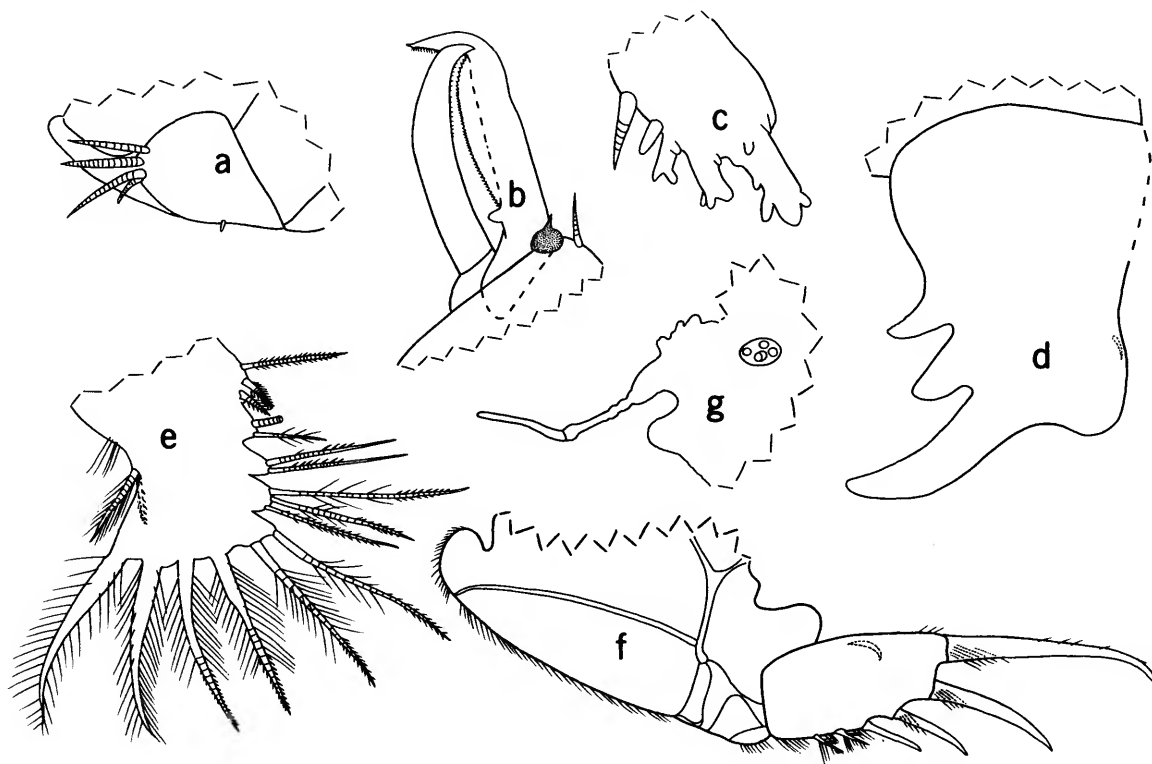


FIGURE 46.—*Rutiderma kalkei*, new species, USNM 159079, holotype, adult female, length 1.08 mm: *a*, endopodite and distal part of protopodite or right 2nd antenna, medial view; *b*, distal part of 2nd exopodial joint and claw of 3rd endopodial joint of left mandible, medial view; *c*, 1st exopodial joint of left 5th limb, anterior view; *d*, 2nd exopodial joint of right 5th limb, posterior view; *e*, 6th limb; *f*, posterior of body showing right lamella of furca, right Y-sclerite, right half of girdle, hirsute posterior margin of body, and hirsute dorsal process; *g*, anterior of body showing left lateral eye, medial eye, and bellonci organ.

**Second Antenna** (Figure 46a): Protopodite bare. Endopodite 1-jointed with 4 small anterior bristles and minute process on ventral edge near posterior end. Exopodite: 1st joint with minute medial bristle on terminal margin; bristles of joints 2–5 fairly short, with closely spaced ventral spines but no natatory hairs; bristles of joints 6–8 long, with natatory hairs but no ventral spines; 9th joint with 6 bristles (3 long with natatory hairs, 1 medium with natatory hairs, 2 minute, either bare or with few faint hairs).

**Mandible** (Figure 46b): Coxale endite bifurcate, pectinate, with long hairs at base. Basale: ventral margin with 4 proximal bristles (2 short pectinate, unringed, 1 short ringed, 1 longer,

ringed, spinous); medial side near ventral margin with short proximal bristle and 2 ringed bristles near middle (longer of these over twice length of other); dorsal margin with bristles forming 2 groups distal to middle, proximal of these with 1 short bristle, distal group with 2 bristles (longer of these hirsute, about one-third longer than other). 1st endopodial joint with 2 short ventral bristles, and medial spines forming rows. 2nd endopodial joint: dorsal margin with 3 short, spinous, proximal bristles; medial surface with abundant spines forming rows; lateral surface with spines near dorsal margin; ventral margin with 2 minute distal bristles (only 1 of these shown in Figure 46b), and small oval sclerotized

process (with minute terminal bristle) at base of stout terminal claw; dorsal margin of terminal claw with proximal tooth, serrate margin, and curved distal end bearing minute process at tip; ventral margin of terminal claw slightly sinuate proximal to curved end. 3rd endopodial joint with stout terminal claw with truncate tip and serrate ventral margin; 3 slender medial bristles near ventral end of base of claw (not shown in Figure 46b); 1 unringed flat bristle (with serrate ventral margin) ventral to stout claw, and 2 short hirsute bristles located lateral to stout terminal claw of 2nd joint.

*Maxilla:* Dorsal margin of coxale with 1 spinous bristle and fringed lamellar prolongation. Endites I to III with 2 or 3 stout pectinate, unringed, bristles, and several ringed bristles. Basale with 1 dorsal bristle and 1 bristle near ventral margin. 1st endopodial joint with spines forming rows near dorsal margin, 1 spinous alpha-bristle, and 1 proximal medial bristle (possibly this bristle is on basale); beta-bristle obscured on specimen examined. 2nd endopodial joint with 2 stout, pectinate, unringed bristles, and 5 spinous ringed bristles. Exopodite small with 2 bristles.

*Fifth Limb* (Figure 46c,d): Endite I with 3 short bristles, endite II with 6 short bristles; endite III with about 6 bristles (bristle placed medially near middle of limb with 3 long proximal hairs on each side and distal spines). Exopodite: 1st joint with proximal bristle followed by smooth elongate tooth and 3 stout teeth bearing secondary teeth; 1 proximal bristle on outer edge of joint. 2nd joint with large 3-lobed tooth (secondary teeth not observed on lobes of specimen examined); posterior side of joint with minute faint bristle near outer corner, and 1 long bristle near middle. Outer lobe of 3rd joint with 2 bristles (1 of these with long faint hairs); inner lobe with 3 bristles. 4th and 5th joints fused, with total of 3 or 4 spinous bristles.

*Sixth Limb* (Figure 46e): Endite I with 2 or 3 bristles (1 long, 1 or 2 short), endites II and III each with 2 bristles; endite IV with 3 bristles; ventral margin of end joint with 2 or 3 long anterior bristles (with long proximal hairs and short distal spines) followed by 4 stout posterior

bristles (anterior 2 of these with long proximal hairs and short distal spines, posterior 2 with only long hairs); anterior part of ventral margin of end joint projecting only slightly past posterior part; posterior edge of stem with 2 hirsute epipodial bristles (longer of these almost twice length of other).

*Seventh Limb:* Each limb with 2 proximal bristles, 1 on each side, each bristle with 3 bells and few distal marginal spines, and 5 or 6 terminal bristles, 2 or 3 on each side, each bristle with 3-6 bells and distal marginal spines. Terminus with opposing combs, each bearing several teeth.

*Furca* (Figure 46f): Each lamella with 4 stout primary claws followed by 2 small secondary claws; claw 1 with anterior distal hairs and both long and short posterior teeth; claws 2-4 with posterior teeth; claws 5 and 6 with spines along both anterior and posterior margins, proximal spines much longer than others; anterior margin of lamellae with slender spines; long hairs on lamellae following claws and medially at bases of claws; claw 1 of right lamella located slightly anterior to claw 1 of left lamella.

*Bellonci Organ* (Figure 46g): Elongate, with undulate surface in proximal part, short broad part near middle, then narrowing to rounded tip.

*Eyes* (Figure 46g): Medial eye tapering distally, unpigmented, dorsal margin with about 6 short processes. Lateral eye smaller than medial eye, unpigmented, with 4 ommatidia.

*Genitalia:* Consisting of small sclerotized oval on each side of body anterior to Y-sclerite.

*Y-Sclerite* (Figure 46f): Typical for genus.

*Posterior of Body* (Figure 46f): Hirsute along posterior edge; small, hirsute, rounded, dorsal process present just dorsal to end of girdle.

*Eggs:* USNM 159079 with 3 eggs in marsupium (2 shown in Figure 45a).

**DESCRIPTION OF ADULT MALE** (Figures 47, 48).—Incisur broader than that of female; tip of rostrum overhanging valve edge; caudal process similar to that of adult female (Figures 47, 48a-c).

*Ornamentation:* Alar process similar to that of female but posterior end of lower horizontal rib not projecting past valve edge; shallow fossae



FIGURE 47.—*Rutiderma kalkei*, new species, USNM 159072, paratype, adult male, length 1.14 mm, lateral view of complete specimen.

present but not as distinct as those on adult female; distribution of surface bristles similar to those of adult female. Triangular process present on straight posterodorsal margin but absent on anteroventral margin (Figures 47, 48a).

**Infold:** Infold of rostrum with 7 or 8 bristles forming row parallel to edge of rostrum; 2 short bristles present at inner end of incisur; anterior infold ventral to rostrum with 2 short bristles; anterior part of ventral margin with 6 bristles forming row. Infold of caudal process similar to that of adult female (Figure 48b,c).

**Selvae:** Similar to that of adult female.

**Size:** USNM 159069B, length 1.19 mm, height 0.65 mm; USNM 159039, length 1.07 mm, height 0.63 mm; USNM 159072, length 1.14 mm, height 0.69 mm.

**First Antenna:** 1st joint with few lateral spines. 2nd joint spinous, with 2 bristles (1 dorsal, 1 lateral). 3rd and 4th joints with well-developed separating suture only on medial side; 3rd joint with 3 bristles (1 ventral, 2 dorsal); longer 4th joint with 4 bristles (3 ventral, 1 dorsal). 5th joint small, wedged ventrally between 4th and 6th joints; sensory bristle with stout, cylindrical, proximal part with abundant distal filaments, and distal stem with minute filament (or spine) near middle and minute process at tip. Elongate 6th joint with spinous medial bristle at distal dorsal

corner (length of bristle about same as width of 6th joint). 7th joint: spinous a-bristle slightly longer than bristle of 6th joint; b-bristle about twice length of a-bristle, with 3 filaments (2 long, proximal to middle of bristle, 1 minute, distal to middle) and minute process at tip; c-bristle extremely long, with 11 filaments. 8th joint: d- and e-bristles bare with blunt tips, about same length as b-bristle; f-bristle similar to c-bristle; g-bristle slightly longer than b-bristle, with proximal marginal filament with thin spinelike tip, and minute distal filament; tip of bristle with minute process.

**Second Antenna:** Protopodite bare. Endopodite 3-jointed: 1st joint with 5 short bristles (4 proximal, 1 distal); 2nd joint elongate with 2 short spinous bristles near middle; 3rd joint elongate, reflexed, with 1 short proximal bristle and 2 small bristles near rounded tip (tip with faint ridges). Exopodite: 1st joint elongate with minute medial bristle at distal end, and hairs forming rows along ventral margin and on lateral surface; 2nd joint short, with bristle about same length as combined length of joints 3 and 4; bristle bearing slender ventral spines and having pointed tip; 3rd joint elongate, with long natatory bristle without spines; joints 4–9 short, decreasing in size distally; joints 4–8 each with long bristle with natatory hairs; 9th joint with 5 bristles (3 long and 1 medium, all with natatory hairs, and 1 minute, either bare, or with few short hairs); joints 2–8 with spines forming rows along distal lateral surface; joints 5–8 with minute basal spine (length of spines about one-fourth length of 9th joint).

**Mandible:** Coxale endite represented by 2 minute medial spines. Basale: medial side spinous, with 5 bristles near ventral margin (distal of these near middle of ventral margin and much longer than others); dorsal margin with 3 bristles distal to middle (1 bristle proximal, paired bristles distal). Exopodite well developed, reaching to about middle of dorsal margin of 1st endopodial joint, tip hirsute. 1st endopodial joint with medial spines and 2 ventral bristles. 2nd endopodial joint: medial side spinous; dorsal margin with 3 proximal bristles; ventral margin with 6 short distal bristles (proximal pair of these with bases

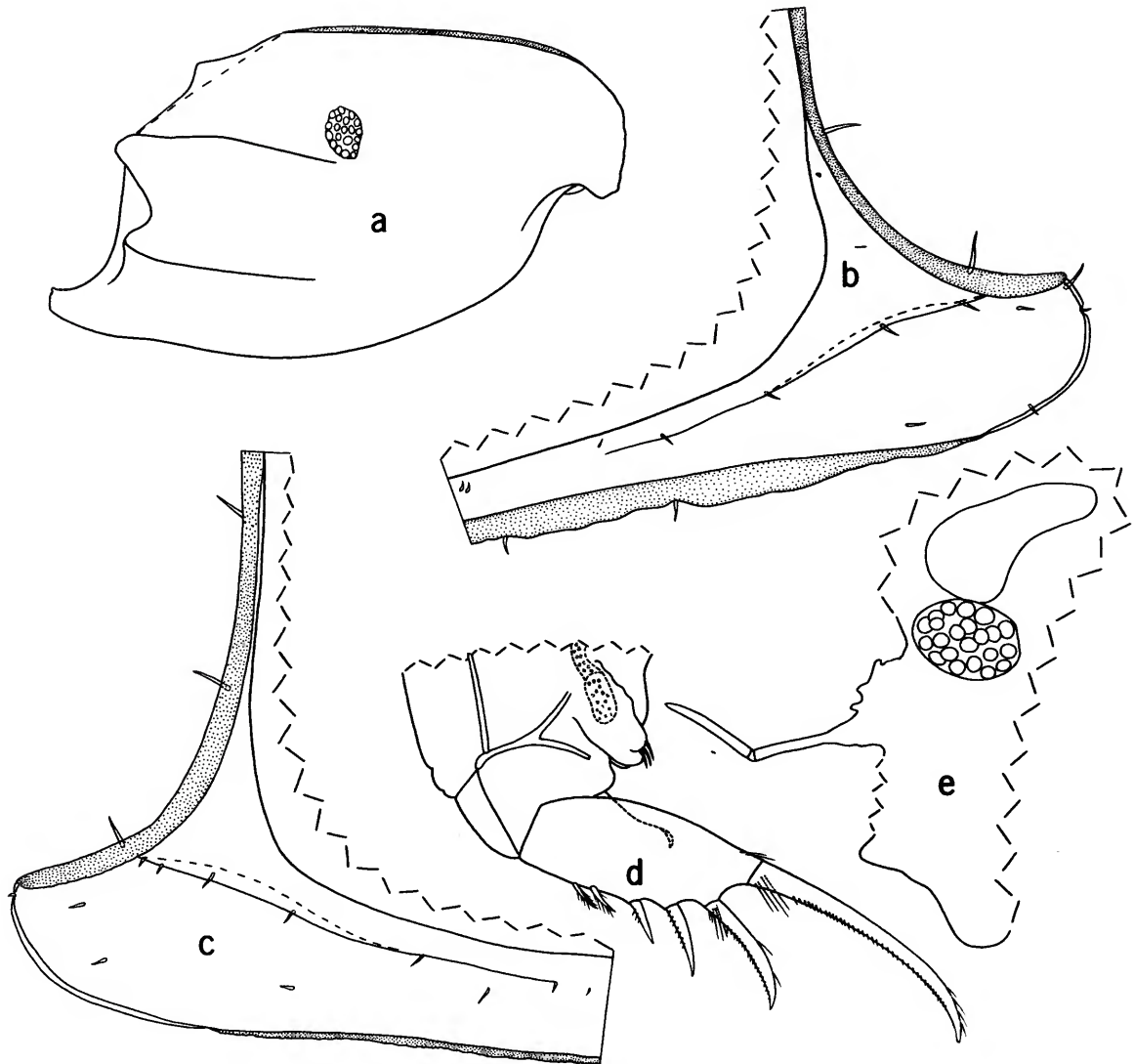


FIGURE 48.—*Rutiderma kalkei*, new species, USNM 159069B, paratype, adult male, length 1.19 mm: *a*, lateral outline of complete specimen showing right lateral eye and alar process; *b*, *c*, inside views of caudal process of right and left valves; *d*, right lamella of furca, right Y-sclerite, and right copulatory organ; *e*, anterior of body showing pear-shaped heart, left lateral eye, medial eye and bellonci organ, and upper lip.

on medial side; distal 4 with bases on lateral side and consisting of 2 small slender bristles lateral to 2 longer and stouter bristles). End joint with 1 stout claw with ventral and dorsal spines and 5 slender bristles.

*Maxilla:* Limb reduced. Endites I to III with faint bristles, some unringed, flattened, others ringed, hirsute. Precoxale and coxale with dorsal fringe of hairs; coxale with stout hirsute dorsal bristle. Basale with 1 bare dorsal bristle, 1 hirsute

medial bristle near ventral margin, and 1 short lateral bristle near base of exopodite. Exopodite short, with 2 bristles (posterior of these about twice length of other and hirsute). Endopodite: 1st joint with 1 slender alpha-bristle and 1 stout, hirsute, beta-bristle; end joint with 7 weakly developed bristles.

*Fifth Limb:* Epipodial appendage with 34 bristles. Endite I with 2 short bristles; endite II with 4 short bristles; endite III with 7 or 8 bristles. Exopodite: joints 1 and 2 each with about 4 bristles, some unringed, flattened; joint 3 with 2 stout hirsute bristles on outer lobe and 1 or 2 bristles on inner lobe; remaining joints fused, with total of about 4 bristles.

*Sixth Limb:* 2 hirsute bristles in place of epipodial appendage. Endite I with 3 bristles; endites II and III each with 2 bristles. End joint with 3 bristles (with long proximal hairs and short distal spines) on slight anterior projection followed by 4 hirsute bristles (anterior 2 of these without hairs on distal one-quarter).

*Seventh Limb:* 2 proximal bristles, 1 on each side, each with 2 or 3 bells and marginal spines; 4 terminal bristles, 2 on each side, each with 4 or 5 bells and marginal spines. Terminus with opposite combs set widely apart, each comb with 2 or 3 spinous recurved teeth.

*Furca* (Figure 48d): Similar to that of adult female, except teeth along claw 1 about same size, and main claws more slender. Few long medial hairs present on claws near base but none on lamella following claws.

*Bellonci Organ* (Figure 48e): Tapering from medial eye to wide rounded part near middle; middle part separated by suture from distal half which tapers slightly to narrowly rounded tip. (Wide middle part not shown on illustrated limb, but visible when organ flattened under cover slip.)

*Eyes* (Figure 48e): Lateral eye unpigmented, with about 20 amber ommatidia. Medial eye unpigmented, about same size as lateral eye, bare.

*Genitalia* (Figure 48d): Each copulatory limb with 2 or 3 terminal lobes bearing few small bristles.

*Y-Sclerite* (Figure 48d): Typical for genus.

*Posterior of Body* (Figure 48d): Without hairs or dorsal process.

*Heart* (Figure 48e): Pear-shaped.

*Gut Content:* USNM 159069B and 159039 with fragments of a ringed nematode.

COMPARISONS.—In lateral view the carapace of the new species *R. kalkei* resembles that of *R. gyre*, but the infold of the caudal process is quite different. The list on the caudal process of *R. gyre* bears an arc almost perpendicular to the ventral margin of the valve, whereas the middle of the arc on the caudal process of *R. kalkei* faces the ventral margin; the tip of the caudal process of *R. kalkei* is more broadly rounded than that of *R. gyre*.

### ***Rutiderma* species B**

FIGURES 49–51

This species has been collected in the vicinity of Belize by Anne C. Cohen and is to be described by her. Because of this, the species recorded here from collections in the Gulf of Mexico off South Texas is not given a formal specific name.

MATERIAL.—South Texas, transect IV, sta 4: USNM 159022-6, 1 ovigerous female + 1 juvenile; USNM 159023-2, 1 ovigerous female; USNM 159041-1, 1 adult male; USNM 159042-5, 1 adult male; USNM 159019-3, 1 adult female; USNM 159020A,B,C-3, 1 ovigerous female, 2 ovigerous females, 6 juveniles; USNM 159021-4, 6 specimens; USNM 159059-3, 2 adult females, 1 A-1 male.

DISTRIBUTION IN STUDY AREA.—Continental shelf off South Texas, 26°10'N, 97°08'W (Figure 4). Known depth 15 m (Table 1).

DESCRIPTION OF ADULT FEMALE (Figures 49, 50a–i).—Carapace with well-defined incisor formed by overhang of rostrum (Figures 49–50a–c); caudal process short but broad (Figures 49, 50a,d,e).

*Ornamentation:* 2 well-developed horizontal ribs present, 1 above and 1 below central adductor muscle attachment scars (Figures 49, 50a); posterior end of each rib not extending past posterior edge of valve; posterior and posterodorsal edge of both left and right valves without triangular process (Figure 50a). Surface of valves with

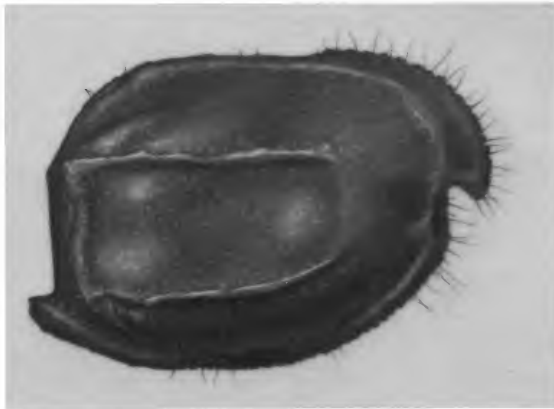


FIGURE 49.—*Rutiderma* species B, USNM 159019, adult female, length 1.11 mm, lateral view of right valve (left valve removed).

abundant round fossae (Figures 49,50a); anterior margin of rostrum scalloped (Figure 50a-c); bristles present on ventral and anterodorsal margins of valves and sparsely distributed on lateral surface.

**Infold** (Figure 50b-e): Rostral infold with 7 bristles parallel to anterior margin and 2 minute bristles at inner edge of incisur (Figure 50b); anteroventral infold with 8 bristles forming row, and 5 ridges paralleling inner edge of infold; list extending from posterior end of ventral margin near ventral edge to point near upper edge of caudal process (Figure 50d,e); middle of list facing ventral margin of valve; edge of list with 10 or 11 minute bristles; a small bristle observed on right valve of USNM 159020A on posterior infold just dorsal to caudal process (Figure 50d).

**Selvage** (Figure 50c-e): Broad lamellar prolongation of selvage along rostrum and anteroventral margin of valve with short hairs as well as groups of long hairs (Figure 50c); lamellar prolongation in vicinity of caudal process narrow, without marginal fringe; selvage divided at inner end of incisur and along posterior edge of caudal process.

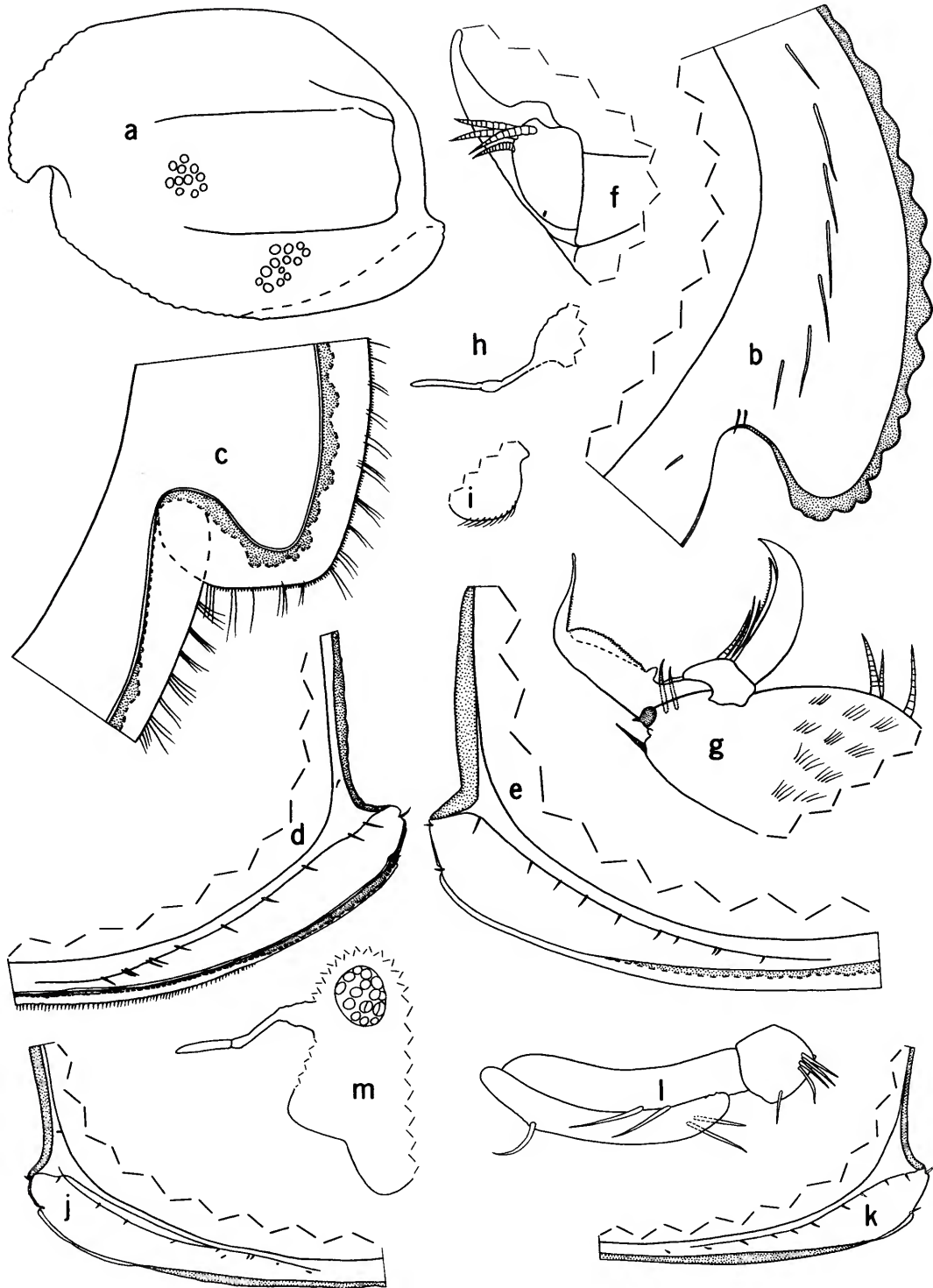
**Size:** USNM 159020B, 2 specimens, length 1.08 mm, height 0.74 mm, length 1.12 mm, height 0.77 mm; USNM 159020A, length 1.10 mm, height 0.77 mm; USNM 159059, 2 specimens, length 1.08 mm, height 0.74 mm, length 1.14

mm, height 0.78 mm; USNM 159019, length 1.11 mm, height 0.78 mm.

**First Antenna:** 1st joint with numerous spines forming rows on medial and lateral surfaces. 2nd joint with hairs along dorsal margin, spines forming rows on medial and lateral surfaces, and 2 spinous bristles (1 dorsal, 1 lateral). 3rd and 4th joints fused; short 3rd joint with 2 short spinous dorsal bristles and 1 longer, spinous, ventral bristle; long 4th joint with 1 short dorsal bristle and 2 long, spinous, ventral bristles. Long 5th joint with spines on distal ventral corner; sensory bristle with short proximal filament and bifurcate tip, each branch with minute process. Bristle of minute 6th joint short, spinous (length of bristle slightly less than width of 5th joint). 7th joint: a-bristle spinous, about one-third longer than bristle of 5th joint; b-bristle about one-third longer than a-bristle, bare; c-bristle slightly longer than sensory bristle of 5th joint, with bifurcate tip, each branch with minute terminal process (remainder of bristle obscure on specimen examined). 8th joint: d- and e-bristles bare with blunt tips, bristles slightly shorter than sensory bristle of 5th joint; f-bristle about one-fourth shorter than c-bristle, with bifurcate tip, each branch with minute terminal process; g-bristle about same length as c-bristle, with fairly long proximal filament with hairlike distal part, tip of bristle bifurcate, each branch with minute terminal process.

**Second Antenna** (Figure 50f): Protopodite bare. Endopodite 1-jointed with 4 small anterior bristles and faint minute process near posterior end of ventral margin. Exopodite: 1st joint with minute medial bristle on terminal margin; bristles of joints 2-4 fairly short, with closely spaced, blunt, ventral spines; bristles of joints 6-8 with long natatory hairs, no spines; 9th joint with 6 bristles (3 long and 1 medium with natatory hairs, 2 minute, bare medial); joints 3-7 with faint spines along distal medial edge.

**Mandible** (Figure 50g): Coxale endite bifurcate, pectinate, with long hairs at base. Basale: ventral margin with 4 proximal bristles (2 short pectinate, unringed, 1 short ringed, 1 longer, ringed, spinous); medial side near ventral margin





with short proximal bristle and 2 slender ringed bristles near middle (of these last 2 bristles, distal bristle slightly longer than other); dorsal margin with bristles forming 2 groups distal to middle, proximal of these with 1 short bristle, distal group with 2 spinous bristles (longer of these about twice length of other). 1st endopodial joint with 2 short ventral bristles, and medial spines forming rows. 2nd endopodial joint: dorsal margin with 3 short proximal bristles; medial surface with abundant spines forming rows; ventral margin with 2 bristles (1 minute and 1 short); a small, oval, medial, sclerotized process (with minute terminal bristle) present at base of stout terminal claw; dorsal margin of terminal claw with proximal tooth, serrate margin, curved, elongate slightly upturned tip; proximal half of tip with dorsal spines. 3rd endopodial joint with stout broadly curved terminal claw with serrate inner margin (serrations not shown on illustrated limb); 3 slender medial bristles near ventral end of base of claw; 1 unringed flat bristle (with serrate ventral margin) ventral to stout claw, and 2 short bristles with marginal hairs (hairs not shown on illustrated limb) located lateral to stout terminal claw of 2nd joint.

**Maxilla:** Similar to that of adult female of *Rutiderma kalkei*.

**Fifth Limb:** Epipodial appendage with 35 bristles. Endite I with 2 short bristles; endite II with

about 4 short bristles; endite III with about 6 bristles. Exopodite: 1st joint with proximal bristle followed by smooth elongate tooth and 3 stout teeth bearing secondary teeth; a proximal bristle on outer edge of joint. 2nd joint with large 3-lobed tooth (secondary teeth not present on lobes); posterior side of joint with minute bristle near outer corner, and 1 long bristle near middle. Outer lobe of 3rd joint with 2 bristles, inner lobe with 3 bristles. 4th and 5th joints fused, with total of 4 bristles.

**Sixth Limb:** Endite I with 3 bristles (1 long, 2 short); endite II with 1 bristle, endite III with 1 or 2 bristles, endite IV with 1 or 2 bristles. End joint with 3 or 4 proximal spinous bristles on low pedestal followed by hirsute bristles (anterior of the 4 bristles may have short distal spines). Epipodial appendage represented by 2 bristles (longer of these may be almost twice length of others, or only slightly longer).

**Seventh Limb:** Each limb with 4 short proximal bristles, 2 on each side, each bristle with 2 bells and marginal spines, and 6 terminal bristles 3 on each side, each bristle with 2–6 bells and marginal spines. Terminus with opposing combs (3 teeth on 1 side, about 6 on other).

**Furca:** Each lamella with 4 stout primary claws followed by 2 small secondary claws; claw 1 with anterior distal hairs and both long and short posterior teeth; claws 2–4 with posterior teeth; claws 5 and 6 with spines along both anterior and posterior margins, proximal spines much longer than others; anterior margin of lamellae with slender spines; long hairs on lamellae following claws and medially at bases of claws; claw 1 of right lamella located slightly anterior to claw 1 of left lamella.

**Bellonci Organ (Figure 50h):** Elongate, broad part with suture near middle, and with broadly pointed tip.

**Eyes:** Lateral eyes pigmented, minute, each with 4 ommatidia. Medial eye with light brown pigment, tapering distally (Figure 50h).

**Upper Lip (Figure 50i):** Hirsute rounded.

**Genitalia:** Consisting of small sclerotized oval on each side of body anterior to Y-sclerite.

**Y-Sclerite:** Typical for genus.

FIGURE 50.—*Rutiderma* species B. USNM 159020A, adult female, length 1.10 mm: *a*, lateral view of left valve showing central adductor muscle attachment scars, alar process, representative fossae near ventral margin, and dashed edge of medial infold of caudal process; *b*, inside view of anterior part of valve (lamellar prolongation of selvage not shown); *c*, inside view of anterior part of valve showing lamellar prolongation of selvage with marginal fringe (medial bristles of infold not shown); *d*, *e*, inside views of caudal process of right and left valves; *f*, endopodite and distal part of proto-podite of right 2nd antenna, medial view; *g*, 2nd and 3rd endopodial joints of mandible, medial view; *h*, medial eye and bellonci organ; *i*, upper lip, anterior toward right. USNM 159042, adult male, carapace torn (not measured); *j*, *k*, inside views of caudal process of left and right valves; *l*, endopodite of left 2nd antenna, medial view; *m*, anterior of body showing left lateral eye, medial eye and bellonci organ, and upper lip.

*Posterior of Body:* Hirsute along posterior edge. Small rounded process just dorsal to end of girdle.

*Eggs:* USNM 159020B, 2 specimens, one with single egg, other with 2 eggs.

**DESCRIPTION OF ADULT MALE** (Figures 50j–m, 51).—Incisur broader than that of female, with only slight overhang (Figure 51).

*Ornamentation:* Similar to that of female, but with more fragile carapace.

*Infold:* Rostral infold and also infold of caudal process (Figure 50j,k) similar to that of adult female.

*Selvae:* Similar to that of adult female.

*Size:* USNM 159041, length 0.98 mm, height 0.66 mm.

*First Antenna:* 1st joint with faint, short, medial spines forming few rows. 2nd joint with dorsal, medial, and lateral spines forming rows, and 2 bristles (1 dorsal, 1 lateral). 3rd and 4th joints separated by fairly well-developed suture on medial side; 3rd joint with 3 spinous bristles, 1 ventral, 2 dorsal; longer 4th joint with 4 bristles (3 ventral, 1 dorsal), and with medial spines forming rows on distal half. 5th joint small, wedged ventrally between 4th and 6th joints; sensory bristle with stout, cylindrical proximal part with abundant filaments at distal end, and distal stem with minute filament or spine near middle and bifurcate tip, each branch with minute terminal process. Elongate 6th joint with



FIGURE 51.—*Rutiderma* species B, USNM 159041, adult male, length 0.98 mm, height 0.66 mm, lateral view of complete specimen.

spinous medial bristle at distal dorsal corner (length of bristle about same as width of 6th joint). 7th joint; a-bristle stouter but about same length as bristle of 6th joint; b-bristle stout, about twice length of a-bristle, with 3 filaments (2 long, proximal to middle of bristle, 1 minute spinelike, distal to middle); c-bristle extremely long, with 10 marginal filaments. 8th joint: d- and e-bristles bare with blunt tips, about same length as b-bristle; f-bristle similar to c-bristle; g-bristle slightly longer than b-bristle, with proximal filament with spinelike tip, and minute distal spine-like filament; tip of bristle bifurcate, each branch with minute terminal process.

*Second Antenna* (Figure 50l): Protopodite bare. Endopodite 3-jointed: 1st joint with 5 or 6 short bristles (4 proximal, 1 or 2 distal); 2nd joint elongate with 2 spinous bristles near middle; 3rd joint elongate, reflexed, with 1 short proximal bristle and 2 small slender bristles near rounded tip (tip with about 6 minute ridges). Exopodite: 1st joint elongate with minute medial bristle at distal end, and short hairs forming rows along ventral and lateral surfaces; 2nd joint short, with bristle about same length as combined lengths of joints 3 to 5; bristle bearing slender ventral spines and having pointed tip; 3rd joint elongate, with long natatory bristle without spines; joints 4–9 short, decreasing in size distally; joints 4–8 each with long bristle with natatory hairs; 9th joint with 5 bristles (3 long, 1 medium, all with natatory hairs, 1 minute, bare); joints 2–8 with spines forming rows along distal lateral surface; joints 3–8 with minute basal spines; basal spine of 4th joint about one-sixth length of 5th joint. Exopodite of right limb of USNM 159042 aberrant in having only 8 joints, and in having 7th joint ventral to 8th joint).

*Mandible:* Coxale endite represented by 1 or 2 weak spines. Basale: medial side spinous, with 6 bristles (3 short, 3 long) near ventral margin (distal of these near middle of ventral margin and slightly longer than proximal bristle); dorsal margin with 3 bristles (1 short bristle near middle, 1 short and 1 long bristle distal to middle). Exopodite well developed, reaching just past middle of dorsal margin of 1st endopodial joint, tip hir-

sute. 1st endopodial joint with medial spines and 2 ventral bristles. 2nd endopodial joint: medial side spinous; dorsal margin with 3 proximal bristles; ventral margin with 6 short distal bristles (proximal 3 bristles longer and stouter than 3 distal bristles, the latter with bases on lateral side some distance from margin). End joint with 1 stout claw with ventral spines, and 5 slender ringed bristles (1 of these minute).

*Maxilla:* Limb reduced. Precoxale and coxale with fringe of dorsal hairs. Coxale with stout dorsal bristle. Endites I to III with faint bristles, some unringed, flattened, hirsute. Basale with 1 slender dorsal bristle. Exopodite short, with 2 bristles (posterior of these about twice length of other and hirsute). Endopodite: 1st joint with 1 slender alpha-bristle and 1 stout, hirsute, beta-bristle; end joint with 6 weakly developed bristles.

*Fifth Limb:* Epipodial appendage with 36 bristles. Endite I with 3 short bristles; endite II with 4 short bristles; endite III with 5 or 6 bristles (longest of these ringed and with long proximal hairs). Exopodite: joints 1 and 2 each with about 4 bristles, some unringed, flattened; joint 3 with 2 stout hirsute bristles on outer lobe, and 2 bristles on inner lobe; remaining joints fused, with total of 4 bristles.

*Sixth Limb:* Endite I with 3 bristles, endites II, III, and IV each with 2 bristles. End joint with 3 bristles on low pedestal, with short marginal spines, followed by space, then a single bristle with long proximal hairs and short distal spines, followed by space and 3 stout hirsute bristles. 2 bristles in place of epipodial appendage (longest bristle hirsute).

*Seventh Limb:* 4 short proximal bristles, 2 on each side, each bristle with 1 bell and marginal spines; 4 terminal bristles, 2 on each side, each with 4 or 5 bells and marginal spines. Terminus with opposing combs set widely apart, 1 comb with 2 recurved spinous teeth, other with 3 alar teeth.

*Furca:* Similar to that of adult female, except teeth along posterior edge of claw 1 about same size, and main claws more recurved; few long medial hairs present on claws near base but none on lamella following claws.

*Bellonci Organ (Figure 50m):* Tapering slightly from medial eye to broad segment near middle, then tapering slightly to broadly rounded tip.

*Eyes (Figure 50m):* Lateral eye unpigmented, with about 20 light amber ommatidia (not all shown in Figure 50m). Medial eye unpigmented, smaller than lateral eye.

*Upper Lip:* Evenly rounded (Figure 50m).

*Genitalia:* Each copulatory limb with 2 or 3 lobes, each with few minute bristles, 1 with small recurved sclerotized process.

*Y-Sclerite:* Ventral branch faint, dorsal branch more easily visible.

*Posterior of Body:* Hairs not visible.

*Gut Content:* USNM 159054 with fragments of ringed nematode in gut.

**COMPARISONS.**—The new species *Rutiderma* species B differs from *R. mollitum* and *R. licinum* in having 4 main claws on each lamella of the furca. It differs from *R. darbyi* in not having serrate list on the caudal process of the left valve. *Rutiderma* species B differs from *R. cohenae* in the caudal process of the left valve being broadly rounded rather than triangular. Considering only those species encountered in the study area, only *R. cohenae* and *Rutiderma* species B have a prolonged tip at the end of the terminal claw of the 2nd endopodial joint of the adult female mandible and on juveniles of both sexes.

#### ***Rutiderma* species indeterminate**

**MATERIAL.**—Florida continental shelf (Atlantic): USNM 158211, 1 early instar, sta 0269-2 (6F).

Bahamas, Andros Island: USNM 158630, 1 A-1 male, sta 72. USNM 158621, 2 juveniles, sta 91.

U.S. Virgin Islands: 16 adult males, St. Croix, Tague Bay.

Windward Islands, Barbados: USNM 171462, 1 adult male, length 0.83 mm, height 0.52 mm (this is the southernmost record of the species in the western Atlantic).

The above specimens are not included in the distribution maps or in Table 1.

## Literature Cited

- Bradford, Janet M.  
1980. First Record of a Copepod Parasitizing the Ostracod Family Rutidermatidae (Myodocopina: Cypridinacea): *Sphaeronella spinosa* n. sp. (Copepoda: Choniostomatidae). *Proceedings of the Biological Society of Washington*, 93(1):141-144, 2 figures.
- Brady, G.S., and A.M. Norman  
1896. A Monograph of the Marine and Freshwater Ostracoda of the North Atlantic and of North-Western Europe. *The Scientific Transactions of the Royal Dublin Society*, series 2, 5:621-784, plates 50-68.
- Camp, David K., Nicholas H. Whiting, and R. Erick Martin  
1977. Nearshore Marine Ecology at Hutchinson Island, Florida: 1971-1974, V: Arthropods. *Florida Marine Research Publications*, 25:1-63.
- Cohen, Anne C.  
In prep. [Myodocopid Ostracoda of Carrie Bow Cay, Belize.] Doctoral dissertation, George Washington University, Washington, D.C.
- Darby, D.G.  
1965. Ecology and Taxonomy in the Vicinity of Sapelo Island, Georgia. In *Four Reports of Ostracod Investigations*, 2: 77 pages, 11 figures, 33 plates. Ann Arbor, Mich.: University of Michigan.
- Flint, Warren R.  
1981. Gulf of Mexico Outer Continental Shelf Benthos: Macroinfaunal-Environmental Relationships. *Biological Oceanography*, 1(2):135-155, 7 figures.
- Hartmann-Schröder, Gesa, and Gerd Hartmann  
1965. Zur Kenntnis des Sublitorals der chilenischen Küste unter besonderer Berücksichtigung der Polychaeten und Ostracoden. *Mitteilungen aus dem Hamburgischen Zoologischen Museum und Institut*, 62:1-384.
- Kornicker, Louis S.  
1958. Ecology and Taxonomy of Recent Marine Ostracodes in the Bimini Area, Great Bahama Bank. *Publications of the Institute of Marine Science* (The University of Texas), 5:194-300, 89 figures.  
1975. Antarctic Ostracoda (Myodocopina). *Smithsonian Contributions to Zoology*, 163:1-720, 432 figures, 9 plates.
- 1981a. Benthic Marine Cypridinoidea from Bermuda (Ostracoda). *Smithsonian Contributions to Zoology*, 331:1-15, 10 figures.  
1981b. Revision, Distribution, Ecology, and Ontogeny of the Ostracode Subfamily Cyclasteropinae (Myodocopina: Cylindroleberididae). *Smithsonian Contributions to Zoology*, 319:1-548, 174 figures, 185 plates.  
1982. *Alternochelata lizardensis*, New Species of Myodocopine Ostracode from the Great Barrier Reef of Australia (Rutidermatidae). *Proceedings of the Biological Society of Washington*, 95(4):793-806, 6 figures.
- Kornicker, Louis S., and Francisca Elena Caraion  
1978. West African Myodocopid Ostracoda (Sarsiellidae, Rutidermatidae). *Smithsonian Contributions to Zoology*, 250:1-110, 59 figures, 33 plates.
- Kornicker, Louis S., and Brad Myers  
1981. Rutidermatidae of Southern California (Ostracoda: Myodocopina). *Smithsonian Contributions to Zoology*, 334:1-35, 20 figures.
- McKenzie, K.G.  
1965. Myodocopid Ostracoda (Cypridinacea) from Scammon Lagoon, Baja California, Mexico and Their Ecologic Associations. *Crustaceana*, 9(1):57-70, 6 figures.
- Pequegnat, Willis E., and Linda H. Pequegnat  
1970. Station List for Benthic and Midwater Samples Taken by R/V *Alaminos* 1964 to 1969. In W.E. Pequegnat and F.A. Chace, Jr., editors, *Contributions on the Biology of the Gulf of Mexico*. *Texas A&M University Oceanographic Studies*, 1:1-16, 2 figures.
- Poulsen, E.M.  
1965. Ostracoda-Myodocopa, 2: Cypridiniformes-Rutidermatidae, Sarsiellidae and Asteropidae. In *Dana Report*, 65:1-484, 156 figures. Copenhagen: Carlsberg Foundation.

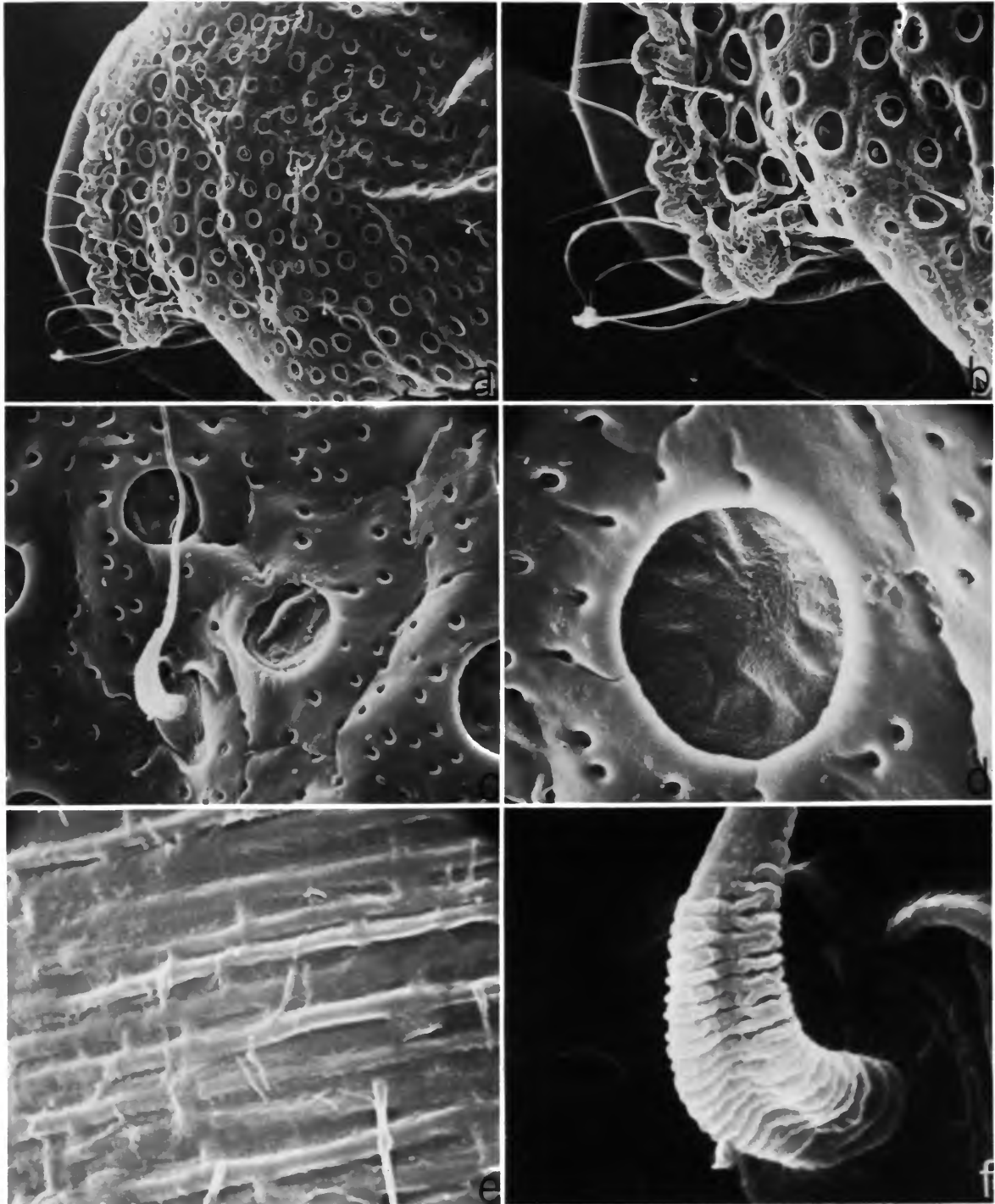


PLATE 1.—*Rutiderma darbyi*, new species, USNM 152851, paratype, adult male, length 1.12 mm, left valve, outside views: *a*, anterior showing rostrum, surface fossae, bristles, and lamellar prolongation of selvage,  $\times 250$ ; *b*, detail from *a*,  $\times 475$ ; *c*, detail from near middle of *a*, showing bristle, fossae, and pits between fossae,  $\times 1900$ ; *d*, detail from *a*, showing single fossa and pits,  $\times 3420$ ; *e*, detail from *b*, showing surface of lamellar prolongation near upper edge of rostrum,  $\times 10,000$ ; *f*, detail of base of bristle shown in *c*,  $\times 10,000$ . (Micrographs reduced to 84% for publication.)

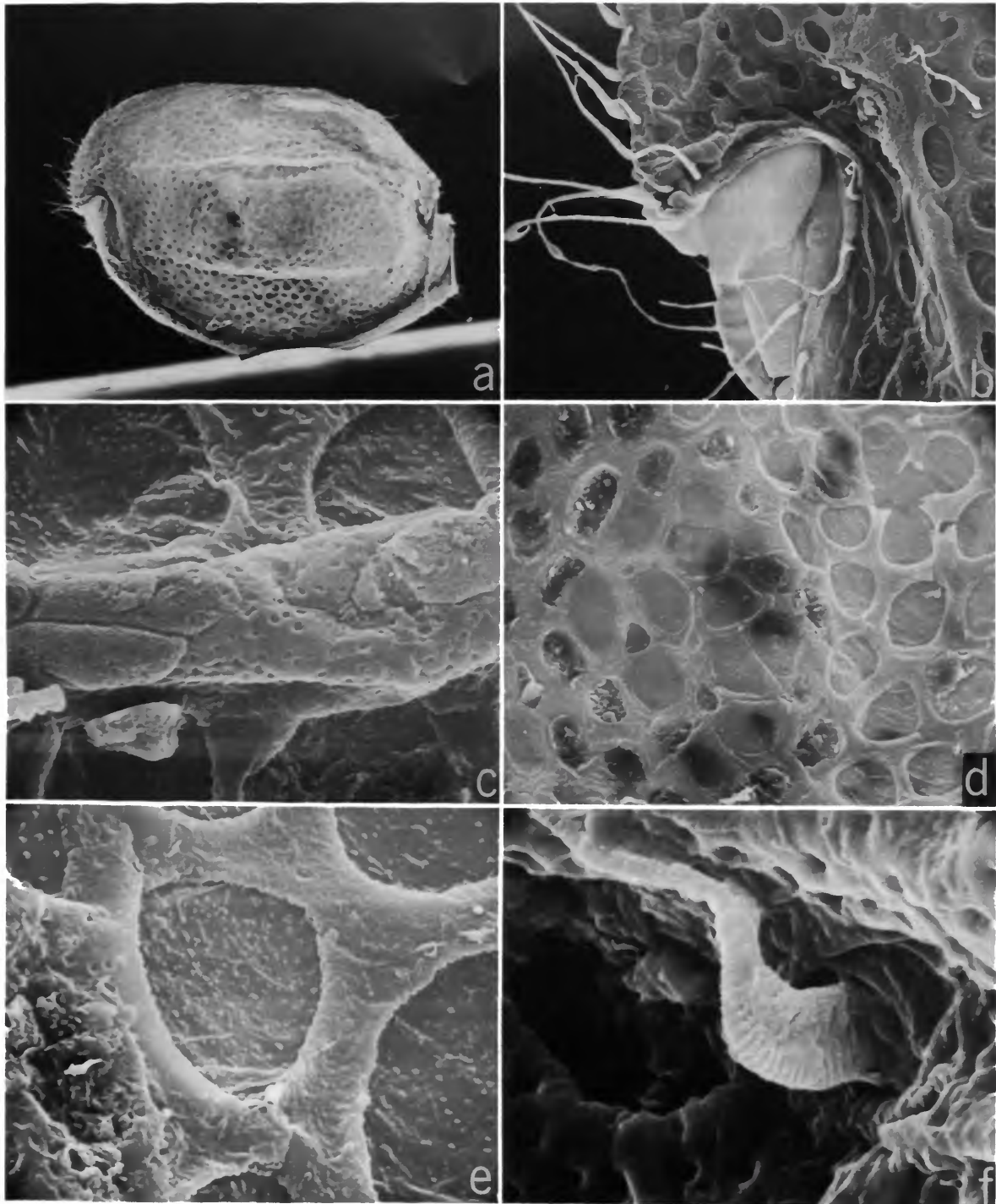


PLATE 2.—*Rutiderma licinum*, new species, USNM 154187, paratype, adult female, length 1.02 mm, left valve, outside views: *a*, entire left valve,  $\times 79$  (posterior end distorted); *b*, detail from *a*, showing incisur and lamellar prolongation of selvage,  $\times 500$ ; *c*, detail from *a* showing part of upper horizontal rib, fossae, and pits between fossae,  $\times 2000$ ; *d*, detail from *a* showing fossae in vicinity of central adductor muscle attachments,  $\times 500$ ; *e*, details from *d*, showing fossae,  $\times 2000$ ; *f*, detail from *b*, showing proximal part of bristle just above inner end of incisur,  $\times 5000$ . (Micrographs reduced to 84% for publication.)

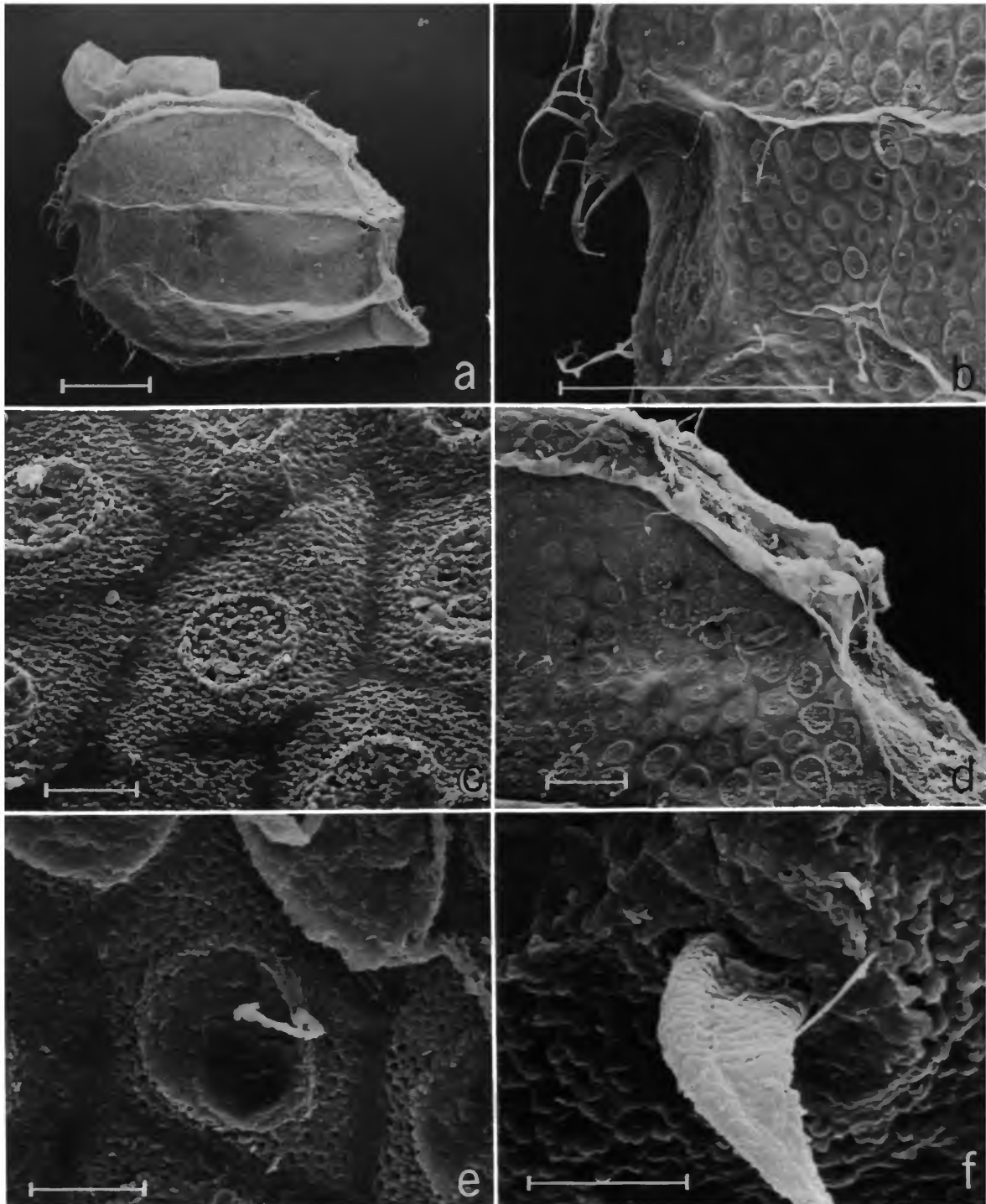


PLATE 3.—*Rutiderma gyre*, new species, USNM 154185, paratype, adult female, length 1.10 mm, left valve, outside view: *a*, entire valve,  $\times 90$  (details somewhat distorted); *b*, anterior of valve in vicinity of incisur,  $\times 300$ ; *c*, detail from *d* showing fossae containing debris,  $\times 2000$ ; *d*, detail from *a* showing posterodorsal edge of valve,  $\times 335$ ; *e*, detail from middle of *d* showing fossae,  $\times 2500$  (white object near middle may be debris); *f*, detail from lower part of *b* showing base of bristle,  $\times 6800$ . (Scales: *a*, *b* = 200  $\mu\text{m}$ ; *c*, *e* = 10  $\mu\text{m}$ ; *d* = 50  $\mu\text{m}$ , *f* = 5  $\mu\text{m}$ ; micrographs reduced to 84% for publication.)









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**Formal tables** (numbered, with captions, boxheads, stubs, rules) should be submitted as carefully typed, double-spaced copy separate from the text; they will be typeset unless otherwise requested. If camera-copy use is anticipated, do not draw rules on manuscript copy.

**Taxonomic keys** in natural history papers should use the aligned-couplet form for zoology and may use the multi-level indent form for botany. If cross referencing is required between key and text, do not include page references within the key, but number the keyed-out taxa, using the same numbers with their corresponding heads in the text.

**Synonymy** in zoology must use the short form (taxon, author, year:page), with full reference at the end of the paper under "Literature Cited." For botany, the long form (taxon, author, abbreviated journal or book title, volume, page, year, with no reference in "Literature Cited") is optional.

**Text-reference system** (author, year:page used within the text, with full citation in "Literature Cited" at the end of the text) must be used in place of bibliographic footnotes in all Contributions Series and is strongly recommended in the Studies Series: "(Jones, 1910:122)" or "... Jones (1910:122)." If bibliographic footnotes are required, use the short form (author,

brief title, page) with the full citation in the bibliography.

**Footnotes**, when few in number, whether annotative or bibliographic, should be typed on separate sheets and inserted immediately after the text pages on which the references occur. Extensive notes must be gathered together and placed at the end of the text in a notes section.

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**Some points of style:** Do not use periods after such abbreviations as "mm, ft, USNM, NNE." Spell out numbers "one" through "nine" in expository text, but use digits in all other cases if possible. Use of the metric system of measurement is preferable; where use of the English system is unavoidable, supply metric equivalents in parentheses. Use the decimal system for precise measurements and relationships, common fractions for approximations. Use day/month/year sequence for dates: "9 April 1976." For months in tabular listings or data sections, use three-letter abbreviations with no periods: "Jan, Mar, Jun," etc. Omit space between initials of a personal name: "J.B. Jones."

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