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Review Article

Review and Catalog of the Ostracode Family Rutidermatidae (Crustacea: Myodocopa)

Elizabeth Harrison-Nelson,[1] John M. Orr,[2] Margaret E. Tarmann,[1] and Louis S. Kornicker[1]

[1] *Department of Invertebrate Zoology, National Museum of Natural History, Smithsonian Institution, Washington, DC 20013-7012, USA*
[2] *Department of Environmental Science and Policy, George Mason University, 4400 University Drive, MSN 5F2, Fairfax, VA 22030-4444, USA*

Correspondence should be addressed to Louis S. Kornicker, kornickl@si.edu

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Cohen and Kornicker (1987) presented a catalog of species of the Rutidermatidae that had been published prior to March 1986. The present contribution includes one additional subfamily, one additional genus, and twelve additional species (one new) and, also, keys to subfamilies, genera, and species, illustrations of carapaces, tables giving characteristics of appendages, and maps showing distribution of species.

1. Introduction

Family Rutidermatidae belongs to the subclass Myodocopa, order Myodocopida. Order Myodocopida can further be divided into the three suborders Cladocopina, Halocyprid-ina, and Myodocopina. The Rutidermatidae is one of five extant families included in the ostracod suborder Myo-docopina. It contains two subfamilies: the Rutidermatinae with three genera (*Alternochelata* with four species, *Ruti-derma* with 37 species, and *Scleraner* with two species) and the Metaschismatinae with one genus (*Metaschisma* with two species). Cohen and Kornicker [1] published a catalog of species of the Rutidermatidae that had been reported prior to March 1986. Since then, an additional subfamily and genus as well as 12 new species have been included in the family, and taxa have been reported from additional localities. We have updated the catalog to August 2009 and have included keys and appendices to help compare and identify the species in this family. Keys are used with care; determination of species should always be verified by use of the descriptions and figures. A tabular key to families of Myodocopida was given in Cohen and Morin [2, Appendix 3] and in Cohen et al. [3, Table 4].

Class Ostracoda Latreille 1806

Superorder Myodocopa Sars 1866

Order Myodocopida Sars 1866

Suborder Myodocopina Sars 1866

Family Rutidermatidae Brady and Norman 1866

Composition. The Rutidermatidae includes two subfamilies, the Rutidermatinae (with three genera, *Alternochelata*, *Ruti-derma*, and *Scleraner*) and the Metaschismatinae (with one genus, *Metaschisma*).

Description. Carapace oval in lateral view with male more elongate than female; surface punctate or smooth; prominent ribbing absent in *Scleraner*, present in most species of *Rutiderma*; projecting caudal process in some species, absent in others; rostrum generally rounded anteriorly; incisur minute in some species and forming small indentation creating overhanging rostrum in others; rostrum of adult male more prominent than that of adult female and juveniles.

First antenna: The third and fourth segments fused in females of some species, separated by suture in adult male; fifth segment long in female and juveniles, small in adult male; sensory bristle of adult female either bare or with few short filaments, of adult male with broad proximal part with numerous long slender filaments; sixth segment of juveniles and adult female minute and fused with fifth segment, of

male long and with suture separating it from fourth and fifth segments; a-bristle of seventh segment not claw-like; d- and e-bristles of eighth segment about same length, bare with blunt tips; c-bristle of seventh segment and f-bristle of eighth segment of female about same length as d- and e-bristles, of adult male extremely long and with numerous short filaments.

Second antenna: Protopodite without distal medial bristle; endopodite of female small with 1 segment in *Rutiderma* and 2 in *Scleraner*, of male 3-segmented and reflexed in both genera; exopodite of female with natatory hairs on long bristles of segments 6–9, of male on long bristles of segments 3–9, of juveniles without natatory hairs on bristles.

Mandible with long narrow hirsute exopodite on male, rudimentary or absent on female; second endopodial segment of female broad with stout ventral claw forming pincer with stout claw of third endopodial segment, of adult male second endopodial segment narrow without stout claw, and with long narrow claw on third endopodial segment.

Maxilla of female stout with 3 endites; exopodial segments of male with bristles; female with stout teeth on first exopodial segment, and broad flat tooth on second exopodial segment. Second thoracic leg well-developed in both sexes but with fewer bristles on male; terminus with opposing combs.

Furca of *Rutiderma* with 3 or 4 stout claws followed by 2 or 3 secondary claws, of *Scleraner* with 4 stout claws followed by 5 secondary claws, of *Alternochelata* with secondary claws between main claws.

Bellonci organ elongate, 1 or 2 segmented, with rounded or pointed tip. Lateral eyes of female small with 4 or 5 ommatidia, of male larger with 14–30 ommatidia.

Medial eye large, pigmented, with dorsal filaments on some species of *Rutiderma*.

Copulatory organ of adult male elongate terminating in small lobes bearing minute processes and bristles (Kornicker [4, page 171]).

Biology. Juveniles and adult females are carnivores eating mostly crustaceans and worms; guts of adult males generally are empty or have little food. Members of the family have 4 juvenile instars; carapaces of instars of both sexes are similar and generally resemble that of the adult female. The adult male is a more efficient swimmer than the female and is occasionally collected in the water column without females; it is generally sparser than the female in collections from substrate; juveniles of both sexes, which are without natatory hairs on the exopodial bristles of the second antenna, are restricted to the bottom (Kornicker [4, page 171]).

Distribution. Members of the family are widespread between latitudes of 45°N and 53°S at mostly shelf depths (0–200 m), but they also have been collected on the upper slope (200–1100 m). *Rutiderma* and *Scleraner* have been collected in the Subantarctic and are absent in the Antarctic (Kornicker [4, page 171]). Tables 1–4 list Rutidermatidae distribution by hemisphere, ocean, locations and depths, and water temperatures and salinities, for those species for which data are available.

Table 1: Rutidermatidae distribution by hemisphere.

Northern Hemisphere	Southern Hemisphere
A. nealei	*A. lizardensis*
A. polychelata	*M. nex*
A. sikorai	*R. arx*
R. apex	*R. dux*
R. arcuatilis	*R. exrex*
R. chessi	*R. ferax*
R. cohenae	*R. gerdhartmanni*
R. compressa	*R. ovate*
R. darbyi	*R. rex*
R. dinochelata	*R. sagax*
R. flex	*R. tryx*
R. fusca	*S. chacaoi*
R. gyre	*S. trifax*
R. hartmanni	
R. irrostrata	
R. judayi	
R. leloeuffi	
R. licina	
R. lomae	
R. kalkei	
R. mollitum	
R. mortenseni	
R. normani	
R. pax	
R. rostrata	
R. rotunda	
R. schroederi	
R. sterreri	
R. tridens	
R. vox	

Comparisons. Species are mapped in Figure 10 (*Alternochelata*, *Scleraner*, and *Metaschisma*), and Figures 11, 12 and 13 (*Rutiderma*). The Rutidermatidae is the only family having mandibles of juveniles and adult females with a stout claw on the second endopodial segment forming a pincer with the stout claw of the third endopodial segment. A stout claw is absent on the second endopodial segment of the mandible of the adult male (Kornicker [4, page 171]).

Ecology. Some abiotic variables that influence the distribution of living marine ostracods are substrate, temperature and salinity, depth, abundance and seasonality.

Klie [5, pages 404, 406 (substrate)], Kornicker [6, pages 195, 202, 217, 222, 223-224, 236–238 (response to light, substrate, temperature, salinity)], Hartmann [7, page 39 (substrate)], Hartmann-Schröder in Hartmann-Schröder and Hartmann [8, pages 30, 31 (substrate)], McKenzie [9, pages 58–60 (substrate, temperature, salinity, productivity)], Poulsen [10, pages 22, 31, 35 (substrate)], Lie [11, pages 274, 288, 550 (substrate)], Lie and Kisker

Table 2: Rutidermatidae distribution by ocean.

Atlantic Ocean	Pacific Ocean	Indian Ocean
A. sikorai	*A. lizardensis*	*R. arx*
A. nealei	*M. nex*	*R. dux*
A. polychelata	*R. apex*	*R. exrex*
R. darbyi	*R. chessi*	*R. ferax*
R. arcuatilis	*R. dux*	*R. fusca*
R. cohenae	*R. gerdhartmanni*	*R. rex*
R. compressa	*R. hartmanni*	*R. sagax*
R. dinochelata	*R. judayi*	
R. flex	*R. lomae*	
R. gyre	*R. normani*	
R. hartmanni	*R. ovate*	
R. irrostrata	*R. pax*	
R. kalkei	*R. rostrata*	
R. leloeuffi	*R. rotunda*	
R. licina	*R. tryx*	
R. mollitum	*R. vox*	
R. mortenseni	*S. chacaoi*	
R. schroederi	*S. trifax*	
R. sterreri		
R. tridens		

[12, page 2279 (substrate, community)], Kornicker [13, pages 25, 29, 30, 37 (substrate, temperature)], Kornicker and Meyers [14, pages 2, 4, 10, 19, 25 (substrate, temperature)], Kornicker [15, page 793 (substrate, salinity)], Kornicker [16, pages 4, 7, 11, 12, 24, 70, 85 (substrate, temperature, salinity)].

Substrate. The Rutidermatidae has been collected on a variety of substrates including sand, shelly sand, shell, gravel, ooze, eel grass in tide pools, corals, oyster shells, red sponge, algae, clay, silty clay, plankton, mud, muddy sand, Gorgonacea, and under rocks [1] but are most commonly found on a sand substrate, which may facilitate burrowing. Grabe et al. [17] found that the densities of eight species of myodocopid ostracods excluding rutidermatids were positively correlated with a silt-clay substrate but the density of *R. darbyi* was not.

Temperature and Salinity. Rutidermatidae has been collected in water temperatures ranging from 9.8° to 32°C, salinities from 30 to 42‰ [1], and dissolved oxygen levels from 2.5 to 9.2 mg/l [18]. When collected from Tampa Bay, *R. darbyi* was more abundant at greater depth, in coarser sediment, and in more saline water than was average for the bay suggesting that *R. darbyi* enters the bay from the Gulf of Mexico [18].

Depth. The Rutidermatidae has been collected as deep as 560 m. Deeper records exist but they are questionable [1]. *Alternochelata nealei* was purportedly collected from 1100 m but the sample contained species of Cyclasteropinae and Asteropteroninae that were confined to continental shelf depths in the area [19]. Kornicker [13] reported a single *R. ovata* collected at 1834 m but the sample contained many cypris larvae and euphausiids which were inconsistent with the reported method of collection.

Biology: Reproduction. Rutidermatids are usually confined to the continental shelf (0–200 m depth) but are occasionally collected on the upper continental slope (200–1100 m depth). Males and females may be collected at different depths. In some species, females become completely benthic after mating by breaking bristles off the second antenna [16], whereas males typically remain free-swimming. Deep water may pose a barrier to their distribution as they are generally not collected around isolated island systems or Antarctica which has a deep continental shelf. Cohen [20] found that rutidermatids were abundant at a shallow lagoon site but uncommon at a deeper fore-reef site. Grabe et al. [17], however, collected fewer *R. darbyi* from shallow subtidal stations than from deeper stations offshore [21, pages 184-185, 196, 199].

Abundance. Large concentrations of rutidermatids have been found in a specific area. For example, rutidermatids were the most abundant family of ostracods collected in Belize [20], where *R. dinochelata* was the most abundant species, accounting for 32.4% of the myodocopids collected from a lagoon. *R. darbyi* was the second most abundant ostracod collected in Tampa Bay, accounting for 19.8% of the ostracods sampled [18]. *R. darbyi* and *R. mollitum* were the third and fourth most numerous ostracod species in samples taken off Florida [22].

Seasonality. In Florida, the abundance of *R. darbyi* was correlated with the seasons [17]. Horsley [22] found the abundance of myodocopid ostracods, including rutidermatids, was greater in May and June (193 rutidermatids sampled) than in December (100 rutidermatids sampled).

2. Catalog of the Rutidermatidae

General Works. Skogsberg [23, pages 31, 33, 156, 159, 165, 166, 168, 171, 173, 195], Mertens [24, Plates 6, 10], Poulsen [25, pages 5, 11, 13, 339, 365], Poulsen [10, pages 5–18, 47–50, 52, 56, 146, 147, 155, 451–454, 457, 464, 465, 468, 481–483, Figure 152, Tables 2, 3] Hartmann [26, pages 95, 166, 168, 176, 183, 184–185, 193, 200, 207–209], Hartmann and Puri [27, page 14], Hartmann [28, pages 671 (key to the suborder Myodocopa), 681 (diagnosis)], Kornicker [13, pages 34, 35, 37, 38, 41, 42-43, 46, 48, 52, 53, 83–84, 645–646, Tables 13, 15, 16, 17, 18, Figures 4, 9, 10, 11, 12, 15, 17, 22, 23], Kornicker and Cohen [29, Table 1], Kornicker [30, pages 1, 30–36, 42, 43, 46–49, 52, 53, 55–57, 63, 66, 67, Tables 8, 15], Kornicker [31, page 5], Kornicker and Meyers [14, pages 1, 2], Kornicker [16, pages 1, 12, 16, Table 1], Kornicker [19, page 2], Kornicker [32, pages 174–178, Figure 113], Kornicker [33, Table 3], Maddocks et al. [34, page 282], Cohen and Kornicker [1, pages 1–8], Hartmann and Petersen [35, pages 157, 158], Cohenand Morin

Table 3: Rutidermatidae species locations and depths.

	Location	Depth (m)
Western Atlantic Region		
Alternochelata polychelata	Bahamas; Belize	1–5
Alternochelata sikorai	Gulf of Mexico	61–137.2
Rutiderma arcuatilis	Virgin Islands	9
Rutiderma cohenae	Key West; Bahamas; Belize	Subtidal-4
Rutiderma darbyi	East coast USA; Gulf of Mexico; Belize; Bahamas	Intertidal-168
Rutiderma dinochelata	East coast USA; Bahamas; Belize	Intertidal-20
Rutiderma flex	Bahamas	25
Rutiderma gyre	Florida Shelf; Gulf of Mexico	6.1–148
Rutiderma hartmanni	Belize	1.5, 18–30
Rutiderma kalkei	Gulf of Mexico	91
Rutiderma. licina	East coast USA; Gulf of Mexico	17–68
Rutiderma mollitum	East coast USA; Gulf of Mexico	5.4–190
Rutiderma mortenseni	Virgin Islands	?
Rutiderma schroederi	Bahamas	67, 90–100
Rutiderma sterreri	Bermuda	Intertidal-11
Eastern Atlantic Region		
Alternochelata nealei	West coast Africa	53–560, 1100?
Rutiderma compressa	West coast Europe	150
Rutiderma irrostrata	Mauritania	94–250
Rutiderma. leloeuffi	Ivory Coast; Mauritania	20–150
Rutiderma tridens	Mauritania	30
Indo-West Pacific Region		
Alternochelata lizardensis	Lizard Island Group, Australia	Intertidal-12.3
Metaschisma nex	New South Wales, Australia	204
Rutiderma arx	Madagascar; Comoros; Mozambique	Reef flat-31
Rutiderma dux	Darwin, Australia; Lizard Island, Australia	Intertidal
Rutiderma exrex	Madagascar	Infralittoral-27
Rutiderma ferax	Madagascar	Residual pool
Rutiderma fusca	Red Sea	Surface
Rutiderma normani	Thailand, Philippines	2–17
Rutiderma rex	Comoros	26
Rutiderma sagax	Darwin, Australia	Intertidal
Rutiderma tryx	Lizard Island, Australia	1.5
Rutiderma vox	Enewetak Atoll, Marshall Islands	3–7
Scleraner trifax	New South Wales, Australia	204–400
East Pacific Region		
Rutiderma apex	California	1.8–5.2, 9.1–11
Rutiderma chessi	San Clemente Island, California	?
Rutiderma gerdhartmanni	Chile	12
Rutiderma hartmanni	Pearl Islands, Panama	9
Rutiderma judayi	California; Baja California, Mexico	7–21
Rutiderma lomae	California	Surface
Rutiderma ovata	Chile	176–192, 1834?
Rutiderma pax	El Salvador	12
Rutiderma rostrata	California; Baja California, Mexico	11–22
Rutiderma rotunda	California; Baja California, Mexico	0.3–22
Scleraner chacaoi	Chile	190

Table 4: Rutidermatidae water temperatures and salinities.

Species	Temperature (°C)	Salinity
Alternochelata polychelata	~29	37
Rutiderma dinochelata	~29	31–42
Rutiderma judayi	18.5–25	34–37
Rutiderma leloeuffi	28.9	34.4
Rutiderma lomae	9.8	
Rutiderma mollitum	32	30, 35
Rutiderma rotunda	18.5	34–37
Scleraner chacaoi	~11	

[21, pages 184, 185, 195–196, 199, Table 2], Morin et al. [36, pages 3-4, Table 1], Kornicker [37, pages 114, 190, 192 (continental shelf of Australia)], Parker [38, pages 633, 650], Parker [39, pages 95, 104], Kornicker [40, pages 680-681], Kornicker [41, pages 268, 270–272], Kornicker [42, pages 798, 800, 808, Figure 11A], Kornicker and Harrison-Nelson [43, pages 426–428, 455-456, 460, 465, 467, Figure 1, Tables 1, 7–9], Kornicker et al. [44, page 82, Table 1], Cohen in Cohen et al. [3, page 432, Table 4, Plate 187: B,C, Plate 188: A,B], Frame et al. [45, page 337].

Keys. Müller [46, pages 34, 35 (*Rutiderma*)], Poulsen [10, pages 17-18 (*Rutiderma*)], Kornicker [13, Key to Families: pages 83, 646 (south of latitude 35°S)], Kornicker and Caraion [47, page 54], Kornicker and Cohen [29, page 500], Kornicker and Myers [14, pages 3, 4 (Southern California coast)], Kornicker [16, pages 16, 25 (genera worldwide, species of SE North America and Gulf of Mexico)], Cohen et al. [3, Table 4], Cohen and Morin [2, Appendix 3].

Regional Works. Continental Shelf Southeastern North America, northern half Gulf of Mexico, Bahama Islands, Andros Island, Bimini Islands, U.S. Virgin Islands, Windward Islands, Barbados, West Indies and Bermuda, Kornicker [16, pages 1–89], Bermuda, Maddocks et al. [34, pages 280–288], Northwest Pacific Ocean: Marshall Islands-Enewetak and Bikini Atolls, Kornicker [48, pages 78–84], Indian Ocean: NE Mozambique Channel, Kornicker [49, 123–144], Darwin, Northern Territory, Australia Lizard Island, Great Barrier Reef, Palfrey Island (Lizard Island Group), Queensland, Australia, Kornicker [50, pages 93-94], North Pacific, Pillar Point Harbor, Half Moon Bay, California, Kornicker and Harrison-Nelson [51, pages 36–45], Tuléar Reef Complex, SW Madagascar, Kornicker and Thomassin [52, pages 73–92], Gulf of Mexico: Florida-Tampa Bay, Grabe [18, page 62, Tables 2–5], Harrison-Nelson et al. [53, pages 873-874], Scripps Coastal Reserve and Cortez Street in La Jolla, California, Frame et al. [45, page 332].

Biology: *Reproduction*. Cohen and Morin [21, pages 184-185, 196, 199].

Parasites. Choniostomatid copepods found in *Rutiderma darbyi* and *R. sterreri*.

Life history and ontogeny. Key to instars of *Rutiderma darbyi* Kornicker and Harrison-Nelson [43, page 456].

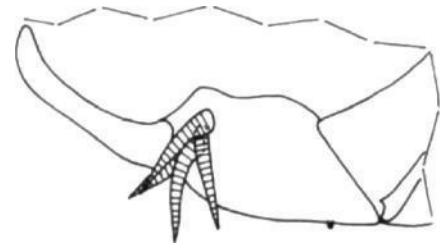
3. Key to the Genera of Rutidermatidae (Adapted from Kornicker and Caraion page 54 of [47])

1. Furca with secondary claws alternating with primary (*Alternochelata*)

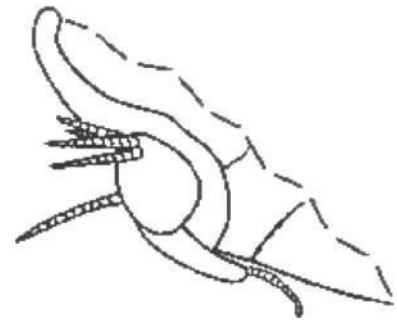
Furca with secondary claws following primary claws (2)

Furca with some claws alternating and some not. (See also Table 9) (*Metaschisma*)

2. Endopodite of female second antenna with 1 segment (*Rutiderma*)



Endopodite of female second antenna with 2 segments. (See also Table 9) (*Scleraner*)



3.1. Alternochelata Kornicker [6]. Rutiderma (Alternochelata) Kornicker [6, pages 236–238] (type-species, by monotypy: *Rutiderma (Alternochelata) polychelata* Kornicker [6]; gender: feminine), Poulsen [10, pages 11, 17], Hartmann and Puri [27, page 14 (mentions)].

Alternochelata. McKenzie [9, page 62], Hartmann in Hartmann-Schröder and Hartmann [8, page 328], Hartmann [28, page 681], Kornicker [13, pages 645, 646, 678], Kornicker [54, page 40 (mentions)], Kornicker and Caraion [47, page 66 (keys)], Kornicker and Meyers [14, page 2], Kornicker [16, pages 12, 16 (Key to species of *Rutiderma*), Table 1], Cohen and Kornicker [1, page 2], Kornicker [37, pages 114, 123], Kornicker and Harrison-Nelson [43, pages 465, 467].

Distribution. Atlantic: Great Bahama Bank; northern Gulf of Mexico; off Mauritania and Western Sahara. Pacific: Great Barrier Reef, Australia; coast of Chile.

Habitat. Marine, benthic, from 1–5600 m (questionable record at 1100 m; Kornicker [16, page 16]) on substrates of sand, muddy sand, mud, and Gorgonacea.

Life History and Ontogeny. From 1 to 6 brooded eggs, broken swimming bristles on adult females of *A. sikorai*, *A. nealei*, and *A. lizardensis*.

4. Key to the Species of *Alternochelata* Kornicker [6]

(See also Tables 5 and 6).

1. Carapace with rounded posteroventral corner; each lamella of furca with main 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*)

   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*)

4.1. Rutidermatinae Brady and Norman [55]

4.1.1. Alternochelata lizardensis Kornicker [15] (Figures 1(a)–1(c)). Alternochelata lizardensis Kornicker [15, pages 793–805, Figures 1–6], Kornicker [16, pages 12, 16, (key), 25], Cohen and Kornicker [1, page 2], Kornicker and Harrison-Nelson [43, page 467, Tables 8, 9].

Holotype. USNM 158609, adult female.

Type Locality. Lizard Island main lagoon, undisturbed sand flat, depth 6 m, Great Barrier Reef, Australia.

Distribution. North Atlantic, viz. the Great Bahama Bank (Kornicker [6, page 237]), off Mauritania (Kornicker and Caraion [47, page 66]), and Lizard Island Group, Great Barrier Reef, Australia.

Habitat. Benthic; from low intertidal to 12.3 m; sand flat near coral reef.

Life History and Ontogeny. Adult male and female, A-1 male, 4 to 6 eggs, broken swimming bristles on females.

Comparisons. *Alternochelata lizardensis* differs from *A. nealei* in that the carapace bears a distinct caudal process; also, furcal claws 1, 2, 3, 5 of *A. nealei* are primary claws, whereas claw 3 is a secondary claw on the furca of *A. lizardensis*. The furca of *A. lizardensis* does not have a secondary claw between 2 sets of primary claws as on *A. polychelata* (Kornicker [15, page 805]).

4.1.2. Alternochelata nealei Kornicker and Caraion [47] (Figures 1(d)-1(e)). Alternochelata nealei Kornicker and Caraion [47, pages 3–6, 66–73, Table 1, Figures 1–3, 56–59], Kornicker and Myers [14, page 2 (mentions)], Kornicker [16, pages 12, 16 (key), 24, 25], Cohen and Kornicker [1, page 2], Kornicker and Harrison-Nelson [43, pages 467, Tables 8, 9].

Alternochelata neali Kornicker [15, page 805 (compares to *A. lizardensis*; misspelling)].

Holotype. "Grigore Antipa" 293, Female, Museum of Natural History, Bucharest, Romania.

Type Locality. Station X013, 19°46′00″N, 17°08′00″W; 61 m; Islamic Republic of Mauritania.

Distribution. Northeast Atlantic off Mauritania and Western Sahara.

Habitat. Benthic, shelf-bathyal, from 53 to 560 m (questionable record at 1100 m); mud, muddy sand, Gorgonacea washings, and sand substrates.

Life History and Ontogeny. Adult male and female, from two to three eggs, female with broken natatory bristles.

Comparisons. The species *A. nealei* differs from *A. polychelata*, Kornicker [6], in not having a distinct caudal process on the carapace. Also, the main claws of the furca are claws 1–3, 5 on *A. nealei* and claws 1, 2, 4, 6 on *A. polychelata* (Kornicker and Caraion [47, page 73]).

4.1.3. Alternochelata polychelata (Kornicker [6]) (Figure 1(f)). Rutiderma (Alternochelata) polychelata Kornicker [6, pages 232, 237, 238, Figures 46:6A-B, 59A–E, 86C–G], Poulsen [10, pages 7, 8, 17, 18, 43], Cohen [20, page 326], McKenzie [9, page 62 (inferred)], Kornicker and Caraion [47, pages 66, 73 (compares to *A. nealei*)], Kornicker [15, pages 793, 805 (compares to *A. lizardensis*)], Kornicker [16, pages 11–14, 16 (key), 17, 25, Table 1, Figures 1, 5].

Rutiderma polychelata. Hartmann in Hartmann-Schröder and Hartmann [8, page 328 (mentions)] .

Alternochelata polychelata. Kornicker [33, Table 3], Kornicker [41, 42, Table 1], Kornicker and Harrison-Nelson [43, page 467, Tables 8, 9], Kornicker et al. [56, Table 3].

Holotype. USNM 122908.

Type Locality. Station 110F-2, Bimini Islands, Bahama Islands.

Distribution. Bimini, Bahamas; Caribbean Sea, Belize.

Habitat. Benthic; from 1 to 5 m; calcareous sand, mangroves (*Avicennia*); about 29°C, about 37‰ salinity.

Life History and Ontogeny. Sex of holotype and paratype unknown.

Comparisons. *Alternochelata polychelata* differs from *A. nealei* in having a distinct caudal process on the carapace, and while, on *A. nealei*, the main claws of the furca are 1–3, and 5, on *A. polychelata*, the main claws are 1, 2, 4, and

Table 5: Summary of characteristics of mature females in *Alternochelata*.

Species	*lizardensis*	*nealei*	*polychelata*	*sikorai*
Shell length, mm	1.36	1.18 mm	1.37	1.27
Surface with ribs (r) or smooth (s)	s	s	s	s
Incisur shallow or deep	*Deep	*Deep	*Deep	*Deep
No. of medial br. on rostrum	(11–12)	7	?	6
1st antenna				
no. of br. 2nd seg., d-la	1–1–0	1–1–1	?	1–1–1
no. of br. 3rd seg., d.-v	1–1	1–1	?	1–1
no. of br. 4th seg., d.-v	1–3	1–3	?	1–3
no. of fil. on sens. br.	3	1	?	1
no. of fil. on b.-br	1	0	?	0
no. of fil. on c.-br.	3	1	?	1
no. of fil. on g.-br.	3	1	?	1
2nd antenna				
endop. no. of br.	6	5	(5–6)	5
endop. no. of br. on 2nd seg.	2	1	?	1
endop. no. of br. on 3rd seg.	0, when present	abs.	?	abs.
Mandible				
coxale + or − bifurcate endite	+	+	?	+
basale, no. of d. br. mid.-dist.	3	3	4	3
basale, no. of thin v. br.	*3	*3	?	*5
basale, no. of stout v. br.	*3	*3	?	*2
basale, total no. of v. br.	6	6	7	7
1st end. seg., no. of v. br.	3	2	2	3
2nd end. seg., no. of d. br.	7	(5–6)	5	7
2nd end. seg., no. of v. br. excl. claw	2	2	4	2
3rd end. seg., no. of br. excl. claw	5	5	3	5
Maxilla, no. of br. on the 3 endites	3–2–4	7–4–(5–6)	?	8–5–7
5th limb				
no. of br. on the 3 endites	2–4–8	2–3–4	?	3–5–5
ex. seg., no. of primary teeth	2	3	?	3
2nd ex. seg., no. of teeth	2	3	?	3
2nd ex. seg., + or − bi-or trifurcate teeth	+	+	?	+
3rd ex. seg., no. of br. on each lobe	2–2	3–2	?	3–2
4th + 5th segs. no. of br.	5	(3-4)	?	(2–4)
6th limb				
no. of epipodial br.	2	2	?	(2–3)
no. of br. endites	3–3–4–3	3–3–3–2	?	3–3–3–2
end-seg., no. of br.	8	7	?	(6-7)
7th limb				
no. of terminal cleaning br.	3–3	3–3	3–3	3–3
no. of prox. cleaning br.	2–2	2–2	2–2	(1-2)–2
no. of comb-teeth	9–3	11–0	2–5	14–0
Furca, no. of main claws	4	4	4	4
Furca, no. of secondary claws	6	6	2	6
Lateral eyes, + or −	+	−	+	−
Specimen Number, # = USNM	#158488	#141269	#122908	#158027

abs.: absent; br.: bristles; d: dorsal; dist.: distal; endop.: endopodite; ex.: exopod; fil.: filaments; no.: number; prox.: proximal; seg.: segment; sens: sensory; ?: unknown; v: ventral, *: after Poulsen [10].

Table 6: Summary of characteristics of *Alternochelata* male.

Species	*lizardensis*	*nealei*	*sikorai*
Shell length, mm	1.36	1.38	1.38
Surface with ribs (r) or smooth (s)	s	s	s
Incisur shallow or deep	*Deep	*Deep	*Deep
No. medial br. rostrum			
(rostral infold)	?	7	6
1st antenna			
no. br. 2nd seg., d.-l.-v.	1–1	1–1–1	1–1–1
no. br. 3rd seg., d.-v	1–1	1–1	1–1
no. br. 4th seg., d.-v	1–4	1–4	1–4
no. fil. sens. br.	Numerous	33	Numerous
no. fil. b.-br	3	3	3
no. fil. c.-br.	13	12	13
no. fil. g.-br.	3	(1–2)	1
2nd antenna			
endop. no. br. 1st seg.	6	6	6
endop. no. br. 2nd seg.	2	2	2
endop. no. br. 3rd seg.	3	2	2
Mandible			
Basale			
no. d. br. mid.-dist.	3	3	3
no. thin v. br.	*6	?	*5
no. stout v. br.	*0	?	*3
total no. v. br.	6	8	8
exop. + or −	−	+	−
1st end. seg., no. v. br.	3	3	3
2nd end. seg., no. d. br.	7	7	7
2nd end. seg., no. v. br. excl. cl.	6	6	6
3rd end. seg., no. br. excl. cl.	6	5	6
Maxilla, no. br. 3 endites	6–4–4	6–6–7	(5-6)–4–6
5th limb			
no. br. 3 endites	3–4–7	2–(2-3)–(4-5)	(2–4)–4–5
3rd exop. seg., no. br. each lobe	3–2	2–2	2–2
5th limb, 4th + 5th segs. no. br.	5	4	(3-4)
6th limb			
no. epipodial br.	2	2	2
no. br. 4 endites	(3-4)–(3-4)–4–3	2–3–3–2	3–3–3–(1-2)
end.-seg., no. br.	9	7	6
7th limb			
no. terminal cleaning br.	2–2	2–2	2–2
no. prox. cleaning br.	2–2	2–2	(1-2)–2
no. comb-teeth	9–2	(11–13)–0	13–0
Furca			
no. main claws	4	4	4
no. secondary claws	5	6	6
Copulatory limbs long or short (sh.)	sh.	*sh.	?
USNM Specimen Number	#158487	#156596	#158935

br.: bristles; cl.: claw; d.: dorsal; dist.: distal; endop.: endopodite; excl.: excluding; exop.: exopodite; fil.: filaments; l.: lateral; no.: number; prox.: proximal; seg.: segment; sens: sensory; v.: ventral. *: after Poulsen [10].

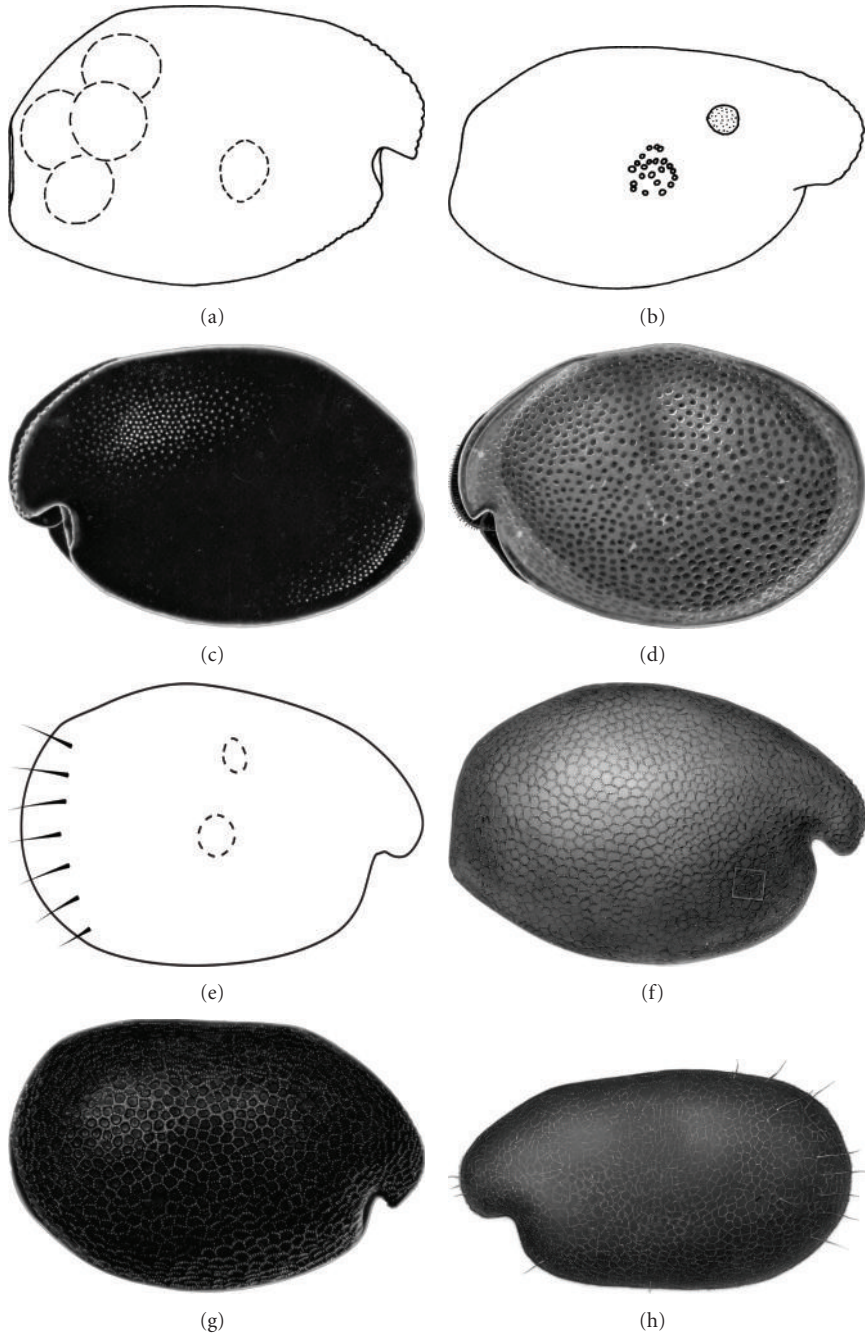


Figure 1: (a) *Alternochelata lizardensis*, ovigerous female, 1.43 mm. (b) *A. lizardensis*, male, 1.36 mm. (c) *A. lizardensis*, A-1 male, 1.29 mm. (d) *A. nealei*, female, 1.18 mm. (e) *A. nealei*, male, 1.27 mm. (f) *A. polychelata*, female, 1.37 mm. (g) *A. sikorai*, female, 1.27 mm. (h) *A. sikorai*, male, 1.38 mm.

6. Furcal claw distribution also distinguishes *A. polychelata* from *A. lizardensis* in that *A. polychelata* has secondary claws between two sets of primary claws. *Alternochelata polychelata* also has a more rounded posteroventral corner of the shell than *A. sikorai.*

4.1.4. Alternochelata sikorai Kornicker [16] (Figure 1(g)–1(h)). *Alternochelata sikorai* Kornicker [16, pages 1, 7–10, 12–14, 16 (key), 17–25, Table 1, Figures 1 (distribution), 6–9], Kornicker [33, Table 3], Kornicker and Harrison-Nelson [43, page 467, Tables 8, 9], Harrison-Nelson and Kornicker [53, page 874].

Alternochelata species A. Flint [57, Figure 4].

Holotype. USNM 158027, adult female.

Type Locality. Station EFG-2, in vicinity of East Flower Garden, continental shelf off Texas, 27°53′N, 93°38′W, depth 112 m.

Distribution. Gulf of Mexico, off Louisiana and Texas.

Habitat. Benthic; from 61 to 137.2 m.

Life History and Ontogeny. Adult male and female, 1 to 3 eggs; broken swimming bristles on female.

Comparisons. The species *A. sikorai* is closely related to *A. nealei*, 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 *A. polychelata*, and the posteroventral corner of the shell is more rounded (Kornicker [16, pages 24-25]).

4.2. Metaschismatinae Kornicker [37]. Metaschismatinae Kornicker [37, page 123], Kornicker and Harrison-Nelson [43, page 428].

Diagnosis and Description. Kornicker [37, page 123].

Distribution. Off Nowra, New South Wales, Australia, depth 204 m.

General Habitat. Benthic; upper continental slope (Kornicker [37, Appendix 1]).

4.2.1. Metaschisma Kornicker [37]. Metaschisma Kornicker [37, page 123 (monotypic; type-species, *Metaschisma nex*)], Kornicker and Harrison-Nelson [43, pages 465, 467].

Distribution. Off Nowra, New South Wales, Australia.

Habitat. Marine; benthic; 204 m, on substrate of coarse shell.

Life History and Ontogeny. From 3 to 6 brooded eggs, broken swimming bristles on adult females of *M. nex.* Instar A-1 male with short bristles without natatory hairs on exopod of second antenna.

4.2.2. Metaschisma nex Kornicker [37] (Figure 2(a)). Metaschisma nex Kornicker [37, pages 123–128, 192, Figures 69–71, 111b, Tables 1, 2, Appendices 1, 2], Kornicker and Harrison-Nelson [43, page 467, Tables 1, 8].

Holotype. NMV J35600, ovigerous female, in collection of Museum of Victoria, Abbottsford, Australia.

Type Locality. Slope 1, 34°59.52′S, 151°5.94′E, off Nowra, New South Wales, 204 m.

Distribution. Type locality only.

Habitat. Upper slope, 204 m; coarse shell.

Life History and Ontogeny. Adult female, A-1 male, late juveniles; ovigerous females with 3 to 6 eggs; swimming bristles of adult female broken, juveniles with short swimming bristles without natatory hairs.

4.3. Rutidermatinae Brady and Norman [55]

4.3.1. Rutiderma Brady and Norman [55]. Rutiderma Brady and Norman [55, pages 623, 627, 640–642, 673] (type species, by monotypy: Brady and Norman [55, gender neuter]), Juday [58, page 147 (diagnosis)], Müller [59, pages 90–92 (diagnosis, compares to other genera)], Müller [46, pages 24, 34, 35 (diagnosis, key)], Skogsberg [23, pages 165–168, 173 (systematic position)], Kornicker [6, pages 236, 237 (diagnosis of subgenus *Rutiderma*)], Hartmann et al. [60, page 328 (compares to *Alternochelata*)], McKenzie [9, pages 57, 62 (diagnosis, compares to *Alternochelata*)], Poulsen [10, pages 6–17 (diagnosis, general), keys to species of males, females: pages 17, 18, (key) 22, 38, 43 (map), 52, 453, 456, Figures 1b, c, 13 (maps of distribution of species), 151c, 152B], Hartmann [26, pages 95, 129, 165, 183, 184], Hartmann [28, pages 588 (found in the Red Sea), 589 (in sand and mixed substrate), 591 (found in Chile), 681], Kornicker [13, pages 645–648, 678 (diagnosis, compares to other genera, Key to Genera, Key to Antarctic Species)], Kornicker [54, page 40], Kornicker [31, pages 1, 5], Kornicker and Myers [14, pages 1, 2 (diagnosis, keys to Southern California species, adult females and males)], Bonaduce et al. [61, page 474, (Red Sea) Figure 2(4)], Kornicker [16, pages 1, 12, 16, 25, Table 1, Key (Key to species of western North Atlantic and Gulf of Mexico)], McCain [62, page 99 Appendix 1 (Arabian Gulf)], Kornicker [63, pages 1, 3, 24, 25, 26 (Bay of Panama, Pacific Ocean)], Kornicker [33, (western North Atlantic and Gulf of Mexico), Table 3], Kornicker [49, page 123 (Indian Ocean)], Kornicker [37, pages 114, 123 (southeastern Australian continental shelf)], Parker [39, page 105], Kornicker and Harrison-Nelson [43, pages 426, 428, 429, 465, 467], Oakley and Cunningham [64, Figure 1 (mentions)], Oakley [65, page 184].

Type Species. *Rutiderma compressa* Brady and Norman [55, page 673].

Distribution. This genus is cosmopolitan between the latitudes of 45°N and 53°S, at depths from intertidal to 317 m (questionably to 1834 m), and contains about 37 species (Cohen and Kornicker [1, page 2], Kornicker [49, page 123], Kornicker [50, page 22]).

Life History and Ontogeny. Key to Instars I–IV, male, female (Kornicker [49, page 123]).

5. Key to Species of *Rutiderma* (Females)

See also Tables 3, 4, 7, 8 (males), 10, 11 (juveniles).

1. Surface of valves smooth	(*R. arx*)
Surface of valves with ribs	(2)
2. Second segment of the first antenna with 1 bristle	(3)
Second segment of the first antenna with 2 bristles	(5)
3. Carapace length approximately 1.1 mm	(*R. tryx*)
Carapace length around 1.5 mm or greater	(4)
4. Incisur shallow	(*R. compressa*)
Incisur deep	(*R. schroederi*)
5. Third segment of the first antenna with 2 bristles	(6)
Third segment of the first antenna with 3 bristles	(8)
6. Lateral eye present	(7)
Lateral eye absent	(*R. irrostrata*)

7. Sensory bristle of first antenna with 1 filament	(*R. sterreri*)
Sensory bristle of first antenna lacking filaments	(*R. leloeuffi*)
8. Sensory bristle of first antenna with no filaments	(9)
Sensory bristle of first antenna with filaments	(11)
9. Furca with 4 primary claws and 2 secondary claws	(*R. dinochelata*)
Furca with 3 primary claws and 3 secondary claws	(10)
10. Second endopodial segment of mandible with 4 dorsal bristles	(*R. normani*)
Second endopodial segment of mandible with 3 dorsal bristles	(*R. licina*)
11. Lateral eyes absent	(12)
Lateral eyes present	(15)
12. Sixth limb with 2 bristles instead of epipodial appendage	(13)
Sixth limb with 1 bristle instead of epipodial appendage	(14)
13. Carapace length approximately 1 mm	(*R. pax*)
Carapace length approximately 1.46 mm	(*R. lomae*)
14. Carapace length slightly less than 1 mm	(*R. vox*)
Carapace length much greater than 1 mm, around 1.3 mm	(*R. rostrata*)
15. Furca with 4 primary claws and 2 secondary claws	(21)
Furca with 3 primary claws and 3 secondary claws	(16)
16. Carapace length less that 1 mm	(*R. rex*)
Carapace length well above 1 mm	(17)
17. Incisur shallow and barely noticeable	(18)
Incisur pronounced and deep	(19)
18. Rostral infold with 7 bristles	(*R. rotunda*)
Rostral infold with 8–12 bristles	(*R. mollita*)
19. Seventh limb with a total of 7 comb teeth	(20)
Seventh limb with around 20 comb teeth	(*R. ovata*)
20 C-bristle on first antenna bare, with no filaments	(*R. gerdhartmanni*)
C-bristle on first antenna with 1 filament	(*R. ferax*)
21. Incisur shallow	(*R. exrex*)
Incisur deep	(22)
22. Rostral infold with 10 bristles	(23)
Rostral infold with less than 10 bristles	(25)
23. Sensory bristle on first antenna with 3 bristles	(*R. chessi*)
Sensory bristle on first antenna with 1 bristle	(24)
24. C-bristle on first antenna bare	(*R. apex*)
C-bristle on first antenna with 2 filaments	(*R. arcuatilis*)
25. Sensory bristle with 5 filaments	(*R. cohenae*)
Sensory bristle with only 1 or 2 filaments	(26)
26. Exterior of carapace with bristles on the ventral and anterodorsal margins	(27)
Exterior of carapace with no bristles	(30)
27. Fifth limb with 5 bristles on the fourth and fifth segments	(*R. dux*)
Fifth limb with 3 or 4 bristles on the fourth and fifth segments	(28)
28. C-bristle of first antenna with 1 filament	(29)
C-bristle of first antenna lacking filaments	(*R. hartmanni*)
29. Rostrum and incisur with sharp angle and sharp tip	(*R. kalkei*)
Rostrum and incisur with a smooth rounded angle and rounded tip	(*R. oakley*)
30. Carapace has very pronounced horizontal ribs with high relief	(31)
Carapace with less pronounced horizontal ribs	(32)
31. C-bristle of first antenna lacks filaments	(*R. judayi*)
C-bristle of first antenna with 1 filament	(*R. sterreri*)
32. List of caudal process of left valve serrate along anterior and ventral margins	(*R. darbyi*)
List of caudal process of left valve not serrate.	(*R. gyre*)

5.1. Rutiderma apex Kornicker and Harrison-Nelson [51] (Figures 2(b)-2(c))

5.1.1. Rutiderma sp. Tuel et al. page 155 of [66] . Rutiderma apex. Kornicker and Harrison-Nelson [51, pages 4, 36–45, Figures 2, 6, 7, 19–25 (compares to other species), Tables 1–3], Kornicker and Harrison-Nelson [43, Tables 1, 8, 9], Oakley [67, Figure 1 (mentions)], Oakley [65, Figures 1, 2, 3, Tables 1, 2], Cohen et al. [3, page 432, Plate 187: B,C, Plate 188: A, B].

Holotype. USNM 158263, ovigerous female.

Type Locality. Pillar Point Harbor, Half Moon Bay, California, Station 9A (Dec).

Distribution. California coast: Stations 5–9, Pillar Point Harbor, Half Moon Bay, depth range from1.8 to 5.2 m; Dark Gulch, 39°14.5′N, 123°45.8′W, Mendocino County, depth from 9.1 to 11 m; Tomales Bay, near Spud Pt. Marina, Bodega Harbor.

Habitat. Clayey silt and sand.

Life History and Ontogeny. Adult male, A-1 male, and female, from 3 to 4 eggs.

Comparisons. The surface ornamentation of *R. apex* resembles that of *R. judayi* McKenzie [9], except that the female is without a small process near the middle of posterior margin that projects past the posterior end of the valve. The length of the female carapace of *R. judayi* is from 0.95

Table 7: Summary of characteristics of mature females in *Rutiderma*.

(a)

Species	*apex*	*arcuatilis*	*arx*	*chessi*	*cohenae*	*compressa*	*darbyi*
Shell length, mm	1.18	1.02	1.43	1.21	1.24	1.6	1.28
Surface with ribs (r) or smooth (s)	r	r	s	r	r	r	r
Incisur shallow or deep	*Deep	*Deep	*Shallow	*Deep	*Deep	*Shallow	*Deep
No. of medial br. on rostrum (infold)	10	10	7–8	10	7–8	?	7
1st antenna							
no. of br. 2nd seg., d-la	1–1	1–1	1–1	1–1	1–1	1–0	1–1
no. of br. 3rd seg., d.-v	2–1	2–1	2–1	2–1	2–1	?	2–1
no. of br. 4th seg., d.-v	1–2	1–2	1–2	1–2	1–2	1–2	1–2
no. of fil. on sens. br.	1	1	2	3	5	?	2
no. of fil. on b.-br	0	0	0	0	0	?	0
no. of fil. on c.-br.	0	2	1	1	2	?	2
no. of fil. on g.-br.	1	2	2	1	3	?	1
2nd antenna							
endop. no. of br.	4	4	5	4	5	4	4
Mandible							
coxale + or − bifurcate endite	+	+	+	+	+	+	+
basale, no. of d. br. mid.-dist.	3	3	3	3	3	?	3
basale, no. of thin v. br.	2	4	3	*3	5	?	*5
basale, no. of stout v. br.	4	3	4	*3	2	?	*2
basale, total no. of v. br.	6	7	7	6	7	?	7
1st end. seg., no. v. br.	2	2	2	2	2	?	2
2nd end. seg., no. of d. br.	3	3	4	3	4	?	3
2nd end. seg., no. of v. br. excl cl..	5	1 or 2	5	2 or 3	2	?	3
3rd end. seg., no. of br. excl. cl.	4	6	3	6	6	?	6
Maxilla, no. br. on the 3 endites	2–3–4	?	(2–4)–(2–4)–(3–5)	(2-3)–(2-3)–(2-3)	6–4–8	?	6–5—6
Fifth limb							
no. br. on the 3 endites	2–6–(6-7)	15	3–5–7	3–5–7	5–6–10	?	(3-4)–5–(5-6)
ex. seg., no. primary teeth	4	4	*4	*4	*4	4	4
2nd ex. seg., no. teeth	3	2	*3	*3	*3	3	*3
2nd ex. seg., + or − bi-or trifurcate teeth	+	+	+	+	+	?	+
3rd ex. seg., no. br. on each lobe	2–2	3–2	3–2	3–2	2–2	?	2—3
4th + 5th segs. no. br.	5	5	4	4	4	4	4
Sixth limb							
no. epipodial br.	2	2	2	1 or 2	2	2	2
no. br. on the 4 endites	3–2–2–2	3–3–2–3	(2-3)–2–3–(3-4)	3–2–2–2	3–3–(2–4)–3	2–2–3–2	3–2–2–3
end-seg., no. br.	7	7	6	7	7	7	7
7th limb							
no. terminal cleaning br.	3–3	3–3	3–3	3–3	3–3	3–3	3–3
no. prox. cleaning br.	2–2	2–2	2–2	2–2	2–2	2–2	2–2
no. comb-teeth	6–6	5–4	4–(5-6)	5–3	3–5	1–5	10–4
Furca, no. of main claws	4	4	3	4	4	3	4
Furca, no. of secondary claws	2	2	3	2	2	3	2
Lateral Eyes, + or −	+	+	+	+	+	+	+
Specimen Number, # = USNM	#158262	#158212	#193411	#158280	#158414	∗	#158628A

(b)

Species	*dinochelata*	*dux*	*exrex*	*ferax*	*gerdhartmanni*	*gyre*	*hartmannii*
Shell length, mm	1.18	0.99	0.99	1.16	1.36	1.1	1.12
Surface with ribs (r) or smooth (s)	r	r	r	r	r	r	r
Incisur shallow or deep	*Shallow	*Deep	*Shallow	*Deep	*Deep	*Deep	*Deep
No. of medial br. on rostrum (infold)	8	6–7	5–6?	8?	13	7–9	7–8
1st antenna							
no. of br. 2nd seg., d-la	1–1	1–1	1–1	1–1	1–1	1–1	1–1
no. of br. 3rd seg., d.-v	2–1	2–1	2–1	2–1	2–1	2–1	2–1
no. of br. 4th seg., d.-v	1–2	1–2	1–2	1–2	1–2	1–2	1–2
no. of fil. on sens. br.	0	1	2	3	2	1	1
no. of fil. on b.-br	0	0	0	0	0	0	0
no. of fil. on c.-br.	0	0	1	1	0	1	0
no. of fil. on g.-br.	1	1	2	2	1	1	1
2nd antenna							
endop. no. of br.	4	3–4	1 or 4	5	4	4	4
Mandible							
coxale + or − bifurcate endite	+	+	+	+	+	+	+
basale, no. of d. br. mid.-dist.	?	3	3	3	3	4	3
basale, no. of thin v. br.	?	5	*5	*3	4?	*2	4
basale, no. of stout v. br.	?	3	*2	*4	2?	*4	2
basale, total no. of v. br.	?	8	7	7	6	6	6
1st end. seg., no. v. br.	?	2	2	2	2	2	2
2nd end. seg., no. of d. br.	?	3	4	3–4	3	3	3
2nd end. seg., no. of v. br. excl. cl.	?	4	4	4	4	2	3
3rd end. seg., no. of br. excl. cl.	?	4	3	3	3	6	4
Maxilla, no. br. on the 3 endites	9	3–3–4	?	?	6–5–6	3–3–3	2–3–3
Fifth limb							
no. br. on the 3 endites	?	3–3–5	3–4–6	?	4–4–7	(2-3)–5–8	3–7–4
ex. seg., no. primary teeth	?	4	4	*4	4	4	4
1st ex. seg., no. teeth	?	3	3	*3	3	3	3
2nd ex. seg., + or − bi-or trifurcate teeth	?	+	+	+	+	+	+
3rd ex. seg., no. br. on each lobe	2–2	3–2	3–2	3–2	3–2	2–3	2–2
4th + 5th segs. no. br.	4	5	4	4	3–4	4–5	4
Sixth limb							
no. epipodial br.	?	2	2	2	2	1–2	2
no. br. on the 4 endites	?	3–2–2–(2-3)	3–2–2–2	3–2–3–2	(2-3)–2–3–3	3–2–2–(2-3)	2–2–3–2
end-seg., no. br.	?	7–8	6	6	7	7–8	7
7th limb							
no. terminal cleaning br.	3–3	3–3	3–3	3–3	3–3	3–3	3–3
no. prox. cleaning br.	2–2	2–(1-2)	(1-2)–(1-2)	2–2	2–2	2–2	2–2
no. comb-teeth	1–2	(2-3)–(2-3)	(3-4)–(3-4)	3–4	5–2	*?4–2	1–5
Furca, no. of main claws	4	4	*4?	3	3	4	4
Furca, no. of secondary claws	2	2	*3?	3	3	2	2
Lateral Eyes, + or −	?	+	+	+	+	+	+
Specimen Number, # = USNM	#122907	#194087	#194254	(1)	ZMH 27297	#154185	#158219

(c)

Species	*irrostrata*	*judayi*	*kalkei*	*leloeuffi*	*licina*	*lomae*	*mollita*
Shell length, mm	1.5	1.01	1.08	1.99	1.02	1.46	1.46
Surface with ribs (r) or smooth (s)	r	r	r	r	r	r	r
Incisur shallow or deep	Deep	*Deep	*Deep	*Deep	*Deep	*Deep	*Shallow
No. of medial br. on rostrum (infold)	?	7	7–8	4	6–7	10–12	8–12
1st antenna							
no. of br. 2nd seg., d-la	1–1	1–1	1–1	1–1	1–1	1–1	1–1
no. of br. 3rd seg., d.-v	1–1	2–1	2–1	1–1	2–1	2–1	2–1
no. of br. 4th seg., d.-v	1–2	1–2	1–2	1–2	1–2	1–2	1–2
no. of fil. on sens. br.	0	1	1	0	0	3	3–4
no. of fil. on b.-br	0	0	0	0	0	0	0
no. of fil. on c.-br.	0	0	1	0	1	0–1	0–1
no. of fil. on g.-br.	0	1	1	0	1	0	2–3
2nd antenna							
endop. no. of br.	4	4	4	4	4	5	4
Mandible							
coxale + or − bifurcate endite	2	(2–5)	(2–5)	(2–4)	(2–5)	(2–5)	(2–5)
basale, no. of d. br. mid.-dist.	+	+	+	+	+	+	+
basale, no. of thin v. br.	3	3	3	2	3	3	3
basale, no. of stout v. br.	4	*2	3	2	2	*2	*3
basale, total no. of v. br.	6	6	4	6	2	5	7
1st end. seg., no. of v. br.	3	2	2	3	2	2	2
2nd end. seg., no. of d. br.	2	3	3	3	3	3	4
2nd end. seg., no. of v. br. excl. cl.	1	2	2	1	3	2	3
3rd end. seg., no. of br. excl. cl.	5	6?	6	5	6	6	6
Maxilla, no. of br. on the 3 endites	(5-6)–(5-6)–7	?	(2-3)–(2-3)–(2-3)	(4–7)–4–5	6–5–8	5–4–(6-7)	5–5–5
5th limb							
no. of br. on the 3 endites	2–3–4	?	3–6–6	2–3–4	3–5–6	2–6–6	3–5–8
ex. seg., no. of primary teeth	*2	4	*4	4	*4	4	4
2nd ex. seg., no. of teeth	*3	3	*3	3	*3	3	3
2nd ex. seg., + or − bi-or trifurcate teeth	+	+	+	+	+	+	+
3rd ex. seg., no. of br. on each lobe	2–2	3–2	2–3	3–2	3–(1 or 2)	3–2	3–2
4th + 5th segs. no. of br.	4	4	3–4	4	4	5	4
6th limb							
no. of epipodial br.	2	2	2	2	2	2	2
no. of br. on the 4 endites	1–2–2–3	2–2–2–2	(2-3)–2–2–3	3–2–2–2	3–1–(2-3)–(2-3)	2–1–2–2	3–2–4–3
end-seg., no. of br.	7	7	7–8	7	7	7	7
7th limb							
no. of terminal cleaning br.	7	3–3	2–3 or 3–3	2–3	2–3 or 3–3	3–3	3–3
no. of prox. cleaning br.	3–2	2–2	1–1	2–2	2–2	2–2	2–2
no. of comb-teeth	2–2	3–2	?	!8	(2-3)–(2-3)	5–3	11–7
Furca, no. of main claws	*3–3	4	4	3	3	4	3
Furca, no. of secondary claws	3	2	2	3	3	2	3
Lateral Eyes, + or −	−	+	+	?	+	−	+
Specimen Number, # = USNM	#152826	#158221	#159079	#149330	#152851	#158258	#158001

(d)

Species	*normani*	*ovata*	*pax*	*rex*	*rostrata*	*rotunda*	*schroederi*
Shell length, mm	1.2	1.52	1	0.92	1.32	1.33	1.73
Surface with ribs (r) or smooth (s)	r	r	r	r	r	r	r
Incisur shallow or deep	*Deep	*Deep	*Deep	*Shallow	*Deep	*Shallow	*Deep
No. of medial br. on rostrum (infold)	5	4?	7	?	7–9	7	17
1st antenna							
no. of br. 2nd seg., d-la	1–1	1–1	1–1	1–1	1–1	1–1	1–0
no. of br. 3rd seg., d.-v	2–1	2–1	2–1	2–1	2–1	2–1	2–1
no. of br. 4th seg., d.-v	1–2	1–2	1–2	1–2	1–2	1–2	1–2
no. of fil. on sens. br.	0	2	1	3	1	3	1
no. of fil. on b.-br	0	0	0	0	0	0	0
no. of fil. on c.-br.	0	0?	1	1	1	1	0
no. of fil. on g.-br.	1	1	1	2	1	2	2
2nd antenna							
endop. no. of br. 1st seg	4	4	4	4	4	4	5
endop. no. of br. 2nd seg	abs.	abs.	abs.	abs.	abs.	abs.	abs.
endop. no. of br. 3rd seg	abs.	abs.	abs.	abs.	abs.	abs.	abs.
endop. no. of br. w/o setules	(2–5)	(2–5)	(2–5)	(2–5)	(2–5)	(2–5)	(2–5)
Mandible							
coxale + or − bifurcate endite	+	+	+	+	+	+	+
basale, no. of d. br. mid.-dist.	3	3	3	3	3	3	3
basale, no. of thin v. br.	4	*5	*5	*3	*5	*5	*5
basale, no. of stout v. br.	2	*2	*2	*4	*2	*2	*3
basale, total no. of v. br.	6	7	7	7	7	7	7–8
1st end. seg., no. of v. br.	2	2	2	2	2	2	3
2nd end. seg., no. of d. br.	4	3	3	4	3	4	5
2nd end. seg., no. of v. br. excl. cl.	2	2	2	4	2	2	2 or 3 (otd)
3rd end. seg., no. of br. excl. cl.	6	3	6	3	6	6	4
Maxilla							
no. of br. on the 3 endites	6–5–5	6–5–7	(4–6)–(4–6)–(4–6)	(2-3)–(2-3)–(2-3)	(4–6)–(4–6)–(4–6)	6–4–5	*6–3–6
5th limb							
no. of br. on the 3 endites	3–5–7	3–4–6	2–4–6	3–3–9	2–4–6	3–(4-5)–6	(1–3)–5–(5-6)
ex. seg., no. of primary teeth	5	4	4	*4	4	4	4
2nd ex. seg., no. of teeth	3	3	3	*3	3	3	3
2nd ex. seg., + or − bi-or trifurcate teeth	+	+	+	+	+	−	+
3rd ex. seg., no. of br. on each lobe	3–2	3–2	1–2	3–2	2–2	4–2	3–2
4th + 5th segs. no. of br.	4	4	4	3–4	4	4	4
6th limb							
no. of epipodial br.	2	2	2	2	1	2	2
no. of br. on the 4 endites	3–2–2–3	3–1–(2-3)–3	3–1–2–2	3–2–2–2	3–1–2–3	3–4–3–3	3–3–3–3
end-seg., no. of br.	7	7	7	6	7	6	6
7th limb							
no. of terminal cleaning br.	3–3	3–3	2–3 or 3–3	(2-3)–(2-3)	3–3	3–3	3–3
no. of prox. cleaning br.	?	2–2	1–2 or 2–2	(1-2)–(1-2)	2–2	3–3	2–2
no. of comb-teeth	2–5	13–9	11–6	6–4	11–6	8–8	5–2
Furca, no. of main claws	3	3	4	3	4	3	4
Furca, no. of secondary claws	3	3	2	3	2	3	2
Lateral Eyes, + or −	+	+	−	+	−	+	+
Specimen Number, # = USNM	#193675	#137686	ZMH 27314-3	#193415	#158222	#158214	#194472

(e)

Species	*sterreri*	*tryx*	*vox*
Shell length, mm	1.1	1.1	0.91
Surface with ribs (r) or smooth (s)	r	r	r
Incisur shallow or deep	*Deep	*Shallow	*Shallow
No. of medial br. on rostrum (infold)	6–8	6	8
1st antenna			
no. of br. 2nd seg., d-la	1–1	1–0	1–1
no. of br. 3rd seg., d.-v	(1-2)–1	2–1	2–1
no. of br. 4th seg., d.-v	1–2	1–2	1–2
no. of fil. on sens. br.	1	2	2
no. of fil. on b.-br	0	0	0
no. of fil. on c.-br.	1	2	1
no. of fil. on g.-br.	1	2	1
2nd antenna			
endop. no. of br.	4	5	3–4
Mandible			
coxale + or − bifurcate endite	+	+	+
basale, no. of d. br. mid.-dist.	3	3	3
basale, no. of thin v. br.	*5	3	4
basale, no. of stout v. br.	*2	2	3
basale, total no. of v. br.	7	5	7
1st end. seg., no. of v. br.	2	2	2
2nd end. seg., no. of d. br.	3	3	3
2nd end. seg., no. of v. br. excl. cl.	2	4	4
3rd end. seg., no. of br. excl. cl.	6	4	3
Maxilla, no. of br. on the 3 endites	5–5–6	3–2–3	2–4–3
5th limb			
no. of br. on the 3 endites	3–5–6	4–4–6	3–(4–6)–4
ex. seg., no. of primary teeth	4	4	4
2nd ex. seg., no. of teeth	3	3	3
2nd ex. seg., + or − bi-or trifurcate teeth	+	+	+
3rd ex. seg., no. of br. on each lobe	3–2	3–2	3–2
4th + 5th segs. no. of br.	4	4	4
6th limb			
no. of epipodial br.	2	2	1
no. of br. on the 4 endites	(2-3)–2-3–3	3–2–3–3	3–2–2–2
end-seg., no. of br.	7	6	7
7th limb	3–3	3–3	3–3
no. of terminal cleaning br.	2–2	2–2	2–2
no. of prox. cleaning br.	5–3	5–3	?
no. of comb-teeth			
Furca, no. of main claws	4	3	4
Furca, no. of secondary claws	2	3	2
Lateral Eyes, + or −	+	+	−
Specimen Number, # = USNM	#158115	#194147	#158309
(1) after Poulsen, [10]			

abs.: absent; br.: bristles; cl.: claw; d: dorsal; dist.: distal; endop.: endopodite; ex.: exopod; fil.: filaments; no.: number; prox.: proximal; seg.: segment; sens: sensory; v: ventral.; ?: unknown; *: after Poulsen [10]. (Only males have been described for the species *fusca*, *mortenseni*, *sagax*, and *tridens*; see Table 4).

Table 8: Summary of characteristics of mature males in *Rutiderma*.

(a)

Species	*apex*	*arx*	*darbyi*	*dux*	*flex*	*fusca*	*gerdhartmanni*
Shell length, mm	1.29	1.3	1.12	1.05	1.21	1.1	1.48
Surface with ribs (r) or smooth (s)	r	s	r	r	r	r	r
Incisur shallow or deep	Shallow!	Deep	Deep	*Shallow	*Deep	Deep	*Deep
No. of medial br. on rostrum (infold)	?	6	8	8	7	5	(12–16)
1st antenna							
no. of br. 2nd seg., d-la	1–1	1–1	1–1	1–1	1–1	1–1	1–1
no. of br. 3rd seg., d.-v	2–1	2–1	2–1	2–1	2–1	2–1	2–1
no. of br. 4th seg., d.-v	1–3	1–3	1–3	1–3	1–3	1–3	1–3
no. of fil. on sens. br.	Numerous!	Numerous	Numerous	Numerous	Numerous	10	20
no. of fil. on b.-br	2	2	2	2	2	2	2
no. of fil. on c.-br.	11	11	10	Numerous	10	20	9
no. of fil. on g.-br.	(1–2)	2	1	1	(1–2)	2	1
2nd antenna							
endop. no. of br. on 1st seg.	5	5	5	5	5	5	5
endop. no. of br. on 2nd seg.	2	2	2	2	2	2	2
endop. no. of br. on 3rd seg.	3	3	3	3	3	3	3
Mandible							
basale, no. of d. br. mid.-dist.	3	3	3	3	3	3	3
basale, no. of thin v. br.	*5	*5	*5	*4	*4	5	*6
basale, no. of stout v. br.	*1	*0	*0	*0	*0	0	*0
basale, total no. of v. br.	6	5	5	4	4	5	6
1st end. seg., no. of v. br.	2	2	2	2	2	2	2
2nd end. seg., no. of d. br.	3	4	3	3	3	4	3
2nd end. seg., no. of v. excl. cl.	6	5	6	6	6	6	6
3rd end. seg, no. of br. excl. cl.	(4–5)	4	5	4	5	5	5
Maxilla, no. br. on the 3 endites	5–4–6	?	4–?–?	?	11	5–4–4	6–?–?
Fifth Limb							
no. br. on the 3 endites	(3–4)–4–6	2–2–3	3–4–6	2–4–3	?	3–4–5	3–(3–5–6–7)
3rd exop. seg., no. br. each ?lobe	3–2	3–2	3–2	?	?	1–2	3–2
4th + 5th segs. no. of br.	4	4	4	?	?	5	4
Sixth Limb							
no. epipodial br.	1	2	2	2	2	1	(1–2)
no. of br. on the 4 endites	3–2–2–2	2–2–3–3	?–?–2–3	3–2–2–3	2–2–3–3	2–2–2–2	3–(2–3)–2–3
end-seg., no. of br.	7	6	7	7	7	6	7
7th limb							
no. of terminal cleaning br.	2–2	2–2	2–2	2–2	2–2	2–2	2–2
no. of prox. cleaning br.	1–2	2–2	2–2	2–2	2–2	2–2	?
no. of comb-teeth	3–3	(2–3) (2–3)	3–2	2–2	2–2	2–2	3–2
Furca, no. of main claws	4	3	4	4	4	3	3
Furca, no. of secondary claws	2	3	2	2	2	3	3
Copulatory limbs long or short	sh.	*sh.	*sh.	*sh.	*l.	sh.	?
Specimen Number, # = USNM	#158264	#193409	#152851	#194091	#1021462	ZMUC	ZMH 27297

(b)

Species	*gyre*	*hartmanni*	*judayi*	*kalkei*	*licina*	*lomae*	*mollita*
Shell length, mm	1.12	1.06	1.03	1.14	1.08	1.21	1.47
Surface with ribs (r) or smooth (s)	r	r	r	r	r	r	r
Incisur shallow or deep	*Deep	*Deep	*Shallow	*Deep	*Deep	*Deep	*Deep
No. medial br. on rostrum (rostral infold)	(6–8)	8	(5-6)	(7-8)	6	8	11
1st antenna							
no. of br. 2nd seg., d-la	1–1	1–1	1–1	1–1	1–1	1–1	1–1
no. of br. 3rd seg., d.-v	2–1	2–1	2–1	2–1	2–1	2–1	2–1
no. of br. 4th seg., d.-v	1–3	1–3	1–3	1–3	1–3	1–3	1–3
no. of fil. on sens. br.	Numerous	25	Numerous	Numerous	Numerous	Numerous	Numerous
no. of fil. on b.-br	3	2	2	3	2	2	2
no. of fil. on c.-br.	12	14	10	11	11	11	11
no. of fil. on g.-br.	2	1	1	1	1	1	2
2nd antenna							
endop. no. of br. on 1st seg.	5	4	5	5	5	5	5
endop. no. of br. on 2nd seg.	2	2	2	2	2	2	2
endop. no. of br. on 3rd seg.	3	3	3	3	1	1	3
Mandible							
basale, no. of d. br. mid.-dist.	3	3	3	3	3	3	3
basale, no. of thin v. br.	*3	*5	*3	?	*4	*4	*6
basale, no. of stout v. br.	*3	*1	*3	?	*2	*2	*0
basale, total no. of v. br.	6	6	6	5	6	6	6
1st end. seg., no. of v. br.	2	2	2	2	2	2	2
2nd end. seg., no. of v. br. excl. cl.	6	6	6	6	5	6	6
3rd end. seg., no. of br. excl. cl.	5	6	5	5	5	5	4
Maxilla, no. of br. on the 3 endites	?	?	?	?	?	5–5–7	?
5th limb							
no. of br. on the 3 endites	3–4–7	2–3–5	3–4–7	2–4–(7-8)	2–3–5	3–4–8	4–5–7
3rd exop. seg., no. of br. on each lobe	2–2	3–2	2–2	(1-2)–2	3–2	3–2	2–2
4th + 5th segs. no. of br.	4	4	4	4	3	4	4
6th limb							
no. of epipodial br.	2	2	2	2	2	2	2
no. of br. on the 4 endites	3–2–2–3	3–2–3–3	3–2–2–3	3–2–2–?	3–1–2–2	3–2–1–2	3–2–4–3
end-seg., no. of br.	7	7	7	7	(7-8)	6	7
7th limb							
no. of terminal cleaning br.	2–2	2–2	2–2	2–2	2–2	2–2	2–2
no. of prox. cleaning br.	2–2	?	2–2	1–1	2–2	2–2	2–2
no. of comb-teeth	(2-3)–(3-4)	2–2	(2-3)–(2-3)	(2-3)–(2-3)	(2-3)–(2-3)	3–3	2–3
Furca, no. of main claws	4	4	4	4	3	4	3
Furca, no. of secondary claws	2	2	2	2	3	2	3
Copulatory limbs long or short	l.	l.	?	*sh.	*l	l.	?
Specimen Number, # = USNM	#157993	#158218	#158220	#159069B	#157878	#158260	#158209

Only female or juvenile: *arcuatilis*, *arx*, *ferax*, *chessi*, *cohenae*, *compressa*, *dinochelata*, *exrex*, *ferax*, *irrostrata*, *leloeuffi*, *rex*, *schroederi*, *tridens*, *tryx*.

(c)

Species	*mortenseni*	*normani*	*ovata*	*rostrata*	*rotunda*	*sagax*	*sterreri*	*vox*
Shell length, mm	1.07	1.2	1.59	1.29	1.24	1.05	0.95	0.96
Surface with ribs (r) or smooth (s)	r	r	r	s	s!	r	r	r
Incisur shallow or deep	Deep	Deep	*Deep	*Deep	*Shallow	*Deep	*Shallow	*Deep?
No. medial br. on rostrum (rostral infold)	12	5	6	(7–9)	(6-7)	(4-5)	8	8
1st antenna								
no. of br. 2nd seg., d-la	1–1	1–1	1–1	1–1	1–1	1–1	1	1–1
no. of br. 3rd seg., d.-v	2–1	2–1	2–1	2–1	2–1	2–1	2–1	2–1
no. of br. 4th seg., d.-v	1–3	1–3	1–3	1–3	1–3	1–3	1–3	1–3
no. of fil. on sens. br.	35	20	23	Numerous	Numerous	Numerous	Numerous	Numerous
no. of fil. on b.-br	1	2	2	2	2	2	2	2
no. of fil. on c.-br.	13	15	12	11	12	Numerous	9	10
no. of fil. on g.-br.	1	1	1	1	2	2	1	1
2nd antenna								
endop. no. of br. on 1st seg.	5	5	5	5	5	5	5	5
endop. no. of br. on 2nd seg.	2	2	2	2	2	2	2	2
endop. no. of br. on 3rd seg.	3	3	3	2	3	3	3	3
exop., ser. no. of segs. w/o setules	2	2	2	2	2	2	2	2
Mandible								
basale, no. of d. br. mid.-dist.	3	3	3	3	3	3	3	3
basale, no. of thin v. br.	4	1	*6	4	*6	*6	*5	5
basale, no. of stout v. br.	0	0	*0	2	**0	*0	*0	0
basale, total no. of v. br.	4	1	6	6	6	6	5	5
1st end. seg., no. of v. br.	2	2	2	2	2	2	2	2
2nd end. seg., no. of d. br.	3	3	3	3	4	4	3	3
2nd end. seg., no. of v. br. excl. cl.	6	6	6	6	6	5	6	6
3rd end. seg., no. of br. excl. cl.	5	6	5	5	4	4	4	4
Maxilla, no. of br. on the 3 endites	5–4–4	3–3–2	5–5–6	?	?	?	?	?
5th limb								
no. of br. 3 endites	3–5–5	3	2–4–5	2–4–4	3–4–6	3–4–7	3–4–7	3–3–6
3rd exop. seg., no. br. on each lobe	2–2	?	3–2	3–2	2(otd)–2	3–2	3–2	3–2
4th + 5th segs. no. br.	5	?	4	4	4	5	4	4
6th limb								
no. of epipodial br.	1	1	(1-2)	1	2	2	2	1
no. of br. on the 4 endites	3–2–3–3	2–2–2–3	3–1–2–3	3–1–3–3	3–2–(2-3)–(2-3)	3–2–2–3	3–2–3–3	3–2–2–2
end-seg., no. of br.	7	7	7	7	6	6	7	6
7th limb								
no. of terminal cleaning br.	2–2	2–2	2–2	2–2	2–2	2–2	2–2	2–2
no. of prox. cleaning br.	2–2	2–2	2–2	2–2	2–2	2–2	2–2	2–2
no. of comb-teeth	2–2	2–3	13–9	(2-3)–(2-3)	3–2	1–1	(2-3)–(2-3)	3–3
Furca, no. of main claws	4	3	3	4	3	3	4	4
Furca, no. of secondary claws	2	3	3	2	3	4	2	2
Copulatory limbs long=l or short=sh.	sh.	l.	l.	sh.	?	sh.	*l.	*sh.
Specimen Number, # = USNM	ZMUC7406	#193675	#137687	#158228	#158215	AM P45365	#158573	#158316

abs.: absent; br.: bristles; d: dorsal; dist.: distal; endop.: endopodite; ex.: exopod; fil.: filaments; no.: number; prox.: proximal; seg.: segment; sens: sensory; v: ventral. (Only female or juvenile: *arcuatilis*, *arx*, *ferax*, *chessi*, *cohenae*, *compressa*, *dinochelata*, *exrex*, *ferax*, *irrostrata*, *leloeuffi*, *rex*, *schroederi*, *tridens*, *tryx*.) *: Poulsen [10].

Table 9: Summary of characteristics of genera *Metaschisma* and *Scleraner*.

Scientific Name	*Metaschisma nex*	*Scleraner trifax*		*Scleraner chacaoi*
Sex	Female	Female	Male	Female
Maturity	m.	m.	m.	m.
Shell length, mm	1.49	1.77	1.96	1.32
Surface with ribs (r) or smooth (s)	s	r	s	s
Incisur shallow or deep	*deep	*deep	*deep	*deep
No. medial br. on rostrum (rostral infold)	(16–20)	15	12	11
1st antenna				
no. br. 2nd seg., d-la-v.	1–1–1	1–1	1—1	1–1–1
no. br. 3rd seg., d-v	1–1	1–2	2—1	1–2
no. br. 4th seg., d-v	1–3	2–2	2–3	1–2
no. fil. on sens. br.	4	2	Numerous	2
no. fil. on b.-br	1	0	3	0
no. fil. on c.-br.	8	3	5	0
no. fil. on g.-br.	2	2	2	2
2nd antenna				
endop. no. br.	5	5	5	5
endop. no. br. 2nd seg.	2	1	2	2
endop. no. br. 3rd seg.	abs.	abs.	3	abs.
Mandible				
coxale + or − furcate endite	+	+	−	+
basale, no. d. br. mid.-dist.	3	3	3	2
basale, no. thin v. br.	*5	?	*9	*6
basale, no. stout v. br.	*2	?	*0	*0
basale, total no. br.	7	11	9	(6-7)
ex. absent, present or rud.	rud.	abs.	Present	abs.
1st end. seg., no. v. br.	4	3	3	3
2nd end. seg., no. d. br.	6	7	6	7
2nd end. seg., no. v. br. excl. claw	2	5	6	2
3rd end. seg., no. br. excl. cl.	7	4	6	4
Maxilla, br. on endites	6–5–3	?	9–6–5	7–3–4
5th limb				
br. on endites	2–2–4	3–5–7	3–5–8	3–4–5
ex. seg., no. prim. teeth	1	4	abs.	4
2nd ex. seg., no. teeth	3	3	abs.	2
2nd ex. seg., + or − bi-or trifurcate teeth	+	+	−	+
3rd ex. seg., no. br. each lobe	1–2	3–2	3–2	3–2
4th + 5th segs. no. br.	4	4	5	8
6th limb				
no. epipodial br.	2	2	2	2
no. br. on 4 endites	3–(2-3)–(2-3)–2	3–2–4–3	3–2–4–3	3–3–3–3
end.-seg., no. br.	10	(7–8)	(7–8)	8
7th limb				
no. terminal cleaning br.	2–2	3–3	2–2	3–3
no. prox. cleaning br.	2–2	2–2	1–1	1–1
no. comb-teeth	17–0	9–2	7–2	7–2
Furca				
no. main claws	4	3	3	4
no. secondary claws	7	3	3	5
Lateral eyes, + or −	+	+	+	−
Copulatory limbs long or short	abs.	abs.	sh.	abs.
Specimen No. (# = USNM)	# 193930	# 193922	# 194019	ZMH K 27302

abs.: absent; br.: bristles; d: dorsal; dist.: distal; endop.: endopodite; ex.: exopod; fil.: filaments; l: lateral; m.: mature; no.: number; prim.: primary; prox.: proximal; rud.: rudimentary; seg.: segment; sens: sensory; v: ventral, *: Poulsen [10].

Table 10: Summary of characteristics of males and females of *Alternochelata*, *Rutiderma*, and *Scleraner*.

	Alternochelata		*Rutiderma*		*Scleraner*	
	Male	Female	Male	Female	Male	Female
Shell length, mm	1.36–1.38	1.18–1.37	0.95–1.59	0.91–1.99	1.96	1.32–1.77
Surface with ribs (r) or smooth (s)	s	s	s	r/s	s	r/s
Incisur shallow or deep	Deep	Deep	Shallow/deep	Shallow/deep	Deep	Deep
No. of medial br. on rostrum (infold)	6, 7	6–12	4–9, 11–16	4–17	12	11, 15
1st antenna						
no. of br. 2nd seg., d-la	1—1—1	1—1—(0,1)	1—1	1—(0,1)	1—1	1—1
no. of br. 3rd seg., d.-v	1—1	1—1	2—1	(1,2)—1	2—1	1—2
no. of br. 4th seg., d.-v	1—4	1—3	1—3	1—2	2—3	(1,2)—2
no. of fil. on sens. br.	33, numerous	1, 3	10, 20, 23, 25, 25, numerous	0–5	Numerous	2
no. of fil. on b.-br	3	0, 1	1–3	0	3	0
no. of fil. on c.-br.	12, 13	1, 3	9–15, 20, numerous	0–2	5	0,3
no. of fil. on g.-br.	1–3	1,3	1-2	0–3	2	2
2nd antenna						
endop. no. of br. on 1st seg.	6	5,6	4,5	1,3–5	5	5
endop. no. of br. on 2nd seg.	2	1,2	2		2	1,2
endop. no. of br. on 3rd seg.	2,3	0	1–3		3	0
exop., ser. no. of segs. w/o setules	2	2–5	2		2	2–5
Mandible						
basale, no. of d. br. mid.-dist.	3	3,4	3	2–4	3	2,3
basale, no. of thin v. br.	5,6	3,5	1,3–6	0–5	9	6
basale, no. of stout v. br.	0,3	2,3	0–3	2–4	0	0
basale, total no. of v. br.	6,8	6,7	1,4–6	2,4–8	9	6,7,11
1st end. seg., no. of v. br.	3	2,3	2	2,3	3	3
2nd end. seg., no. of d. br.	7	5–7	3,4	2–5	6	7
2nd end. seg., no. of v. br. excl. cl.	6	2,4	5,6	1–5	6	2,5
3rd end. seg., no. of br. excl. cl.	5,6	3,5	4–6	3–6	6	4
Maxilla, no. of br. on the 3 endites	(5,6)—(4,6)—(4,6,7)	(3,7,8)—(2,4,5)—(4–7)	(3–6)—(3–5)—(2,4,6,7)	(2–7)—(2–6)—(3–8)	9—6—5	7—3—4
Fifth Limb						
no. of br. on the 3 endites	(2–4)—(2–4)—(4,5,7)	(2,3)—(3–5)—(4,5,8)	(2–4)—(2–5)—(3–8)	(1–5)—(3–7)—(4–10)	3—5—8	3—(4,5)—(5,7)
3rd exop. seg., no. of br. on each lobe	(2,3)—2	(2,3)—2	(1–3)—2	(1–4)—(1–3)	3—2	3—2
4th + 5th segs. no. of br.	3–5	5–7	3–5	3–5	5	4,8
Sixth Limb						
no. of epipodial br.	2	2,3	1,2	1,2	2	2
no. of br. on the 4 endites	(2–4)—(3,4)—(3,4)—(1–3)	3—3—(3,4)—(2,3)	(2,3)—(1–3)—(1–4)—(2,3)	(1–3)—(1–4)—(2–4)—(2–4)	3—2—4—3	3—(2,3)—(3,4)—3
end-seg., no. of br.	6,7,9	6–8	6–8	6–8	7,8	7,8
Seventh limb						
no. of terminal cleaning br.	2—2	3—3	2—2	(2,3)—(2,3)	2—2	3—3
no. of prox. cleaning br.	(1,2)—2	(1,2)—2	(1,2)—(1,2)	(1–3)—(1–3)	1—1	(1,2)—(1,2)
no. of comb-teeth	(9,11,13)—(0,2)	(7,9,11,14)—(0,3,5)	(1–3,13)—(1–4,9)	(1–13)—(2–9)	7—2	7,9—2
Furca, no. of main claws	4	4	3,4	3,4	3	3,4
Furca, no. of secondary claws	5,6	2,6	2–4	2,3	3	3,5
Copulatory limbs long or short	Short	—	Long/short	—	Short	—

abs.: absent; br.: bristles; d: dorsal; dist.: distal; endop.: endopodite; ex.: exopod; fil.: filaments; no.: number; prox.: proximal; seg.: segment; sens: sensory; unk.: unknown; v: ventral.

Table 11: Summary of characteristics of juvenile males and females of *Rutiderma tridens*. (Only juvenile specimens have been found for this species and so it was not included with adult females or males.)

Sex	male	female
Maturity	A-1	A-1
Shell length, mm	1.32	0.87
Surface with ribs (r) or smooth (s)	r	r
Incisur shallow or deep	*Shallow	*Shallow
No. of medial br. on rostrum (infold)	5	(3–5)
1st antenna		
no. of br. 2nd seg., d-la	1–1	1–1
no. of br. 3rd seg., d.-v	1–1	1–1
no. of br. 4th seg., d.-v	1–2	1–2
no. of fil. on sens. br.	2	2
no. of fil. on b-br.	0	0
no. of fil. on c.-br.	0	0
no. of fil. on g.-br.	1	1
2nd antenna		
endop. no. of br. on 1st seg.	4	3
endop. no. of br. on 2nd seg.	3	abs.
endop. no. of br. on 3rd seg.	2	abs.
Mandible		
basale, no. of d. br. mid.-dist.	2	2
basale, no. of thin v. br.	*5	*5
basale, no. of stout v. br.	*2	*2
basale, total no. of v. br.	7	7
1st end. seg., no. of v. br.	(3–4)	(3–4)
2nd end. seg., no. of d. br.	3	3
2nd end. seg., no. of v. br. excl. cl.	2	2
3rd end. seg., no. of br. excl. cl.	7	7
Maxilla, no. of br. on the 3 endites	?	?
5th limb		
no. of br. on the 3 endites	?	?
1st ex. seg., no. of primary teeth	4	4
2nd ex. seg., no. of teeth	3	3
2nd ex. seg., + or − bi-or trifurcate teeth	+	+
3rd exop. seg., no. of br. on each lobe	3–2	3–2
4th + 5th segs. no. of br.	5	5
6th limb		
no. of epipodial br.	2	2
no. of br. on the 4 endites	3–2–(1-2)–1	3–2–(1-2)–1
end-seg., no. of br.	6	6
7th limb		
no. of terminal cleaning br.	2–2	2–2
no. of prox. cleaning br.	2–2	2–2
no. of comb-teeth	8–2	5–2
Furca, no. of main claws	3	3
Furca, no. of secondary claws	3	3
Lateral Eye, + or −	+	+
Specimen Number, # = USNM	#152829	#156686

abs.: absent; br.: bristles; d: dorsal; dist.: distal; endop.: endopodite; ex.: exopod; fil.: filaments; no.: number; prox.: proximal; seg.: segment; sens: sensory; unk.: unknown; v: ventral, *: after Poulsen [10].

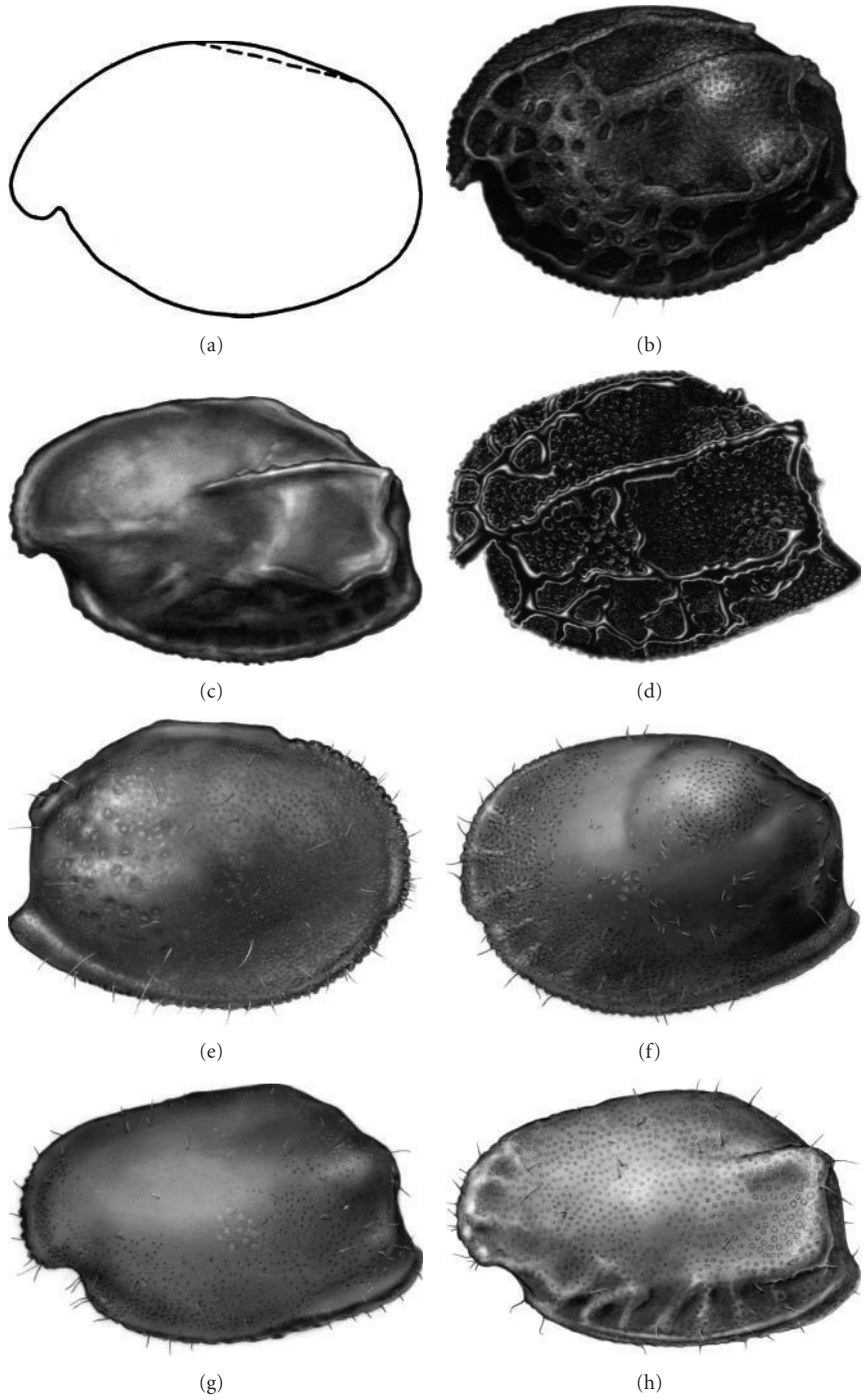


Figure 2: (a) *Metaschisma nex*, female, 1.49 mm. (b) *Rutiderma apex*, ovigerous female, 1.18 mm. (c) *R. apex*, male, 1.29 mm. (d) *R. arcuatilis*, female, 1.02 mm. (e) *R. arx*, female, 1.43 mm. (f) *R. arx*, ovigerous female, 1.42 mm. (g) *R. arx*, male, 1.32 mm. (h) *R. arx*, male, 1.41 mm.

to 1.05 mm, compared to from 1.18 to 1.25 mm for *R. apex*. The rostral infold of the female *R. judayi* bears a row of 7 bristles compared to from 10 to 12 on *R. apex*. The vertical rib at the posterior end of the alar process on the carapace of the female *R. lomae* [58] has a space near middle, whereas it is continuous on *R. apex*. Adult males of *R. lomae* and *R. apex* are difficult to separate, except that the middle part of the vertical rib of the carapace of *R. apex* does appear to be better developed (see Kornicker and Myers [14, page 15, for *R. lomae*]). The caudal process of the carapace of the female *R. chessi* projects farther than that of *R. apex*, the c-bristles of the second and third endopodial segments of the mandible are more elongate, and the Bellonci organ has a pointed rather than a rounded tip. The ridges of the carapace of the female *R. rostrata* are less well defined than those of *R. apex*, and the c-bristle of the second endopodial segment of the

female mandible of *R. rostrata* has a long produced tip that is absent on *R. apex*. The ribs of the carapace of *R. apex* resemble those of *R. hartmanni* from the Gulf of Panama, but the carapace of *R. apex* is slightly larger and the caudal process has less posterior projection; the anterior ridge of the infold of the caudal process is more concave posteriorly on *R. hartmanni*, and the c-bristle of the second endopodial segment of the female mandible of *R. hartmanni* bears a small terminal extension that is absent on *R. apex*. The lateral ribs of *R. rotunda* are evenly rounded posteriorly, not indented like the vertical rib of *R. apex*, and each lamella of the furca of *R. rotunda* bears 3 primary claws compared to 4 on *R. apex* (Kornicker and Harrison-Nelson [51, page 43]). According to molecular analysis, Oakley [65] reported that *Rutiderma apex* is the sister group to *Euphilomedes* (Philomedidae) (Kornicker and Harrison-Nelson [51, pages 43, 45]).

5.2. *Rutiderma arcuatilis*

5.2.1. Kornicker [16] (Figure 2(d)). Rutiderma arcuatile Kornicker [16, pages 11–13, 25, 67–70, Table 1, Figures 39, 40], Kornicker [33, Table 3], *Rutiderma arcuatilis* Kempf [68, page 668], Kornicker [48, page 84 (compares to *R. vox*)], Kornicker and Harrison-Nelson [43, Tables 8, 9].

Holotype. USNM 158212, adult female.

Type Locality. East side of Bolongo Bay, St. Thomas Island, U.S. Virgin Islands. 18°18′59′′N, 64°53′4′′W, intertidal.

Distribution. Northwest Atlantic: Virgin Islands: St. Croix and St. Thomas Islands.

Habitat. Benthic, intertidal, shifting sands by rocks; planktonic near bottom, 9 m, outer reef.

Life History and Ontogeny. Female, 3 eggs.

Stomach Contents. Copepods.

Comparisons. *R. arcuatilis* is closely related to *R. dinochelata*. On *R. arcuatilis* the curvature of the list of the caudal process has a low angle with the ventral margin. On both *R. dinochelata* 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. arcuatilis* bears several bristles along the list (Kornicker [16, page 70]).

5.3. Rutiderma arx Kornicker, 1992 (Figures 2(e)–2(h)). Rutiderma arx Kornicker, [49, pages 124–140, Key to instars of *Rutiderma*: 123, Tables 1, 2, 13–17, Figures 72–79, 80], Kornicker [37, page 114], Kornicker and Thomassin [52, pages 73–83, Figures 48–57, Table 1, Appendix, (supplementary description of adult female) (Northeastern end of Mozambique Channel, Indian Ocean)], Kornicker and Harrison-Nelson [43, pages 427, 456–457 (comparison of development of *R. darbyi to R. arx*), Tables 1, 4, 7, 8, 9].

Holotype. MNHN Os 272, ovigerous female, Museum National d'Histoire Naturelle, Paris, France.

Type-locality. Station 101-DS, 8 Apr 1977, NW le du Lys, Glorioso Islands, 11°25′42′′S, 47°19′30′′E, depth 26 m.

Distribution. Glorioso Islands, depth 24 to 26 m. Madagascar, depth: on reef flat to 31 m.

Habitat. Benthic (infauna). Gravelly sand, sedimentary pocket with nodules of melobesians in large ripples, coarse sediment among coral patches.

Life history and ontogeny. Adult male and female, ovigerous female (4 eggs), instar I, instar II, male instar III, male instar.

Gut content. One specimen with two harpacticoid copepods, and fragment of (?) nematode**.**

Comparisons. *Rutiderma arx* differs from both *R. leloeuffi* and *R. tridens* in the female carapace having a smaller rostrum and in the terminal claw of the second endopodial segment of the female mandible not having a pronounced tip. The infold of the caudal process of *R. tridens* has 3 "teeth" along the dorsal margin of the "pocket" that are absent on *R. arx*, and the carapace of *R. tridens* bears lateral ribs absent of *R. arx. Rutiderma irrostrata* differs from *R. arx* in having a carapace with lateral ribs, and in having marginal teeth on the 3 lobes of the large flat tooth forming the second exopodial segment of the fifth limb. The carapace of *R. arx* differs from that of *R. compressa* and *R. normani* in lacking lateral ribs. Only the male is known of *R. fusca*; the posterior edge of the alar process on the carapace of that species bears a backward pointing triangular process at the ventral and dorsal ends that is not present on the male of *R. arx.* The male *R. arx* (length 1.30–1.34 mm) is longer than the male *R. fusca* (length 1.10 mm) (Kornicker [49, page 136]).

5.4. Rutiderma chessi Kornicker and Myers [14] (Figure 3(a)). Rutiderma chessi Kornicker and Myers [14, pages 2, 3, Key to species of adult females and males of *Rutiderma* of southern California, 31–34, Figures 19, 20], Kornicker [48, page 84], Kornicker and Harrison-Nelson [43, Tables 8, 9].

Holotype. USNM 158280, ovigerous female.

Type Locality. San Clemente Island, station D-3.

Distribution. Northeast Pacific: off California, USA: San Clemente Island.

Life History and Ontogeny. Female, 4 eggs.

Comparisons. The rib structures on the carapace of *R. chessi* differ from those of other species of *Rutiderma* in southern California. The species whose carapace resembles it most closely is *R. judayi*, which is smaller, has 3 instead of 2 main horizontal ribs on each valve, has more processes along the posterodorsal margin, and has a less acute caudal process. The main claws on the second and third endopodial segments of the female mandible are longer and more slender than those on other species of *Rutiderma* in the area (Kornicker and Myers [14, page 34]).

5.5. Rutiderma cohenae Kornicker [16] (Figure 3(b)). Rutiderma cohenae Kornicker [16, pages 4, 1–13, 15, 25, 26, 62–67, 85, Table 1, Figures 3, 36–38], Kornicker [33, Table 3], Cohen [20, pages 322, 331], Kornicker [48, page 84], Kornicker and Harrison-Nelson [43, Tables 8, 9], Kornicker et al. [56, Table 1], Harrison-Nelson et al. [53, page 874] .

Holotype. USNM 158359, ovigerous female.

Type Locality. San Salvador, Bahamas; San Salvador Island, dump reef, depth from subtidal to 4 m.

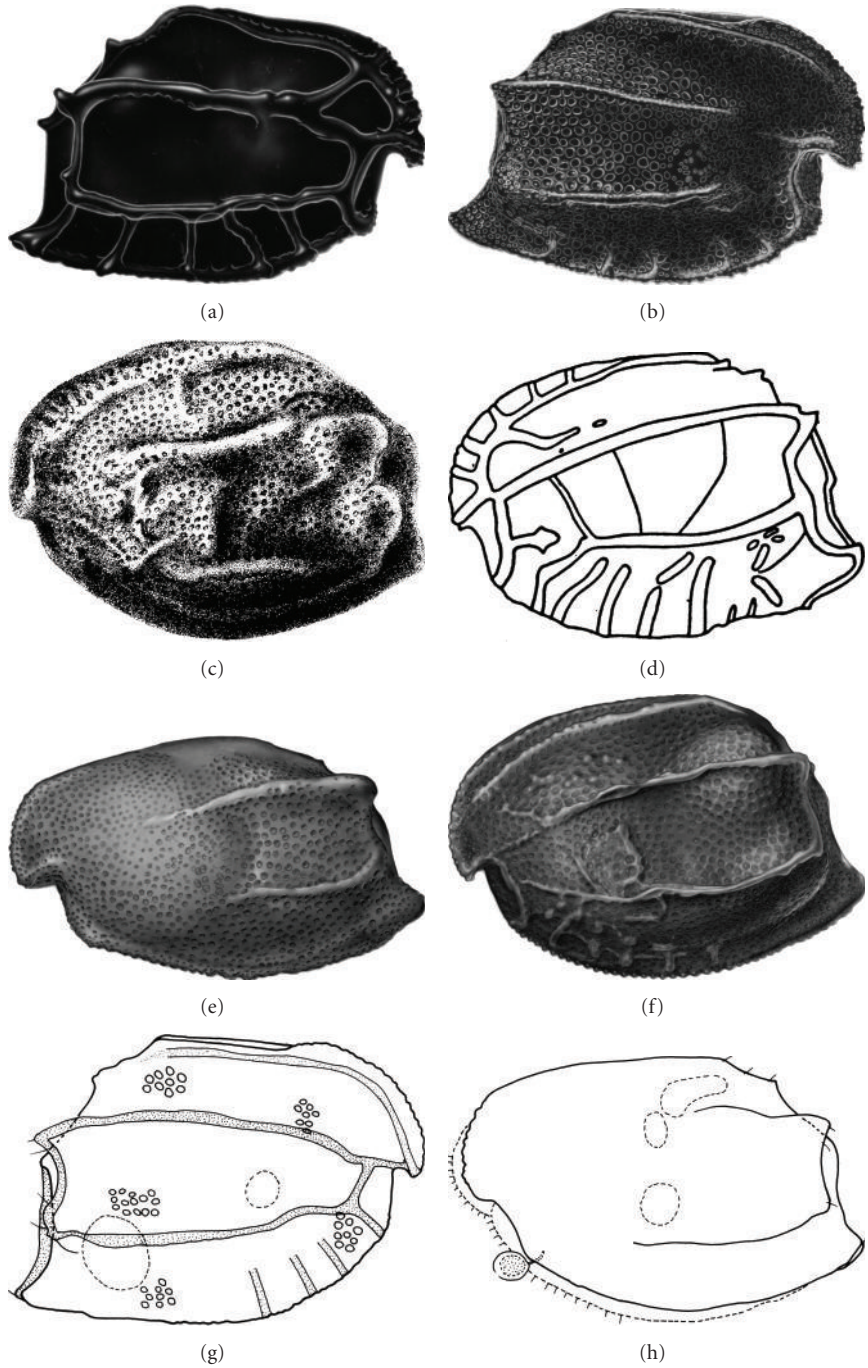


Figure 3: (a) *Rutiderma chessi*, female, 1.21 mm. (b) *R. cohenae*, female, 1.24 mm. (c) *R. compressa*, female, 1.5 mm. (d) *R. dinochelata*, female, 1.18 mm. (e) *R. darbyi*, male, 1.12 mm. (f) *R. darbyi*, female, 1.28 mm. (g) *R. dux*, female, 1.11 mm. (h) *R. dux*, male, 1.05 mm.

Distribution. Carrie Bow Cay, Belize; Fleming Key, Key West, Florida; Virgin Islands.

Habitat. Benthic from subtidal to 4 m; sand in *Thalassia* beds; spur-and-groove, outer fore-reef slope.

Life History and Ontogeny. Adult female, 4 eggs.

Comparisons. The elongate finger-like extension of the tip of the stout terminal claw of the second endopodial segment of the mandible and the small, slender, unringed, posterior bristle on the endopodite of the second antenna of the adult female distinguishe *R. cohenae* from the previously described species. A few species have one of the above characters but not both. The new species differs from *R. mortenseni* Poulsen [10, page 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 (Kornicker[16, page 67]).

5.6. Rutiderma compressa Brady and Norman [55] (Figure 3(c)). Rutiderma compressa Brady and Norman [55, pages 5, 6, 8, 9, 17, 18, 38, 43, 623, 673–675, Plate

58, Figures 9–16 (holotype: unknown; type locality: "one of these from off the Cap de Penas (Bay of Biscay))], the other from the Fosse de Cap Breton," Müller [46, page 35], Klie [5, pages 404-405, 406 (identification of African specimens needs verification)], Kornicker [6, page 236], Hartmann [7, page 39 (identification of Red Sea specimens needs verification)], Poulsen [10, pages 6, 8, 9, 17, 38, 43], Hartmann-Schröder and Hartmann [8, pages 25, 30, 33, Table 3], Hartmann [26, pages 183, 192: Figure 111c, (according to G. W. Müller 1908), page 201: Figure 115b] Puri [69, page 475], Hartmann [70, page 237], Kornicker [13, pages 30, 646, 657, 675], Kornicker [54, page 43 (compares to *R. leloeuffi*)], Kornicker and Caraion [47, pages 2, 54, 65, 66 (compares to *R. tridens*)], Kornicker [16, page 25 (mentions)], Kornicker [63, page 3 (mentions)], Kornicker and Iliffe [71, page 43], Kornicker [48, page 84 (compares to *R. vox*)], Kornicker [49, page 136], Kornicker and Harrison-Nelson [43, page 429 (mentions)].

(?) *Rutiderma compressa*. Müller [59, pages 53, 92, 93, Plate 7: Figures 1–13] (questionably referred to *R. tridens* by Kornicker and Caraion [47, pages 60, 65: "The carapace of *R. tridens* resembles that of the female of *R. compressa* from South Africa] illustrated by Müller [59, Plate 7:1]). Müller's specimen has been put into synonymy of *R. tridens* with a question, because the first antenna illustrated by Müller [59, Plate 7:2] does not show a lateral bristle on the second segment, but this could be because the illustration is a medial view of the limb. The first, third, and fourth endites of the sixth limb illustrated by Müller [59, Plate 7:12] have a different number of bristles than do the same endites of the two specimens of *R. tridens* described herein, but this could be the result of intraspecific variability.").

Rutiderma (Rutiderma) compressa. Kornicker [6, pages 236, 237 (compares to *R. dinochelata*)], Hartmann in Hartmann-Schröder and Hartmann [8, page 328].

(?) *Rutiderma africana.* Puri [69, page 484] (Puri credits *R. africana* Müller to Klie [5, pages 404–448], but *R. africana* is not described or mentioned in the Klie [5] or Müller publications. Puri probably meant *R. compressa* instead of *R. africana* because Klie [5] lists *R. compressa* between *Cypridina dorsoserrata* Müller and *Philomedes africana* Klie, and Puri [69], lists *R. africana* Müller between *Cypridina dorsoserrata* Müller and *Philomedes africana* Klie).

(?) *Rutiderma cf. compressa.* Hartmann-Schröder and Hartmann [72, pages 48, 56, 77], Hartmann and Hartmann-Schröder 1975:360 [73] (identification of African specimens needs verification).

Rutiderma cf. compressa Brady and Norman [55], Hartmann [70, page 237].

Not *Rutiderma compressa.* Hartmann [60, page 328] (adults = *R. gerdhartmanni* Kornicker [13, pages 648-649, 673] juveniles = *R.* species A).

Holotype. Unknown.

Type Locality. One collection off the Cap de Peñas (Bay of Biscay), the other from the Fosse de Cap Breton, depth 150 m.

Distribution. Northeast Atlantic: Bay of Biscay; Cabo de Penas, Spain; Fosee Cap Breton, France (fide Klie [5]). (?) Southeast Atlantic: Lüderitz Bay, South West Africa; Simonstown, Atlantic coast of South Africa near Cape of Good Hope. (?) Indo-West Pacific: Al Ghardaqah, Egypt, Red Sea; Tongaat, coast of South Africa; Xai Xai, Moçambique, Mozambique.

Habitat. Benthic; 150 m; (?) from 1 to 2 m, subtidal; (?) shallow, sand; (?) rock and gravel beach, hummock-algae, tropical littoral; (?) rock-dwelling.

Life History and Ontogeny. Female, A-1 female, juvenile.

Comparisons. The incisur on *R. compressa* is less distinct and the rostrum and caudal process is less prominent than on *R. leloeuffi.* The incisur forms a right angle, unlike *R. licina*, which has a deep incisur with overhanging rostrum. It is distinguished from *R. ovata* in that the carapace does have a projecting posteroventral caudal process. *Rutiderma compressa* differs from *R. gerdhartmanni* in the morphology of the first antenna. While *R. gerdhartmanni* has a bristle on the second segment and 2 bristles on the third segment, *R. compressa* lacks a bristle on the second segment and has just 1 on the third segment. *Rutiderma compressa* can also be differentiated from *R. gerdhartmanni* in that *R. compressa* has numerous riblets between the anterodorsal rib and anterodorsal shell margin, while *R. gerdhartmanni* lacks these riblets.

5.7. Rutiderma darbyi Kornicker [16] (Figures 3(e)-3(f)). *Rutiderma dinochelata* Darby [74, pages 28, 56, 57, Plate 13: Figures 1–9, Plate 14: Figures 1b–7], Kornicker [13, pages 65, 74] (not *Rutidema dinochelata* Kornicker [6]).

Rutiderma darbyi Kornicker, Bradford [75, pages 141, 143, Figure 2] (deliberate nomen nudum).

Rutiderma darbyi. Kornicker [16, pages 2–7, 11–14, 17, 25, 36–47, 62, 85, Table 1, Figures 1, 18–24, Plate 1], Kornicker [63, page 25], Kornicker [33, Table 3], Cohen [20, pages 322, 331], Kornicker [48, page 84], Kornicker [37, page 114], Grabe et al. [17, page 698, Tables 2, 3], Kornicker and Harrison-Nelson [43, pages 426–471, Figures 2–20, Tables 1–9, key to stages of *Rutiderma darbyi* (males and females) page 456], Kornicker et al. [44, pages 82-83, Table 1, Figure 59], Grabe [18, pages 57, 59, 62, 67, Tables 2–5, Figure 4], Kornicker et al. [56, page 95, Table 1], Harrison-Nelson and Kornicker [53, page 874].

Holotype. USNM 158003, ovigerous female.

Type Locality. Georgia continental shelf, 31°05′N, 80°35′W, 26 m.

Distribution. Continental shelf off North and South Carolina, Georgia, and Florida (Atlantic and Gulf of Mexico); also, Bahama Islands in vicinity of San Salvador Island, Andros Island, and in Crab Cay Cravasse, Exuma Islands. Known depth range from intertidal to 168 m.

Life History and Ontogeny. Female, male, instars I–IV, from 2 to 4 eggs.

Parasites. Choniostomatid copepods Bradford [75, page 141], Kornicker [16, page 43].

Comparisons. The carapace of *R. 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 10x or 20x. The spine-like processes are present on juveniles and adults of both sexes (Kornicker [16, page 47]).

5.8. Rutiderma dinochelata Kornicker [6] (Figure 3(d)). Rutiderma (Rutiderma) dinochelatum Kornicker [6, pages 236–238, Figures 46: 8A-B, 57: A–F, 58: A–D, 86: B,F,J].

Rutiderma (Rutiderma) dinochelata. Kornicker [6, page 297, Figure 86: B,F,J] (misspelling).

Philomedes lomae. Kornicker [6, pages 233, 234, Figures 46: 7A-B, 52: A–E, 53: A–D, 86: A,E.I], Poulsen [10, pages 15, 17] (recognizes specimens as male *Rutiderma*) not Juday [58], not Darby [74, page 28, Plates 13, 14] (= R. darbyi, new species).

Rutiderma dinochelata. Hartmann in Hartmann-Schröder and Hartmann [8, page 328] (mentions), McKenzie [9, page 66] (compares to *R. judayi*), Poulsen [10, pages 7, 8, 17, 18, 43], Kornicker [76, page 110], Kornicker [13, page 675], Kornicker [54, page 43] (compares to R. *leloeuffi*), Kornicker [31, page 8] (compares to *R. sterreri*), Kornicker [16, pages 11-12, 25–28, 70, Table 1, Figures 2, 10, 11], Kornicker [33, Table 3], Kornicker [48, page 84], Cohen [20, pages 322, 324, 325, 327, 330, 331, 332, 333], Kornicker and Harrison-Nelson [43, Table 9], Kornicker et al. [56, page 95, Table 1].

Holotype. USNM 122907, adult female.

Type Locality. Bimini area, Great Bahama Bank, depth from 1 to 20 m.

Distribution. Northwest Atlantic: Bahama Islands: Bimini and Andros Islands. Belize: Carrie Bow Cay.

Habitat. Benthic, from intertidal to 30 m; temperature about 29°C, salinity: from 31–42‰; lagoon, back-reef 1.5 m, sand and rubble zone; outer fore-reef, 30 m, sand trough.

Life History and Ontogeny. Female, juvenile female.

Biology. Response to light (Kornicker [6, page 224]).

Comparisons. The carapace of the male *R. dinochelata* differs from that of *R. flex* in that the upper lateral rib does extend anteriorly to intersect the anterior edge of the rostrum and the lower lateral rib does extend anteriorly to midlength of the carapace. The species *R. dinochelata* differs from *R. sterreri* in that the tip of the Bellonci organ is pointed, not rounded. The list of the caudal process of the female *R. vox* is longer and more oblique than that of the female *R. dinochelata*. *Rutiderma dinochelata* is very similar to *R. arcuatilis*, but they differ in that the list of the caudal process on *R. arcuatilis* has a low angle with the ventral margin, but, in *R. dinochelata*, the curvature of the list forms about a 45° angle with the ventral margin.

5.9. Rutiderma dux Kornicker [50] (Figures 3(g)-3(h), 4(a)). Rutiderma dux Kornicker [50, pages 22–28, Figures 13–16, (compares to *R. normani*), Table 1, Appendices 1-2].

Holotype. AM P45375, female with unextruded eggs.

Type Locality. Darwin, Australia, station JLB Darwin 302 and 305 combined (Station 302: Channel Island, 20 Aug 1982, mud; station 305 (same as station 304): East Point, 22 Aug 1982), both samples from intertidal washings of algae and substrate.

Distribution. Channel Island and/or East Point, Darwin, Australia, and Lizard Island, Great Barrier Reef, Australia.

Habitat. Mud.

Life History and Ontogeny. Adult male, A-1 male, female, ovigerous female (3 to 4 eggs), juvenile.

Comparisons. *Rutiderma dux* is close to *R. normani* Poulsen [10, page 22], and they could be conspecific. The female sixth limbs of the two species differ in that the ventral margin of the end segment of *R. normani* is straight (Poulsen [10, Figure 4j]), whereas the anterior 3 bristles on the end segment of *R. dux* are on a long projection. Also, Poulsen [10, pages 26, 28] described both the female and male furcae of *R. normani* as having 3 main claws and 3 secondary claws, whereas the female and male furcae of *R. dux* have 4 main claws and 2 secondary claws (Kornicker [50, page 28]).

5.10. Rutiderma exrex Kornicker in Kornicker and Thomassin [52] (Figure 4(b)). Rutiderma exrex Kornicker in Kornicker and Thomassin [52, pages 87–92, Figures 61–63, Table 1, Appendix], Kornicker and Harrison-Nelson [43, Tables 8, 9].

Holotype. Undissected adult female with large unextruded eggs; Muséum National d'Histoire Naturelle.

Type Locality. BT-227, "Oct 1969; southern Grand Récif, southern corner transect; close on outerslope; coral flagstone; depth 27 m; bottom with nodules of melobesians or rhodoliths, algae dominant."

Distribution. Tuléar Reef Complex, SW Madagascar.

Habitat. Grand Récif, South Lovobé area; reef flat; boulder tract; front of a detrital embankment; SC (shovel). Nosy Vé Cay reef; west beach (seaward side); infralittoral; reef flat sand with ripples and scattered *Phyllochaetopteridea* mats; SC (shovel). Coral flagstone; depth 27 m; bottom with nodules of melobesians or rhodoliths, algae dominant.

Life History and Ontogeny. Adult female.

Comparisons. *Rutiderma exrex* is quite similar to *R. rex* and they could be conspecific. The carapace of *R. exrex* differs from that of *R. rex* in three characters: (1) the ribs and riblets of *R. rex* have high relief, whereas, those of *R. exrex* are barely visible, (2) the ridge forming the anterodorsal edge of the pocket of the infold of the caudal process is slightly convex posteriorly on *R. rex* and slightly concave on *R. exrex*, but there is some variability in this character; and (3) the posterior edge of the alar process on the outer surface of each valve as well as the posterodorsal edge of the valves of *R. rex* bears small tubercles that are either absent or much smaller in *R. exrex.* Also, the length of the female carapace of *R. rex* is from 0.90 to 0.92 mm (3 specimens), whereas the length of the female *R. exrex* is from 0.99 to 1.19 mm (3 specimens), but the difference could be the result of intraspecific variability. The carapace of *R. exrex* differs from those of *R. arx* and *R. ferax* in having a caudal process with less posterior projection, and the ridge forming the anterodorsal edge of the pocket of the infold of the caudal process forms a 45° angle in *R. exrex* but forms a shallow arc at a much lower angle with the ventral edge of the caudal process in *R. arx* and *R. ferax.* Also, the ribs and riblets on the outer surface of the carapace of *R. ferax* have much greater relief than those of *R. exrex.* The tip of the dorsal margin

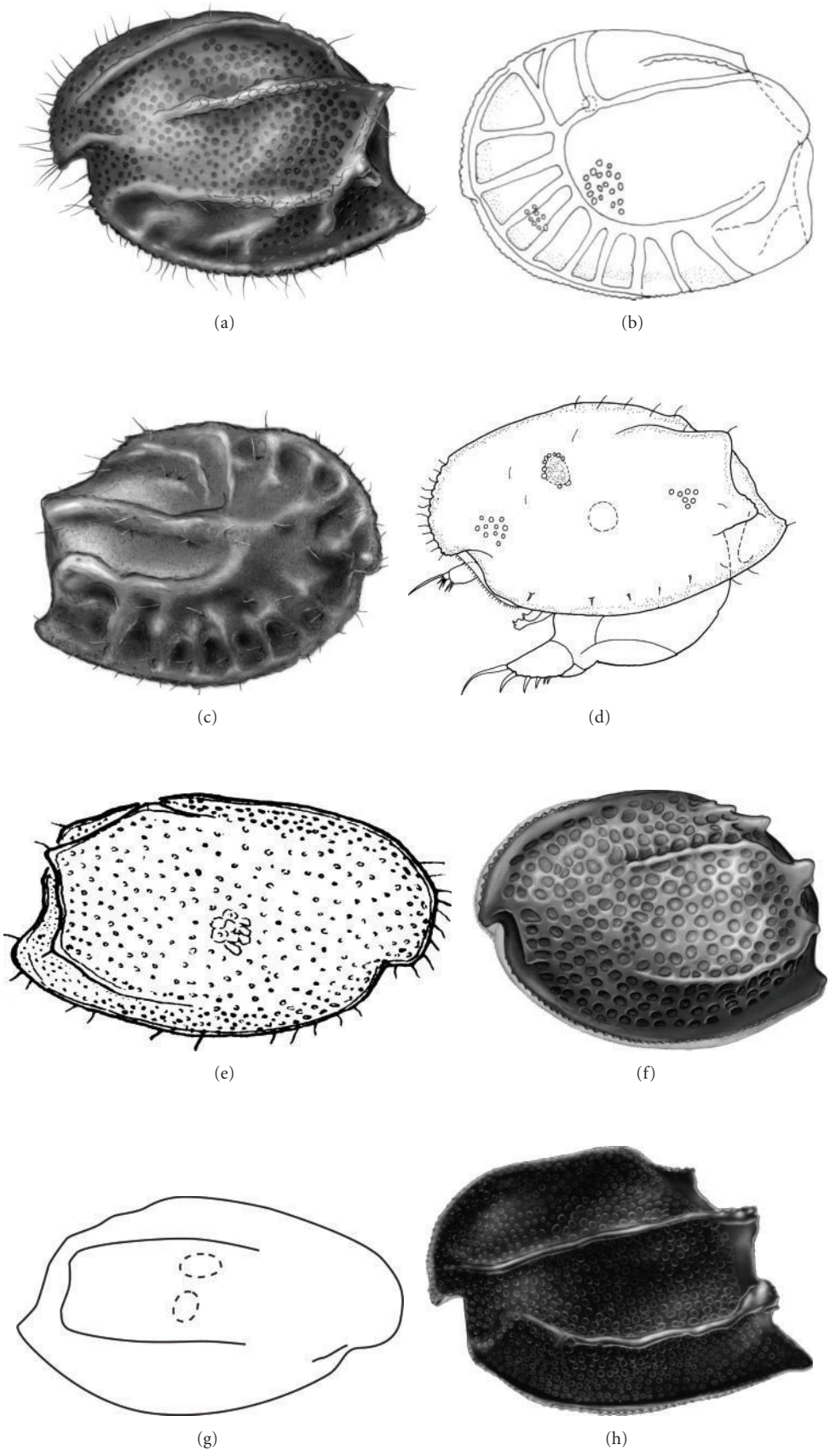


Figure 4: (a) *Rutiderma dux*, A-1 male, 0.99 mm. (b) *R. exrex*, female, 0.99 mm. (c) *R. ferax*, female, 1.16 mm. (d) *R. flex*, male, 1.21 mm. (e) *R. fusca*, male, 1.10 mm. (f) *R. gerdhartmanni*, female, 1.38 mm. (g) *R. gerdhartmanni*, male, 1.48 mm. (h) *R. gyre*, female, 1.10 mm.

of the claw-like c-bristle of the third endopodial segment of the mandible of *R. arx* has a small projecting tooth that is absent on *R. exrex*. The proximal and middle lobes of the large flat second exopodial segment of the fifth limb have 1 or 2 marginal cusps in *R. ferax*, but they are without cusps in *R. exrex*. The Y-sclerites of *R. ferax* and many specimens of *R. arx* are without a ventral branch, which is present in *R. exrex*. The female carapace of *R. exrex* is smaller than that of *R. arc* (Kornicker and Thomassin [52, page 92]).

5.11. Rutiderma ferax Kornicker in Kornicker and Thomassin [52] (Figure 4(c)). Rutiderma ferax Kornicker in Kornicker and Thomassin [52, pages 83–87, Figures 58–60, Table 1, Appendix], Kornicker and Harrison-Nelson [43, Tables 8, 9].

Holotype. Adult female holotype, Muséum National d'Histoire Naturelle, Paris.

Type Locality. Madagascar, BT-836 (Grand Récif; Petite Vasque 2 (residual pool 2); Sediment Collected (bag)).

Distribution. Type locality only.

Habitat. Grand Récif, Residue Pools of Reef Flat, sand, collected with a SC (shovel).

Life History and Ontogeny. Adult female.

Comparisons. *Rutiderma ferax* is very similar to *R. rex*. The main difference noted is in the infold of the caudal process of the carapace: the ridge dorsal to the pocket is straight of slightly convex and forms a 45° angle in *R. rex* (see Kornicker [49, Figure s 82b,c]) and is a shallow concave arc more-or-less parallel to the ventral edge of the caudal process in *R. ferax*. The length of the carapace of the female *R. ferax* is 1.16 mm, compared to from 0.90 to 0.92 mm (three specimens) for *R. rex* (Kornicker [49, page 142]). The caudal process has greater posterior projection in *R. ferax*. The anterodorsal and anteroventral infolds of *R. rex* each bears 4 or 5 bristles compared to 8 on *R. ferax*. The endopodite of the second antenna of *R. ferax* bears a small posterior spine absent on *R. rex*. The proximal and middle lobes of the second exopodial segment of the fifth limb of *R. ferax* bear 1 or 2 marginal cusps absent on *R. rex*. The Y-sclerite of *R. rex* bears a ventral branch absent on *R. ferax* (Kornicker and Thomassin [52, page 87]).

5.12. Rutiderma flex Kornicker in Kornicker et al. [56] (Figure 4(d)). Rutiderma flex Kornicker in Kornicker et al. [56, pages 91–95, Figures 48–51, Tables 1, 2].

Holotype. USNM 1021462, adult male.

Type Locality. Conch Sound Blue Hole, Andros Island, Great Bahama Bank.

Distribution. Type locality only.

Habitat. Sediment at 25 m depth about 365 m inside cave.

Life History and Ontogeny. Adult male.

Comparisons. The carapace of the male *R. flex* differs from that of *R. dinochelata* in that the upper lateral rib does not extend anteriorly to intersect the anterior edge of the rostrum, and the lower lateral rib does not extend anteriorly to midlength of the carapace. The structure of the posterior edge of the shelf in the anterior part of the pocket of the infold of the caudal process of *R. flex* differs from those of *R. darbyi* (Kornicker [16, Figure 23b]) and *R. schroederi* (Kornicker and Iliffe [77, Figure 53c,d (female)]). The infold of the rostrum of *R. flex* bears a row of 7 bristles compared to 12 on *R. mortenseni* (Poulsen [10, Figure 11b]). The adult male of *R. flex* is larger than that of *R. licina* Kornicker [16], the furca bears 1 or 2 instead of 3 secondary claws, and the basis of the mandible bears 4 instead of 6 bristles near the ventral margin (Kornicker et al. [56, page 95]).

5.13. Rutiderma fusca Poulsen [10] (Figure 4(e)). Rutiderma fusca Poulsen [10, pages 7, 8, 11, 14, 17, 38, 41–44, Figure 12], Kornicker [13, pages 70, 80], Cohen and Kornicker [78, pages 21, 26], Kornicker [49, page 136], Kornicker et al. [44, Tables 8, 9].

Holotype. Male, Zoological Museum, University of Copenhagen.

Type Locality. "Guardaga," Red Sea; surface (perhaps locality is Al Ghardaqah, Egypt).

Distribution. Type locality only.

Life History and Ontogeny. Male.

Comparisons. The Bellonci organ of *R. fusca* is pointed, whereas the Bellonci organ of *R. rex* is broadly rounded. *Rutiderma fusca* differs from the male *R. arx* in that the posterior edge of the alar process on the carapace of *R. fusca* species bears a backward pointing triangular process at the ventral and dorsal ends not present on the male *R. arx*.

5.14. Rutiderma gerdhartmanni Kornicker [13] (Figures 4(f)-4(g)). Rutiderma compressa Hartmann et al. [60, page 328 (part: adults)], Hartmann-Schröder and Hartmann [8, pages 25, 30, 33, 41, 45 (adults only)] (not Brady and Norman [55]).

Rutiderma gerdhartmanni. Kornicker [13, pages 25, 29, 47, 60, 70, 74, 80, 646–657, 673–675, 678, Figures 406, 408–410], Kornicker [54, page 43 (nom. nud.)], Hartmann and Petersen [79, page 228 (location of types Zoologischen Museums der Universität Hamburg)], Kornicker [30, Table 15], Kornicker [48, page 84], Parker [39, Table 1], Kornicker and Harrison-Nelson [43, Tables 8, 9].

Holotype. Gravid female labeled "Holotype," (no. 27297 includes all specimens from Chile identified by G. Hartmann as *Rutiderma compressa*), Hamburg Zoological Museum.

Type Locality. Bahia Ingles, Chile, 41°48′S, 75°53′W, 12 m.

Distribution. Type locality only.

Habitat. Benthic; 12 m; sand-mud and gravel.

Life History and Ontogeny. Female, male, 4 eggs.

Comparisons. The specimens identified by Hartmann as *R. compressa* have been assigned to a new species primarily because of the sixth limb on which the anterior part of the end segment forms a projecting process bearing 3 bristles. The sixth limb of *R. compressa* was not described in the original description by Brady and Norman [55] but was illustrated by Müller [59] from a specimen collected near South Africa. His figure shows the anterior part of the end segment of the sixth limb to be only very slightly separated from the posterior part. I have not examined either the specimens described by Brady and Norman or that described by Müller, and it is possible that they do not belong to the same species; however, both Brady and Norman and Müller illustrated the first antenna of a female. These illustrations

show the lack of a lateral bristle on the second segment and only 1 dorsal bristle on the third segment. The first antenna of *R. gerdhartmanni* bears a lateral bristle on the second segment and 2 dorsal bristles on the third segment. I do not, however, rely strongly on those differences in the first antennae, because bristles may have been overlooked by Brady and Norman and Müller, or they may have described and illustrated second antennae from juveniles. The carapace illustrated by Brady and Norman bears numerous riblets between the anterodorsal rib and the anterodorsal shell margin. These are not present on *R. gerdhartmanni*. The length of the carapace of the female *R. gerdhartmanni* is in the order of from 1.35 mm to 1.39 mm; the length of *R. compressa* given by Brady and Norman [55, page 674] was 1.5 mm; the length of the specimen identified as *R. compressa* by Müller was given by him as 1.6 mm [59, page 92] (Kornicker [13, page 657]).

5.15. Rutiderma gyre Kornicker [16] (Figures 4(h), 5(a)). *Rutiderma gyre* Kornicker [16, pages 4–8, 10–13, 15, 25, 54–62, 80, Table 1, Figures 30–35, Plate 3], Kornicker [33, Table 3], Kornicker [37, page 114], Oakley [65, Figures 1(b), 3(b)], Kornicker and Harrison-Nelson [43, Tables 8, 9], Harrison-Nelson and Kornicker [53, page 874].

Holotype. USNM 157988, ovigerous female.

Type Locality. Gulf of Mexico off Galveston, Texas, 28°10′N, 94°18′W; 53.5 m.

Distribution. Northwest Atlantic: Florida shelf, USA; predominantly from Gulf of Mexico from continental shelves of Florida, Alabama, Louisiana, and Texas.

Habitat. Benthic; from 6.1 to 148 m.

Life History and Ontogeny. Female, male, from 1 to 4 eggs.

Comparisons. The infold of the caudal process of the left valve of *R. gyre* does not have the flat spines present on the left valve of *R. darbyi*. *Rutiderma mortenseni* Poulsen [10], is known only from a single adult male. The male of *R. gyre* differs from the male of *R. mortenseni* in having from 6 to 8 rather than from 10 to 12 bristles forming a row on the rostral infold (Kornicker [16, 62a]).

5.16. Rutiderma hartmanni Poulsen [10] (Figures 5(b)-5(c)). *Rutiderma hartmanni* Poulsen [10, pages 7, 17, 18, 22, 32–35, 41, 151, Table 1, Figure 8, Keys to species of *Rutiderma* (males), (females) pages 17-18], Kornicker [13, pages 70, 80, 678], Kornicker [54, page 43 (compares to *R. leloeuffi*)], Cohen and Kornicker [78, pages 21, 26], Kornicker and Cohen [80, page 740, Table 1], Kornicker and Meyers [14, page 4], Kornicker [81, page 127], Kornicker [63, ii, iii, pages 1–28, Figures 1–20], Kornicker [48, page 84], Kornicker [49, pages 136, 137, 140, Table 17], Kornicker [37, pages 114, 192], Kornicker and Harrison-Nelson [43, page 467, Tables 1, 7–9].

Not Rutiderma rostrata. Hartmann [82, pages 195, 196, 198, 199] (placed in synonymy of *R. hartmanni* by Poulsen [10]), Kornicker [81, page 127] (= Rutiderma pax Kornicker [81]), *Rutiderma hartmanni*. Cohen [20, pages 322, 324, 325, 331, 334 (possibly new subspecies "A")].

Holotype. Female without eggs or embryos, Zoological Museum, University of Copenhagen.

Type Locality. SW Bay, San José Island, Pearl Islands, Gulf of Panama, East Pacific.

Distribution. Bay of Panama, Pacific Ocean.

Habitat. Depth 9 m.

Comparisons. *Rutiderma hartmanni* differs from *R. vox* in that it has an upturned tip on the c-bristle (claw) of the second endopodial segment of the female mandible. *Rutiderma hartmanni* can be distinguished from *R. kalkei* by the c-bristle on the first antenna; it lacks filaments on *R. hartmanni* but has 1 on *R. kalkei*.

5.17. Rutiderma irrostrata Kornicker and Caraion [47] (Figure 5(d)). *Rutiderma irrostratum* Kornicker and Caraion [47, pages 3–6, 54, 56–60, 106, Table 1, Figures 2, 3, 49–51, Plate 31], Kornicker [30, Table 15], Kornicker [49, page 136], Kornicker and Harrison-Nelson [43, Tables 1, 8, 9].

Holotype. 291, female (A-1 stage), "Grigore Antipa" Museum of Natural History, Bucharest, Romania.

Type Locality. Station X053, 21°47′00″N, 17°28′02″W, 260 m, Western Sahara.

Distribution. Northeast Atlantic off Western Sahara, Mauritania.

Habitat. Benthic; shelf-bathyal; from 94 to 250 m; sand and mud.

Life History and Ontogeny. Ovigerous female, A-1 female and male, juvenile.

Stomach Contents. Harpacticoid copepod, polychaete, and a nematode in the gut.

Comparisons. The main tooth of the first exopodite segment of the fifth limb of females and advanced juveniles of previously described species consist of 3 or 4 large prongs and a proximal peg. The main tooth of the new species *R. irrostrata* bears only 1 large prong with 3 marginal teeth. The b-bristle of the seventh segment of the first antenna is minute, much smaller than that bristle on previously described species. The tip of the seventh limb of *R. irrostrata* is either bare or has a few minute spines, unlike the tip of the limb of other species which bears 2 opposing combs with well-developed teeth. In addition, the rostrum is totally lacking on *R. irrostrata* and in its place is a minute line. The degree of development of the rostrum of previously described species varies, but none is without a rostrum. The above differences may warrant future inclusion of this species in a new subgenus of *Rutiderma* (Kornicker and Caraion [47, page 60]).

5.18. Rutiderma judayi McKenzie [9] (Figures 5(e)-5(f)). *Rutiderma judayi* McKenzie [9, pages 58, 64, 66, Figures 3, Plate 1: Figure 2], Kornicker [13, page 678 (compares to *R.* species B)], Kornicker and Myers [14, pages 25–31, 34, (key to species of adult females of southern California, key to species of adult males of southern California), Figures 15–18], Kornicker [48, page 84], Kornicker [37, page 114], Kornicker and Harrison-Nelson [43, Tables 8, 9], Frame et al. [45, Table 1, Figure 1 Fifth Row].

Holotype. USNM 110916, adult female.

Type Locality. Laguna Ojo de Liebre, Scammon Lagoon, Baja California, depth about 7 m.

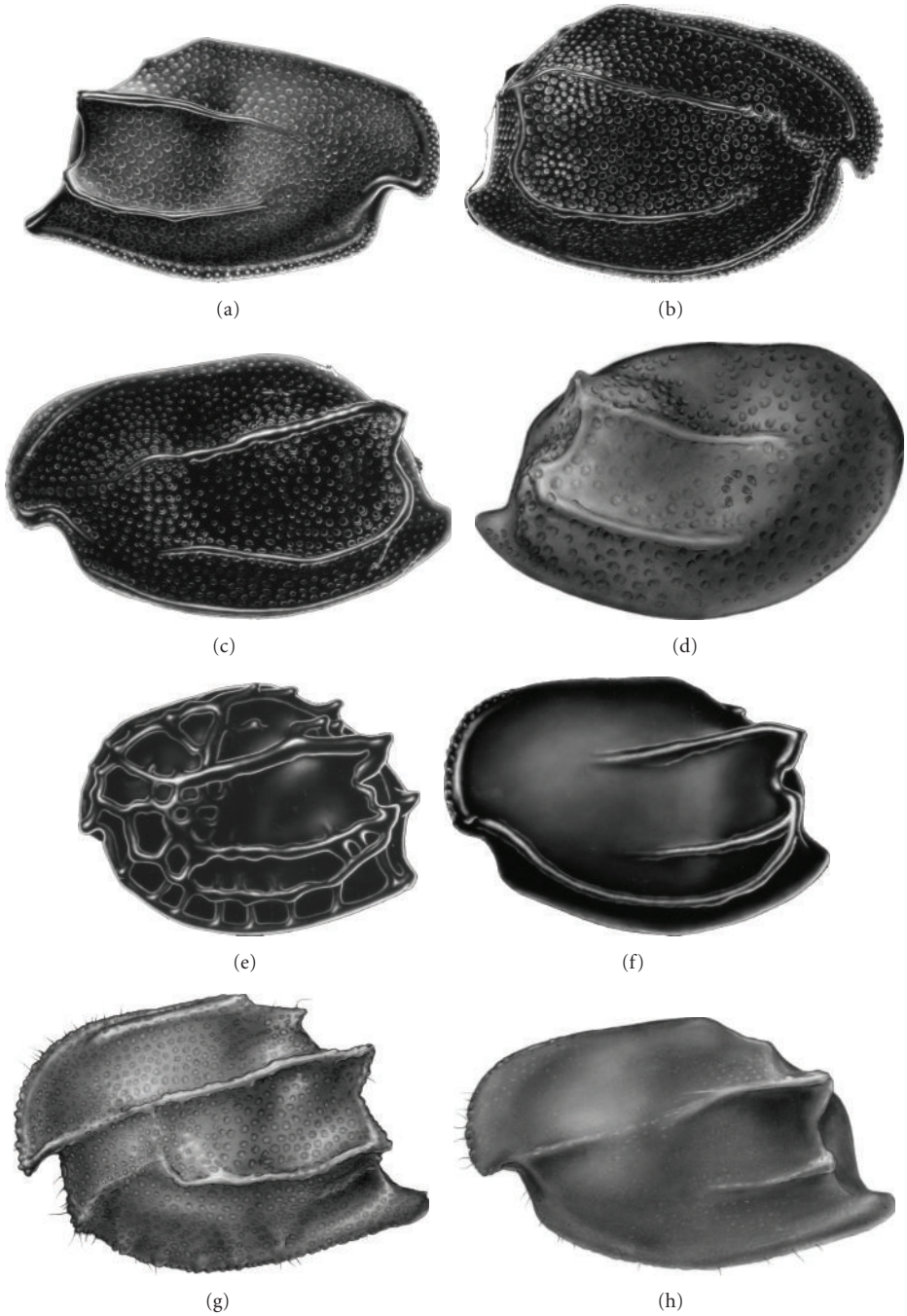


Figure 5: (a) *Rutiderma gyre*, male, 1.12 mm. (b) *R. hartmanni*, female, 1.12 mm. (c) *R. hartmanni*, male, 1.06 mm. (d) *R. irrostrata*, female, 1.50 mm. (e) *R. judayi*, female, 1.01 mm. (f) *R. judayi*, male, 1.03 mm. (g) *R. kalkei*, female, 1.08 mm. (h) *R. kalkei*, male, 1.14 mm.

Distribution. Northeast Pacific in Scammon Lagoon, Baja California, Mexico; San Diego and San Clemente Island, and La Jolla, California, USA

Habitat. Benthic, from 7 to 21 m; fine to coarse sands, mostly poorly sorted, quartz and sometimes shells principle components, surface water temperature and salinity: from 18.5°–25°C, from 34–37‰; lagoon organic production rate: 50 mg C m^{-3} d^{-1}; part of lower lagoon faunal assemblage; 3 cm deep, eel grass in tide pools.

Life History and Ontogeny. Female, male.

Comparisons. Rutiderma judayi differs from *R. vox* in having a deep indentation at midheight of the posterior edge of the alar process on each valve. The carapace of *R. judayi* is similar to *R. apex* but differs in that the female has a small process near the middle of the posterior margin that projects past the posterior end of the valve. The carapace is also similar to *R. chessi* but differs from it in that *R. judayi* has 3 instead of 2 main horizontal ribs, has more processes on the posterodorsal margin, and has a less acute caudal process.

5.19. Rutiderma kalkei Kornicker [16] (Figures 5(g)-5(h)). *Rutiderma kalkei* Kornicker [16, pages 1, 10, 12, 15, 16, 25, 73–80, Table 1, Figures 3, 44–48], Kornicker [33, Table 3], Kornicker [48, page 84], Kornicker [37, page 114], Kornicker and Harrison-Nelson [43, Tables 8, 9], Harrison-Nelson and Kornicker [53, page 874].

Rutiderma kalke. Kornicker [16, page 12] (misspelling).

Holotype. USNM 159079, ovigerous female.

Type Locality. South Texas continental shelf, off Port Isabel, 26°10′N, 96°24′W, 91 m.

Distribution. Gulf of Mexico: south Texas shelf, USA

Habitat. Benthic; 91 m.

Life History and Ontogeny. Female, male, 3 eggs.

Stomach Contents. 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* (Kornicker [16, page 80]).

5.20. Rutiderma leloeuffi Kornicker [13] (Figure 6(a)). *Rutiderma leloeuffi* Kornicker [54, pages 2, 40–45, Figures 29–32], Kornicker and Caraion [47, pages 2–4, 6, 54–56, 66, 103–105, Figure 48, Plates 28–30], Kornicker [30, Table 15], Kornicker [48, page 84], Kornicker [49, page 136], Kornicker and Harrison-Nelson [43, Tables 1, 8, 9].

Holotype. USNM 149330, adult female.

Type Locality. Station 18, near Grand Bassam, Ivory Coast, 5°12′05″N, 3°49′05″W, 20 m.

Distribution. Northeast Atlantic: off Ivory Coast and Mauritania.

Habitat. Benthic; shelf-bathyal; from 20 to 150 m; fine sand; water temperature and salinity: 28.9°C, 34.4‰.

Life History and Ontogeny. Female, A-1 male.

Comparisons. *Rutiderma leloeuffi*, new species, differs from *R. hartmanni* and *R. mortenseni* in having only 3 stout claws on the furca. It differs from *R. normani* in having a larger and more elongate carapace. The incisur is more distinct and the rostrum and caudal process more prominent on *R. leloeuffi* than on *R. compressa*, *R. dinochelata*, *R. gerdhartmanni*, and *Rutiderma* species A and B (Kornicker [54, page 43]).

5.21. Rutiderma licina Kornicker [16] (Figures 6(b)-6(c)). *Rutiderma licinum* Kornicker [16, pages 2, 4–8, 10, 12, 25, 47–54, 85, Table 1, Figures 2, 25–29, Plate 2], Kornicker [81, page 130, Figure 3c (compares with *R. pax*)], Kornicker [33, Table 3], Cohen and Morin [21, Figure 3 (compares copulatory organs with other families of Myodocopida)], Kornicker [48, page 84], Kornicker [37, page 114], Kornicker and Harrison-Nelson [43, Tables 8, 9], Oakley [65, Figures 1(b), 3(b)], Kornicker et al. [56, page 95], Harrison-Nelson and Kornicker [53, page 874].

Holotype. USNM 154186, ovigerous female.

Type Locality. Gulf of Mexico, off Galveston, Texas, 28°16′N, 94°06′30″W, 53 m.

Distribution. Northeast Atlantic: North Carolina continental shelf, USA: Gulf of Mexico: Florida, Alabama, and Texas continental shelves.

Habitat. Benthic; from 17 to 68 m.

Life History and Ontogeny. Female, male, from 1 to 3 eggs.

Comparisons. All the following bear 3 strong claws on each lamella of the furca. The new species *R. licina* differs from *R. tridens*, *R. mollita*, and *R. compressa*, in that the female has a fairly deep incisur with overhanging rostrum, not a right angle forming the incisur as in the other three species (Kornicker [16, page 54]).

5.22. Rutiderma lomae Juday [58] (Figures 6(d)-6(e)) . *Philomedes lomae* Juday [58, pages 141, 142 (syntypes not extant)], Müller [46, pages 26, 31], Skogsberg [23, page 380 (not in *Philomedes*)], Lucas [83, page 399 (mentions)], Poulsen [25, pages 358, 395 (compares to *Scleroconcha*)], McKenzie [9, page 57 (mentions)], Poulsen [10, pages 15–17, 22].

(?) *Philomedes lomae.* Hartmann [84, pages 230, 231, 247], Hartmann [85, pages 60, 61, 76, Table opposite pp. 83 (identification of specimens from El Salvador needs verification)], Hartmann-Schröder and Hartmann [86, pages 33, 34, 48], Hartmann [87, pages 171, 264 (identification of specimens from Chile needs verification)].

Rutiderma lomae. Kornicker and Myers [14, pages 1-2, Keys: 3-4 (Species of adult females from southern California, Species of adult males of southern California), pages 10–18, 34, Figures 5–10], Kornicker [48, page 84], Kornicker [37, pages 114, 192], Kornicker and Harrison-Nelson [43, Tables 1, 8, 9].

Neotype. USNM 158258, adult female.

Neotype Locality. 33°34′15″N, 118°00′45″W, California, USA (locality data for Juday [58], in Michael and McEwen [88, pages 133, 143]).

Distribution. Off San Diego, off Santa Catalina Island, and Oxnard, California; (?) El Salvador; (?) Southeast Pacific: Bay of Caldera, Chile.

Habitat. Planktonic, surface [58]; benthic, sediment at 9.8°C. (?) Benthic; upper sublittoral, shelly sand beach.

Life History and Ontogeny. Male, female, juvenile female, 4 eggs.

Comparisons. The males of *R. lomae* and *R. apex* are very similar except that the middle part of the vertical rib of the carapace of *R. apex* seems to be better developed. The females of *R. lomae* and *R. apex* can be differentiated by the vertical rib at the posterior end of the alar process on the carapace; on *R. lomae*, there is a space near the middle, but, on *R. apex*, it is continuous. *Rutiderma lomae* females have a shorter caudal process, more bristles on the list of the caudal process, and a longer b-bristle on the first antenna than female specimens of *R. vox*. *R. vox* also has a stouter fourth claw on the furca, and it lacks a minute bristle near the middle of the margin.

5.23. Rutiderma mollita Darby [74] (Figures 6(f)-6(g)). *Rutiderma mollita* Darby [74, pages 29, 58. Plate 15: Figures 1, 2], Kornicker [13, page 74], Kornicker and Caraion

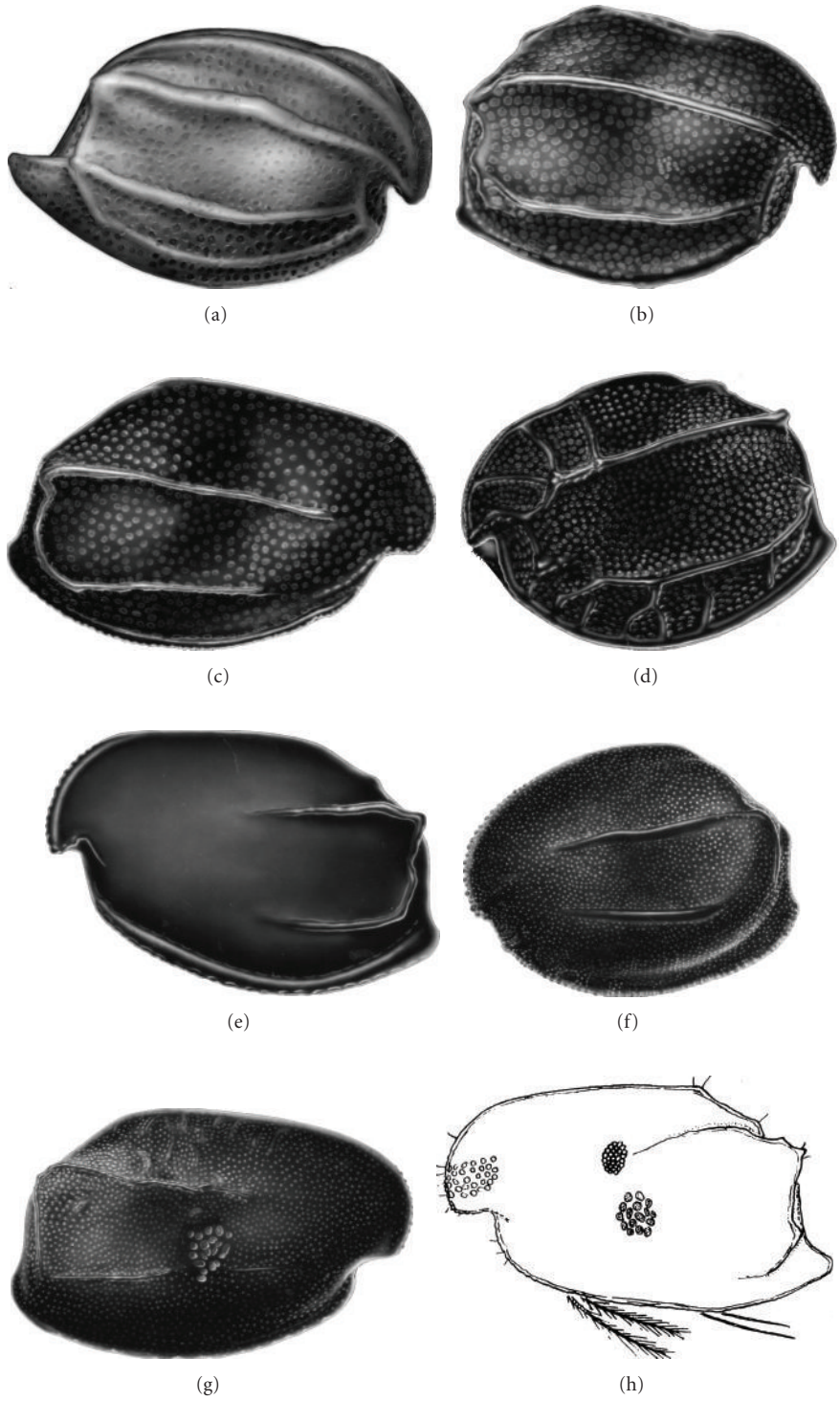


Figure 6: (a) *Rutiderma leloeuffi*, female or instar, 1.99 mm. (b) *R. licina*, female, 1.02 mm. (c) *R. licina*, male, 1.08 mm. (d) *R. lomae*, female, 1.46 mm. (e) *R. lomae*, male, 1.21 mm. (f) *R. mollitum*, female, 1.46 mm. (g) *R. mollitum*, male, 1.47 mm. (h) *R. mortenseni*, male, 1.07 mm.

[47, page 66 (compares to *R. tridens*)], Oakley [65, Figures 1, 3 (compares to other species)].

Rutiderma mollitum. Kornicker [16, pages 2–7, 12, 13, 15, 25, 28–36, 54, 85, Table 1, Figures 3, 12–17], Kornicker [33, Table 3], Kornicker [37, page 114], Grabe [18, Tables 2, 5], Kornicker and Harrison-Nelson [43, Tables 8, 9], Oakley [65, Figures 1(b), 3(b)], Harrison-Nelson and Kornicker [53, page 874].

Holotype. UMMP 48791, female, University of Michigan, Museum of Paleontology.

Type Locality. Continental shelf off Sapelo Island, Georgia, from 19.8 m.

Distribution. Northwest Atlantic: shelf off South Carolina to Florida; Gulf of Mexico: Tampa Bay, shelf off Florida, Alabama.

Habitat. Benthic; from 5.4 to 190 m; salinity and temperature: about 30‰ (Darby) and 35‰, 32°C; fine to coarse sand.

Life History and Ontogeny. Female, male, 3 to 4 eggs.

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 (Kornicker [16, page 36]).

5.24. Rutiderma mortenseni Poulsen [10] (Figure 6(h)). Rutiderma mortenseni Poulsen [10, pages 7, 8, 11, 14, 17, 38–41, 43, 44, Figure 11], Kornicker [13, pages 70, 80], Kornicker [54, page 43], Cohen and Kornicker [78, pages 21, 26], Kornicker and Cohen [80, Table 1], Kornicker [16, pages 12, 13, 25, 28, 62, 67, 70, Table 1], Kornicker [33, Table 3], Kornicker and Harrison-Nelson [43, Tables 8, 9], Kornicker et al. [56, page 95].

Holotype. Male, Zoological Museum, University of Copenhagen.

Type Locality. Virgin Islands, West Indies.

Distribution. Type locality only.

Life History and Ontogeny. Male.

Comparisons. *Rutiderma mortenseni* has 10–12 bristles in the rostral infold, whereas *R. gyre* has just 6–8. On *R. arcuatilis*, the curvature of the list of the caudal process has a low angle with the ventral margin, but, on *R. mortenseni*, it forms a 45° angle. The two species also differ in that *R. arcuatilis* has bristles all-on the ends.

5.25. Rutiderma normani Poulsen [10] (Figures 7(a)-7(b)). Rutiderma normani Poulsen [10, pages 7, 8, 11, 14, 17, 18, 22–32, 34, 38, 41, 452, Figures 4–7, 150], Cohen and Kornicker [78, pages 21, 26], Hartmann [28, Figure 389b] (according to Hartmann [60] and Poulsen [10]), Kornicker [13, pages 70, 74, 80], Kornicker [54, page 43], Hanai et al. [89, page 49], Kornicker and Cohen [80, Table 1], Hiruta and Maddocks [90, page 674, Table 1], Jones [91, Table 1], Kornicker [63, page 14], Kornicker [48, page 84], Kornicker [49, pages 136, 140, Table 17], Kornicker [37, page 114], Kornicker and Harrison-Nelson [43, Tables 1, 7–9].

Holotype. Zoological Museum, University of Copenhagen.

Type Locality. Koh Kahdat, Thailand, 8–10 m.

Distribution. Type locality and Koh Mesan-Cape Liant, Koh Kam, and Koh Chung on the south coast of Thailand.

Habitat. Benthic; from 2 to 17 m; sand, gravel, and corals.

Life History and Ontogeny. Female, ovigerous female, male, juvenile male, 1 juvenile, 4 eggs.

Comparisons. *Rutiderma dux* is close to *R. normani* Poulsen [10, page 22], and they could be conspecific. The female sixth limbs of the two species differ in that the ventral margin of the end segment of *R. normani* is straight (Poulsen [10, Figure 4j]), whereas the anterior 3 bristles on the end segment of *R. dux* are on a long projection. Also, Poulsen [10, pages 26, 28] described both the female and male furcae of *R. normani* as having 3 main claws and 3 secondary claws, whereas the female and male furcae of *R. dux* have 4 main claws and 2 secondary claws. *Rutiderma normani* has a shorter and less elongate carapace than *R. leloeuffi*. *R. normani* and *R. arx* differ in that *R. arx* lacks lateral ribs on the carapace, whereas *R. normani* does have lateral ribs. While *R. normani* has a serrate list on the infold of the caudal process of the right valve, *R. vox* does not. According to Poulsen [10], the males of *R. rostrata* and *R. normani* are similar but *R. normani* has just 1 bristle on the ventral margin of the mandible basale and has at least 7 bristles on the end segment of the sixth limb. The shell height of *R. rostrata* is also greater than that of *R. normani* (Poulsen [10]). The females of *R. normani* and *R. rostrata* differ in that *R. rostrata* does not have the prominent longitudinal shell-ridges that *R. normani* does (Poulsen [10]).

Remarks. Poulsen [25, Figure 7] identified two juveniles of *Rutiderma normani* as "females?", but on page 30 he stated for the same two specimens: "As the copulatory limbs and the secondary sexual characters of the first and second antennae were not developed, the sex of these two young larvae could not be ascertained." The endopod of the second antenna of the adult female of the species has only one short segment (Poulsen [10, page 23, Figures 4f.f']), whereas, the endopodes of the second antennae of the two juveniles (Figures 7b, 7i) are elongate. Therefore, it is the opinion of Kornicker (herein) that the two juveniles are males.

5.26. Rutiderma oakley Kornicker, new species (Figures 7(c)-7(d)). Etymology. The species is named after Todd H. Oakley, University of California.

Rutiderma species B Kornicker [16, pages 10, 80–85, Table 1, Figures 49–51], Cohen [20, pages 322, 324, 325, 331, 333], Kornicker [37, page 114], Kornicker and Harrison-Nelson [43, Tables 8, 9].

Holotype. USNM 159019, ovigerous female.

Type Locality. Gulf of Mexico, continental shelf off South Texas, USA, Transect 4, 25 may 1977, 26°10′N, 97°08′W, depth 15 m.

Paratypes. *Rutiderma* species B in Kornicker [16, page 80].

Distribution. Belize, vicinity of Carrie Bow Key, 16°49′N, 88°.05′W, Continental shelf off South Texas, 26°10′N, 97°08′W, depth ca. 15 m.

Description. A detailed description of adult male and female is presented in Kornicker [16, pages 80–85, Figures 49–51]. The furca bears 4 stout claws followed by 2 small claws on each lamella. Tip of terminal claw of second endopodial segment of adult female mandible with elongate slightly upturned tip.

Comparisons. The new species *Rutiderma oakley* differs from *R. mollita* 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 oakley* differs

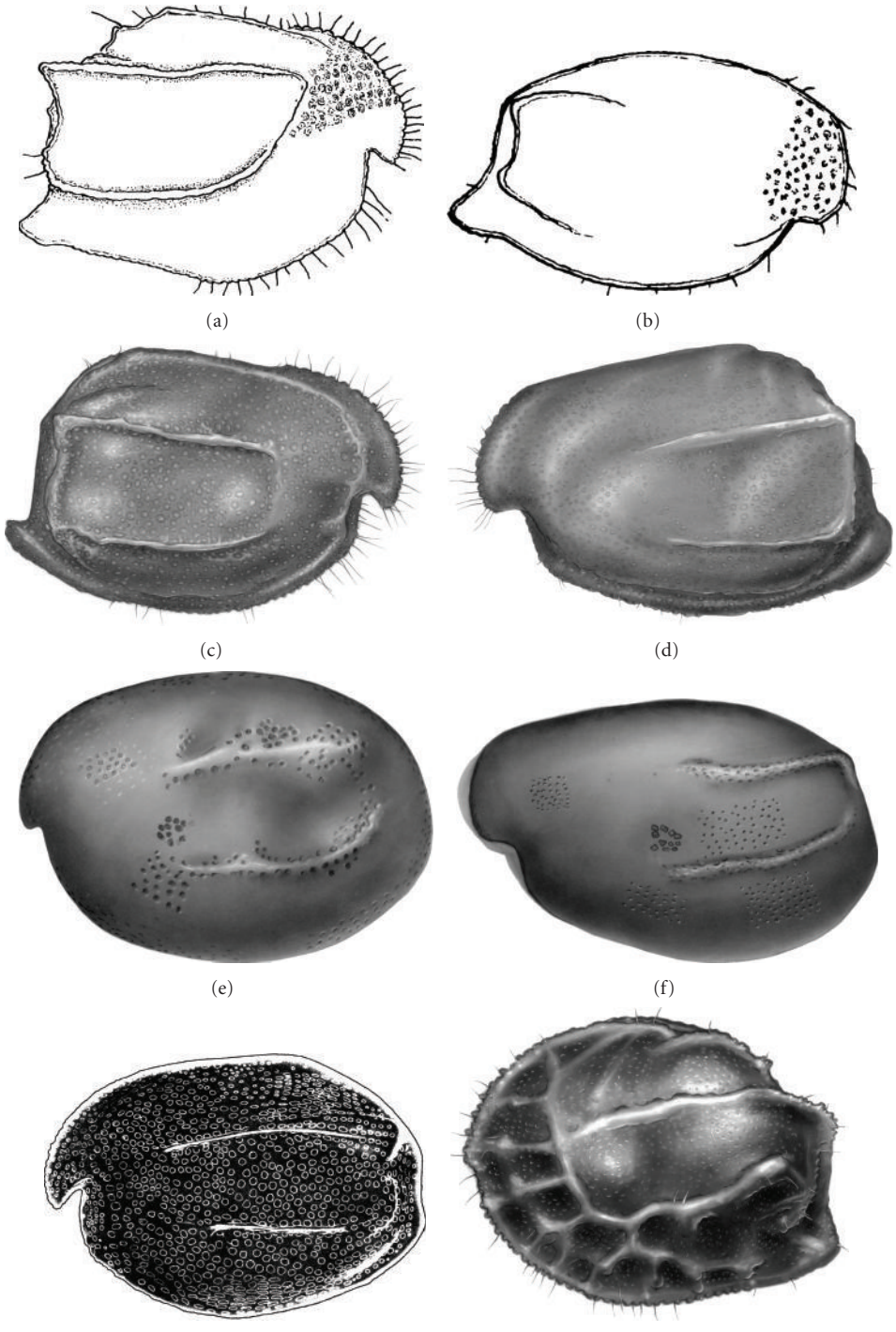


Figure 7: (a) *Rutiderma normani*, ovigerous female, 1.25 mm. (b) *R. normani*, male, 1.2 mm. (c) *R. oakley*, female, 1.11 mm. (d) *R. oakley*, male, 0.98 mm. (e) *R. ovata*, female, 1.52 mm. F. *R. ovata*, male, 1.59 mm. (g) *R. pax*, female, 1.00 mm. (h) *R. rex*, ovigerous female, 0.92 mm.

from *R. cohenae* in that the caudal process of the left valve is broadly rounded rather than triangular. Only *R. cohenae* and *R. oakley* have a prolonged tip at the end of the terminal claw of the second endopodial segment of the adult female mandible and on juveniles in both sexes. Most species of *Rutiderma* do not have a prolonged tip on the terminal claw on the second segment.

5.27. Rutiderma ovata Kornicker [13, 54] (Figures 7(e)-7(f)). *Rutiderma ovata* Kornicker [13, pages 10, 29, 47, 60, 65, 70, 74, 80, 646, key: 647, 650, 657–673, Figures 407, 411, 412–424, 432 h–k], Kornicker [30, Table 15], Kornicker and Cohen [80, Table 1], Kornicker [63, pages 25, 26], Kor-nicker [37, page 114], Kornicker and Harrison-Nelson [43, Tables 8, 9].

Holotype. USNM 137683, gravid female.

Type Locality. "Eltanin Cruise 3, station 71, sample 71–26, 31°05′S, 71°44′W to 31°06′S, 71°47′W, depth 192–176 m, shelf west of Chile."

Distribution. Southeast Pacific: off Chile: 31°10′S, 71°56′W; 31°05′S, 71°44′W; 31°06′S, 71°47′W.

Habitat. Benthic; from 192 to 176 m (shelf); (?) 1834 m (probably not collected at that depth).

Life History and Ontogeny. Female, male, A-1 juvenile male, juvenile, from 2 to 4 eggs.

Stomach Contents. Nematodes, crustacean fragments, annelid spines, copepods, and sedimentary particles.

Comparisons. Because of the absence of a projecting posteroventral caudal process, the carapace of the new species resembles that of *R. rotunda* Poulsen [10]. The incisur of *R. ovata* is much more developed than that of *R. rotunda*, also the latter has 6 proximal bristles on the seventh limb compared vto just 4 on *R. ovata*. The furca of *R. ovata* bears 6 claws compared to 5 for *R. rotunda*. *Rutiderma californica* McKenzie [9], which is synonym of *R. rotunda*, also has 6 proximal bristles on the seventh limb and the carapace is more ornate than that of *R. ovata.*

In addition to difference in shape of the carapace, *R. rostrata* Juday [58], differs from *R. ovata* in having 4 strong claws on the furca. *Rutiderma compressa* Brady and Norman [55] has a carapace with a projecting posteroventral caudal process, which is absent on *R. ovata* (Kornicker [13, page 673]).

5.28. Rutiderma pax Kornicker [81] (Figure 7(g)). Rutiderma rostrata Hartmann [82, pages 195, 196, 198, 199], Kornicker [30, page 4] (note in synonymy that species not *R. rostratum* Juday [58]).

Rutiderma rostrata. Hartmann [82, page 195 (misspelling)].

Rutiderma hartmanni. Poulsen [10, page 32 (part; includes only *R. rostrata* of Hartmann in synonymy)].

Rutiderma pax. Kornicker [81, pages 127–131, Figures l–3a], Hartmann and Petersen [35, page 158].

Holotype. K-27314 (G1), ovigerous female, Zoologisches Museum Hamburg.

Type Locality. Off Mejanguera Island, Gulf of Fonseca, El Salvador, sublittoral, 12 m (Hartmann [82, pages 195, 196]).

Distribution. Northeast Pacific: El Salvador: Mejanguera.

Habitat. Benthic; 12 m; mud.

Life History and Ontogeny. Female, 1 egg.

Comparisons. Three species similar to *R. pax* in having carapaces with poorly defined lateral ribs and in not having a prominent backward projecting caudal process are *R. rostrata* Juday [58], *R. licina* Kornicker [16], and a species identified as *R. rostrata* Juday by McKenzie [9], but which is probably a new species (USNM 110918). The three species can be distinguished from *R. pax*, as well as from each other, by the morphology of the tip of the stout terminal claw of the second endopodial segment of the female mandible (Kornicker [81, pages 130-131]).

5.29. Rutiderma rex Kornicker [49] (Figure 7(h)). Rutiderma rex Kornicker [49, pages 140–144, Tables 1, 2, Figures 81–83], Kornicker and Harrison-Nelson [43, Tables 8, 9].

Holotype. MNHN Os 277, ovigerous female, Muséum National d'Histoire Naturelle, Paris, France.

Type Locality. "Station 101-DS, 8 Apr 1977, NW Île du Lys, Glorioso Islands, 11°25′42″S, 47°19′30E, 26 m."

Distribution. Collected only at type-locality, from sediment. (Females only).

Life History and Ontogeny. Adult female, ovigerous females.

Comparisons. The carapace of *R. rex* with its rugosity and minute incisur resembles that of *R. compressa* Brady and Norman [55, page 673]. The carapace of *R. rex* is much smaller; the tip of the claw-like c-bristle on the second endopodial segment of the mandible of *R. compressa* is produced and pointed (Brady and Norman [55], Plate LVIII: Figure 14), unlike that of *R. rex*. Only the male is known of *Rutiderma fusca* (Poulsen [10, page 41]), so its carapace and most appendages are not directly comparable with those of the female *R. rex* (male unknown). However, *R. fusca* has a pointed Bellonci organ (Poulsen [10, Figure 1]), whereas that of *R. rex* is broadly rounded, indicating that they are not conspecific. The small size and rugosity of the carapace of *R. rex* easily distinguish it from *R. arx*, the only other species of *Rutiderma* in the present collection; they differ also in the morphology of the Y-sclerite, which is unbranched in *R. arx* and branched in *R. rex*. The carapace of *R. rex* differs from that of *R. vox* Kornicker [48, page 78] in having a smaller rostral projection (Kornicker [49, page 144]).

5.30. Rutiderma rostrata Juday [58] (Figures 8(a)-8(b)). Rutiderma rostrata Juday [58, pages 142, 147–149, Plate 20: Figures 8–13], Müller [46, page 35].

Rutiderma (*Rutiderma) rostrata.* Kornicker [6, pages 236, 237].

(?) *Rutiderma rostrata*. Lie [11, pages 274, 288, 550 (specimens not available; identification needs verification)], Lie and Kisker [12, page 2279].

Rutiderma rostratum. Kornicker [13, pages 70, 80, 678], Kornicker and Myers [14, pages 1–10, keys: 3-4 (adult females; adult males), Figures 1–4], Cohen and Kornicker [78, pages 21, 26], Kornicker and Cohen [80, Table 1], Kornicker [81, pages 127–131, Figures 3b,d (compares to *R. pax*)], Kornicker [48, page 84], Kornicker [37, page 114], Kornicker and Harrison-Nelson [43, Tables 8, 9].

Not *Rutiderma rostrata.* Hartmann [82, pages 195, 196, 198, 199] (= *R. pax* Kornicker [16]), Hartmann [60, page 328], Poulsen [10, pages 6–9, 11, 14, keys: 17-18, 18–22, 31–35, 38, 41, 43, Figures 2, 3, Table 1 (= *R.* species)], McKenzie [9, pages 58, 62–64, Figure 2; Plate 1: Figure 3, (*R.* species)].

Holotype. Female, unique specimen, not extant.

Type Locality. Glorietta Bight, San Diego Bay.

Distribution. Northeast Pacific: off California, USA: San Diego, Oxnard, Monticeito. (?) Northeast Pacific: Washington, USA: Puget Sound and off northern coast about 125°W between 47°N and 48°N.

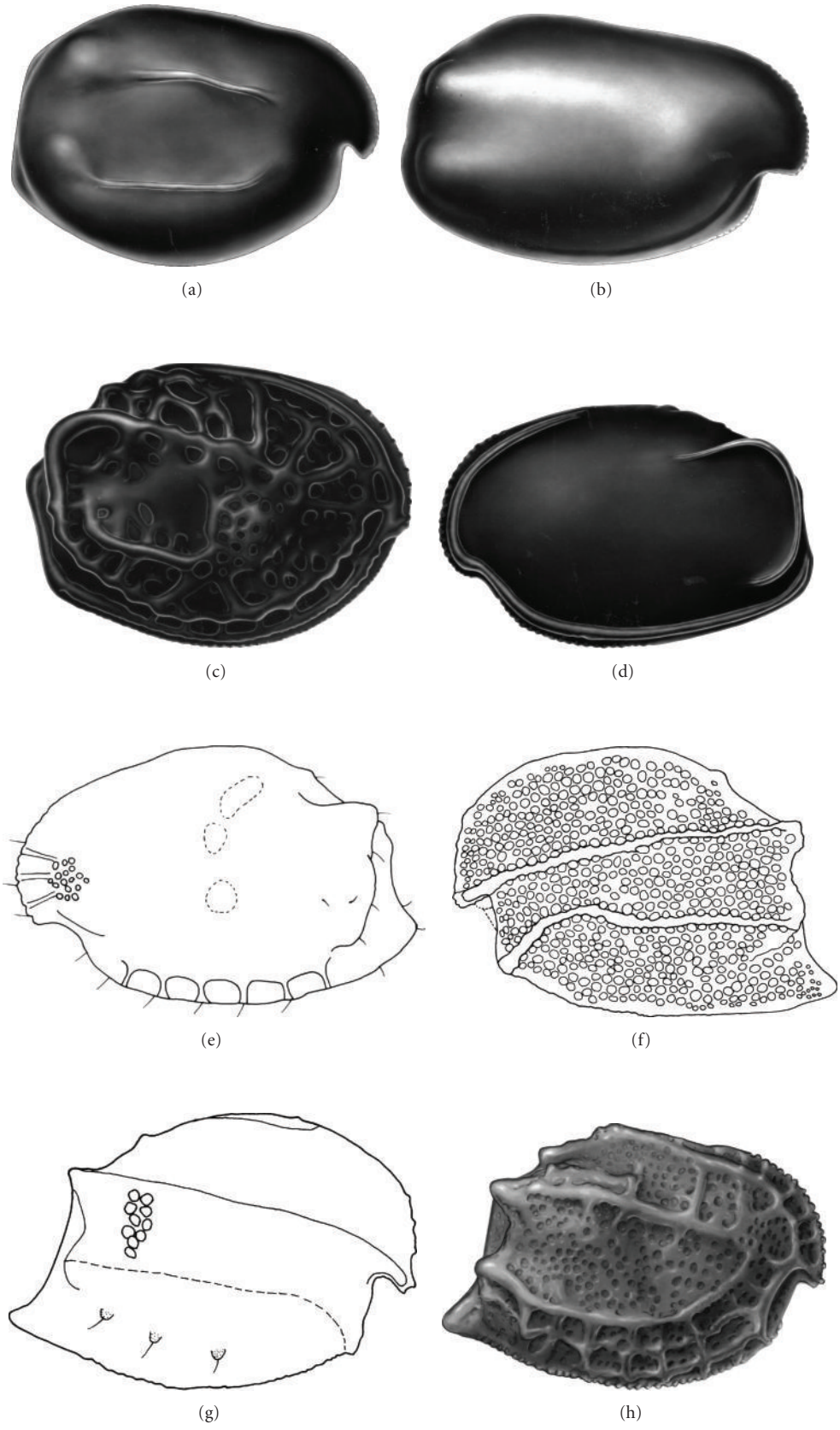


Figure 8: (a) *Rutiderma rostrata*, female, 1.32 mm. (b) *R. rostrata*, male, 1.29 mm. (c) *R. rotunda*, female, 1.33 mm. (d) *R. rotunda*, male, 1.24 mm. (e) *R. sagax*, male, 1.05 mm. (f) *R. schroederi*, female, 1.73 mm. (g) *R. schroederi*, instar III, 1.09 mm. (h) *R. sterreri*, female, 1.10 mm.

Habitat. Benthic: from 11 to 22 m; sand. (?) Benthic; from 15 to 317 m; sand, sand and mud, mud, mud and gravel, fine sand mixed with shell fragments.

Life History and Ontogeny. Female, male, 2 eggs.

Comparisons. *R. rostrata* is similar to *R. pax* in having carapaces with poorly defined lateral ribs and in not having a prominent backward projecting caudal process. *Rutiderma hartmanni* differs from *R. rostrata* in that the shell of *R. rostrata* lacks riblets or ridges and is ovular, whereas, in *R. hartmanni*, the shell is ridged and has a posterior pointing process (Poulsen [10]).

5.31. Rutiderma rotunda Poulsen [10] (Figures 8(c)-8(d)). *Rutiderma rotunda* Poulsen [10, pages 7, 17, key to females: 17–18, 22, 34–38, 43, 455, Table 1, Figures 9, 10 (Holotype: Female, Zoological Museum, University of Copenhagen, Denmark; type-locality: "La Jolla, California, shallow water")], Cohen and Kornicker [78, pages 21, 26], Kornicker [13, pages 70, 74, 80, 673], Kornicker [63, page 14].

Rutiderma californica. McKenzie [9, pages 58, 65, 66, Figure 4; Plate 1: Figure 1], Kornicker and Meyers [14, page 18 (Holotype: Female, USNM 110911; type locality: "Laguna Ojo de Liebre. . .Scammon Lagoon, Baja California, Mexico")], Kornicker [13, page 673 (compares to *R. ovata*)].

Rutiderma rotundum. Kornicker and Myers [14, page 2], emendation, Key to species of adult females and males of southern California pages 3-4, 18–25, Figures 11–14, Kornicker [37, page 114], Kornicker and Harrison-Nelson [43, Tables 1, 8, 9], Frame et al. [45, pages 337, 339, Table 1, Figure 1 Fifth row].

Distribution. Northeast Pacific: California, USA: off La Jolla. (Poulsen), Irvine Beach, Ocean Beach (San Diego), between Newport Beach and Laguna Beach; Mexico: Scammon Lagoon, Baja, California.

Habitat. Benthic; from 0.3 to <22 m; shallow water, rocks with algae, eel grass, tide pools; fine to coarse sand, mostly poorly sorted, mainly quartz or shell, 18.5°C surface salinity from 34–37‰, productivity about 50 mg C m^{-3} d^{-1}; eel grass and tide pool vegetation.

Life History and Ontogeny. Females, male, juvenile females, from 2 to 4 eggs.

Comparisons. The carapace of *R. rotunda* is similar to *R. ovata* because of the absence of a projecting posteroventral caudal process. It differs from *R. ovata* in that it has a less well-developed incisur and a more ornate carapace. *Rutiderma rotunda* also differs from *R. compressa* in the incisur. *Rutiderma compressa* has a right angle between the incisur and the margin, whereas *R. rotunda* has an obtuse angle.

5.32. Rutiderma sagax Kornicker [50] (Figure 8(e)). *Rutiderma sagax* Kornicker [50, pages 28–31, Figures 17-18, Table 1, Appendices 1-2].

Holotype. AM P45365, male.

Type Locality. Darwin, Australia, station JLB Darwin 302 and 305 combined (Station 302: Channel Island, 20 August 1982, mud; station 305 (same as station 304): East Point, 22 Aug 1982), both samples from intertidal washings of algae and substrate.

Distribution. Collected only at type locality.

*Habita*t. Mud.

Life History and Ontogeny. Adult male.

Comparisons. This species differs from the previously described species of the genus in having 7 furcal claws (3 primary and 4 secondary). The carapace of *R. sagax* is readily separated from that of *R. dux* because of the absence of flat pointed spines on the infold of the caudal process of the left valve. In addition to having fewer claws, the furca of *R. dux* differs from that of *R. sagax* in having 4 rather than 3 primary claws (Kornicker [50, page 31]).

5.33. Rutiderma schroederi, Kornicker and Iliffe [77] (Figures 8(f)-8(g)). *Rutiderma schroederi*, Kornicker and Iliffe [77, pages 53–61, Figures 33–38, Tables 1, 2, Appendix], Kornicker [42, pages 798, 808–810, Figure 7], Kornicker and Harrison-Nelson [43, Tables 7–9], Kornicker et al. [56, page 95, Table 1].

Holotype. USNM 194472, adult female.

Type Locality. Station 94–018, transect AA Buoy, Exuma Sound, depth 67 m.

Distribution. Bahamas: Great Exuma Island, Lee Stocking Island, depth 67–100 m.

Habitat. Sandy sediments on ledges of upper slope and submarine escarpment.

Life History and Ontogeny. Female with small, unextruded eggs, instar III, late instar.

Stomach Contents. Crustacean fragments.

Comparisons. The carapace of *R. schroederi* outwardly resembles that of *R. darbyi* Kornicker [16, page 36]. The infold of the caudal process of the left valve of *R. schroederi* is without the pleated ruffle present on *R. darbyi* (the ruffle is easily visible through the outside of the left valve). The carapace of *R. schroederi* also outwardly resembles *R. gyre* Kornicker [16, page 54], but the infold of the caudal process of *R. schroederi* is without the vertical crescent list present on *R. gyre*. The endopodites of the second antennae of *R. darbyi* and *R. gyre* are without the ringed posterior bristle present on *R. schroederi*. The carapace of *R. schroederi* also outwardly resembles that of *R. cohenae* Kornicker [16, page 62], which was collected near San Salvador, Bahamas, and Key West, Florida, from subtidal to 4 m depth (Kornicker [16, page 62]). The morphology of the infolds of the caudal processes of the two species is also similar. The rostral infold of *R. schroederi* bears 17 bristles compared to 7 or 8 for *R. cohenae*. The length of the carapace of the unique female of *R. schroederi* is 1.73 mm, compared to a range of 1.24 to 1.29 mm for two females of *R. cohenae* (Kornicker [16, page 63]). A major difference between the two species occurs in the mandible: the c-bristle of the second endopodial segment of *R. cohenae* has a prolonged finger-like tip that is absent on *R. schroederi*. Slides of three type-specimens of *R. cohenae* were reexamined during the present study, and all 6 limbs have the long finger-like tip on the c-bristle. The two specimens of *R. schroederi* examined do not have the long finger-like tip, but the tip of one limb of the holotype is obviously broken. The endopodites of the second antennae of *R. schroederi* and *R. cohenae* both share the unusual character of having a fairly long posterior bristle; the bristle is ringed in *R. schroederi*

and unringed in *R. cohenae*, but more specimens should be examined to determine whether this character might be variable (Kornicker and Iliffe [77, page 61]).

Internal muscles are of limited use in identifying segments of *R. schroederi*. The interpretation of segmentation of the female fifth limb of this species is based mainly on that derived from the study of the fifth limb of *Isocypridina* (Kornicker [41, 42, pages 800, 806, 808]).

5.34. Rutiderma sterreri Kornicker [30, 31] (Figures 8(h), 9(a)). Rutiderma sterreri Kornicker [31, pages 1, 2, 5–8, Figures 3–5], Kornicker [16, pages 11–13, 25, 70–73, Figures 41–43], Kornicker [33, Table 3], Maddocks et al. [34, page 282, Figure 90 (part)], Kornicker [37, page 114], Kornicker and Iliffe [71, pages 43, 45, Figures 25, 26, Tables 4–8, Appendix], Kornicker [48, page 84], Kornicker and Harrison-Nelson [43, Tables 8, 9].

Holotype. USNM 158115, ovigerous female.

Type Locality. Station 630820, Harrington Sound, Bermuda, about 11 m.

Distribution. Northwest Atlantic: Bermuda.

Habitat. Benthic; from intertidal to 11 m; algae, grasses, oysters, shells, mud with grass, mud, coarse sand with *Thalassia* and *Halimeda* overlying mud, red sponge and algae, sand and mud under rocks.

Life History and Ontogeny. Female, male, 4 eggs.

Parasites. Choniostomatid copepod (Kornicker [31, page 8]).

Comparisons. The species *R. sterreri* differs from *R. dinochelata* in that the tip of the Bellonci organ is rounded, not pointed. The lengths of the three specimens of *R. dinochelata* listed by Kornicker [6, page 237] ranged from 1.14 to 1.22 mm (average 1.18 mm). The lengths of seven ovigerous females of *R. sterreri* measured herein ranged from 0.94 to 1.10 mm (average 1.00 mm). A closer comparison of the two species will require a better description of *R. dinochelata* (Kornicker [31, page 8]).

5.35. Rutiderma tridens Kornicker and Caraion [47] (Figures 9(b)-9(c)). Rutiderma tridens Kornicker and Caraion [47, pages 3–5, 54, 60–66, Figures 1–3, 52–55, Plates 32, 33], Kornicker [30, Table 15], Kornicker [49, page 136], Kornicker [37, page 114], Kornicker [48, page 84], Kornicker and Harrison-Nelson [43, Tables 1, 8].

(?) *Rutiderma compressa.* Müller [59, pages 53, 92, 93, Plate 7: Figures 1–13]. (questionably referred to *R. tridens* by Kornicker and Caraion [47, pages 60, 65]: "The carapace of *R. tridens* resembles that of the female of *R. compressa* from South Africa illustrated by Müller [59, Plate 7:1]. Müller's specimen has been put into synonymy of *R. tridens* with a question, because the first antenna illustrated by Müller [59, Plate 7:2] does not show a lateral bristle on the second segment, but this could be because the illustration is a medial view of the limb. The first, third, and fourth endites of the sixth limb illustrated by Müller [59, Plate 7:12] have a different number of bristles than do the same endites of the two specimens of *R. tridens* described herein, but this could be the result of intraspecific variability."), Müller [46, page 35], Hartmann [26, pages 183, 201, Figure 115b (after Müller)], Kornicker [48, page 84]. (Not Brady and Norman [55]).

Holotype. USNM 152829, A-1 male.

Type Locality. Station X051, 21°48′01″N, 17°02′00″W; 30 m; Western Sahara.

Distribution. Northeast Atlantic: off Western Sahara. (?) Southeast Atlantic: South Africa.

Habitat. Benthic; 30 m; sand.

Life History and Ontogeny. A-1 male.

Comparisons. The species *R. tridens* differs from *R. compressa* Brady and Norman [55], in not having anterodorsal and ventral ribs and riblets on the surfaces o the valves. The carapace of *R. tridens* resembles that of the female of *R. compressa* from South Africa illustrated by Müller [59, Plate 7:1]. Müller's specimen has been put into the synonymy of *R. tridens* with a question because the first antenna illustrated by Müller [59, Plate 7:2] does not show a lateral bristle on the second segment, but this could be because the illustration is a medial view of the limb. The first, third, and fourth endites of the sixth limb illustrated by Müller [59, Plate 7:12] have a different number of bristles than do the same endites of the two specimens of *R. tridens* described herein, but this could be the result of intraspecific variability. *Rutiderma tridens* is easily separated from *R. leloeuffi* by the absence of ribs on the anterior half of the valves and by having a smaller caudal process. Klie ([5, page 406]) did not describe the specimens from Lüderitz Bay, South-West Africa, that he identified as *R. compressa* Brady and Norman; their identification should be verified. The carapace of *R. tridens* differs from that of *R. mollita* Darby [74], in having the caudal process projecting past the posterior end of the shell (Kornicker and Caraion [47, pages 65–66]).

5.36. Rutiderma tryx Kornicker [50] (Figure 9(d)). Rutiderma tryx. Kornicker [50, pages 31–36, Figures 19–21, Table 1, Appendices 1-2].

Holotype. QM W20741, undissected, ovigerous female, Queensland Museum.

Type Locality. Lizard Island, Australia, station AC-LI-2, west of Lizard Island Research Station, off Casuarina Beach; 200–300 m off shore of sandy beach; depth of water about 1.5 m; substrate silty sand, some substrate very thin on flat rock lying between coral heads in patch reef.

Distribution. Collected only at type locality.

Habitat. Silty sand.

Life History and Ontogeny. Ovigerous female with 2 eggs.

Comparisons. The carapace of *R. tryx* differs from that of *R. sagax* (only male known) in having an alar process with a convex rather than a concave posterior edge. The furca of *R. tryx* bears 6 claws on each lamella compared to 7 on *R. sagax*. The anterior ridge of the infold of the left valve caudal process of *R. dux* bears numerous flat pointed spines that are absent on *R. tryx* (spines usually are visible through shell). The furca of *R. dux* bears 4 primary and 2 secondary claws on each lamella compared to 3 primary and 3 secondary claws on the furca of *R. tryx* (Kornicker [50, page 36]).

5.37. Rutiderma vox Kornicker [48] (Figures 9(e)-9(f)). Rutiderma sp. Kornicker [92, pages 217, 218, Figure 1b].

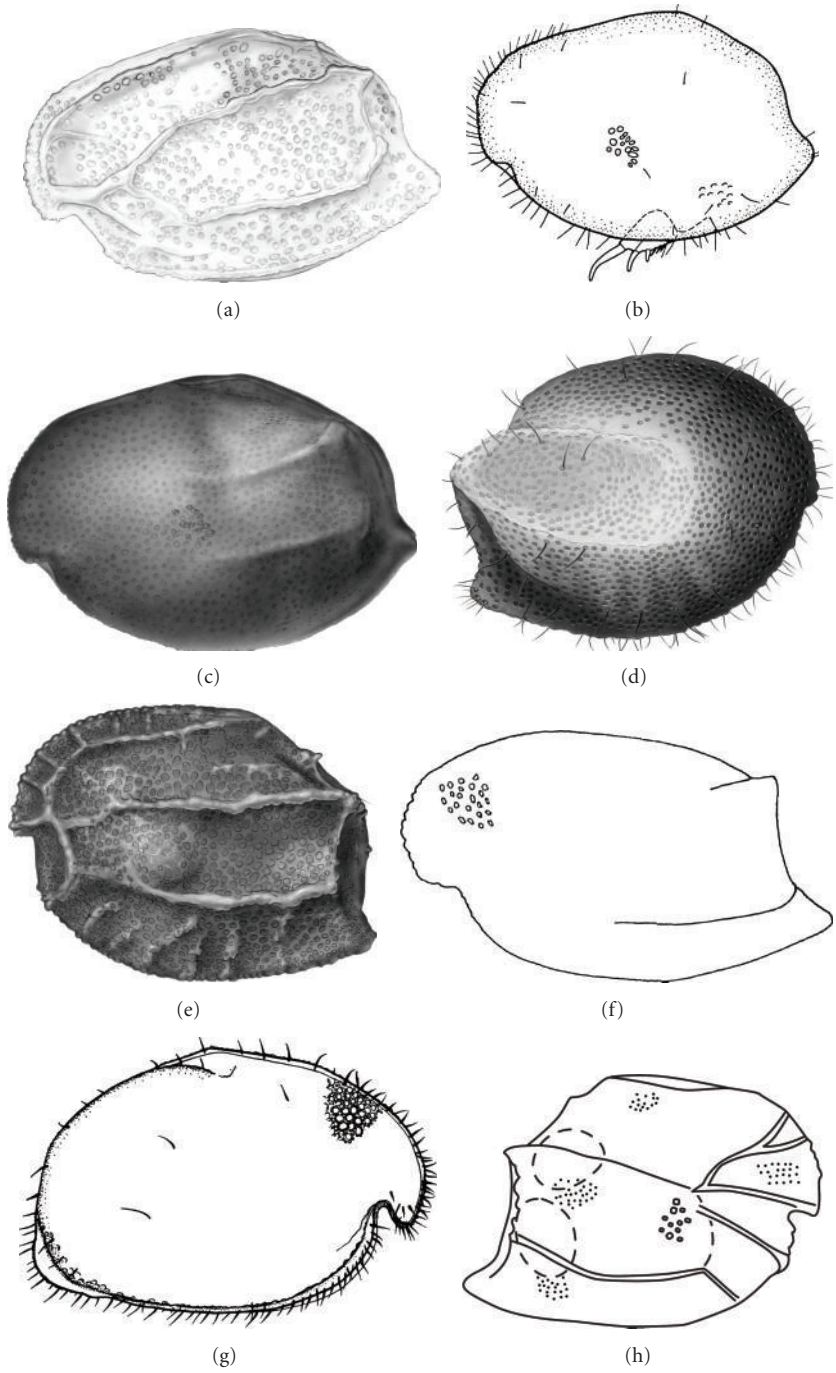


Figure 9: (a) *Rutiderma. sterreri*, male, 0.95 mm. (b) *R. tridens*, A-1 female, 1.24 mm. (c) *R. tridens*, A-1 male, 1.32 mm. (d) *R. tryx*, ovigerous female, 1.10 mm. (e) *R. vox*, female, 0.91 mm. (f) *R. vox*, male, 1.0 mm. (g) *Scleraner chacaoi*, female, 1.30–1.4 mm. (h) *S. trifax*, ovigerous female, 1.77 mm.

Rutiderma vox Kornicker [48, pages 78–84, Figures 39–42, Table 1], Kornicker [37, page 114], Kornicker and Harrison-Nelson [43, Tables 8, 9].

Holotype. USNM 158309, ovigerous female.

Type Locality. Enewetak lagoon from sample collected from various airlift and emergence trap samples, from 5 to 8 m of water.

Distribution. Enewetak Atoll.

Habitat. Sandy lagoon shelf.

Life History and Ontogeny. Adult male, female, ovigerous female (from 1 to 4 eggs).

Comparisons. *R. vox* differs from *R. normani* in not having a serrate list on the infold of the caudal process of the right valve and from *R. darbyi* Kornicker [16, 19] in not having a serrate list on the infold of the caudal process of the left valve. The female *R. vox* differs from the female *R. lomae*

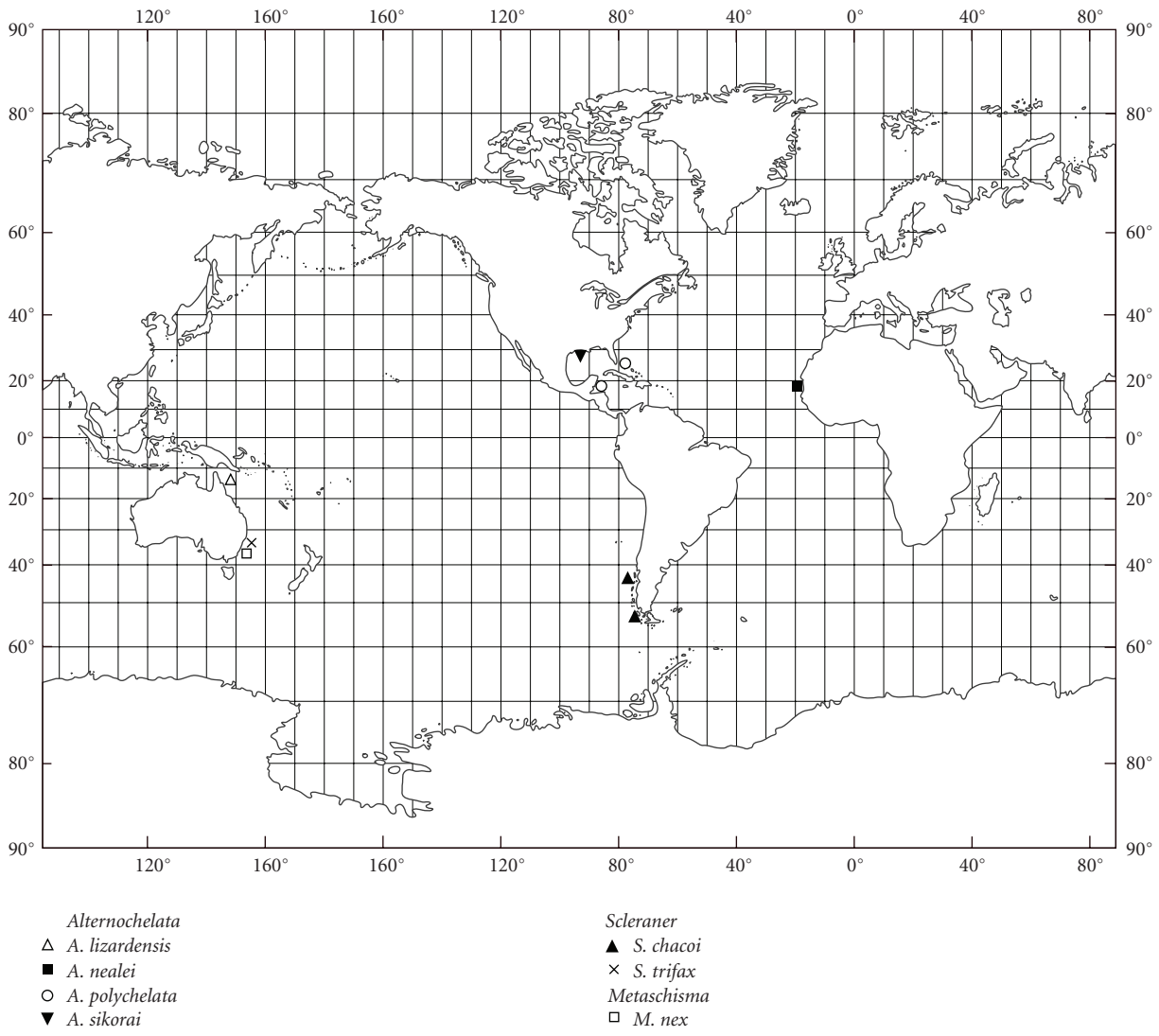


Figure 10

in having a longer caudal process, fewer bristles on the list of the caudal process, a shorter b-bristle on the seventh segment of the first antenna, an endopodite of the second antenna without a minute bristle near the middle of its margin, and a slightly stouter fourth claw on the furca. *Rutiderma vox* differs from *R. judayi* in not having a deep indentation at midheight of the posterior edge of the alate process on each valve. *Rutiderma vox* differs from *R. gerdhartmanni*, *R. chessi*, *R. sterreri*, *R. arcuatilis*, *R. cohenae*, and *R. kalkei*, in having marginal teeth on the 3 lobes of the second segment of the female fifth limb. The female *R. vox* differs from the female *R. compressa*, *R. rostrata*, *R. leloeuffi*, and *R. tridens* in not having a prolonged tip on the c-bristle of the second endopodial segment of the female mandible. *Rutiderma vox* differs from *R. hartmanni*, *R. pax*, and *R. licina* in not having an upturned tip on the c-bristle (claw) of the second endopodial segment of the female mandible. The list of the caudal process of the female *R. vox* is longer and more oblique than that of the female *R. dinochelata*.

6. Species in Open Nomenclature

6.1. Rutiderma species A Cohen [20]. Cohen [20, pages 322, 324, 327, 330, 331, 332, 334, 325, Figure 4].

Distribution. Belize, vicinity of Carrie Bow Key, 16°49′N, 88°05′W.

Habitat. Lagoon, back-reef, *Thalassia*, plankton; 1.5 m. Sand and rubble zone. Outer fore-reef, 30 m. Sand trough.

Life History and Ontogeny. Live specimens reared from egg to second instar.

6.2. Rutiderma Species KE Cohen [20]. Cohen [20, pages 324, 326].

Distribution. Belize.

Habitat. Sand trough, outer fore-reef slope, spur and groove, and back-reef.

6.3. Rutiderma Species KO Cohen [20]. Cohen [20, pages 322, 331].

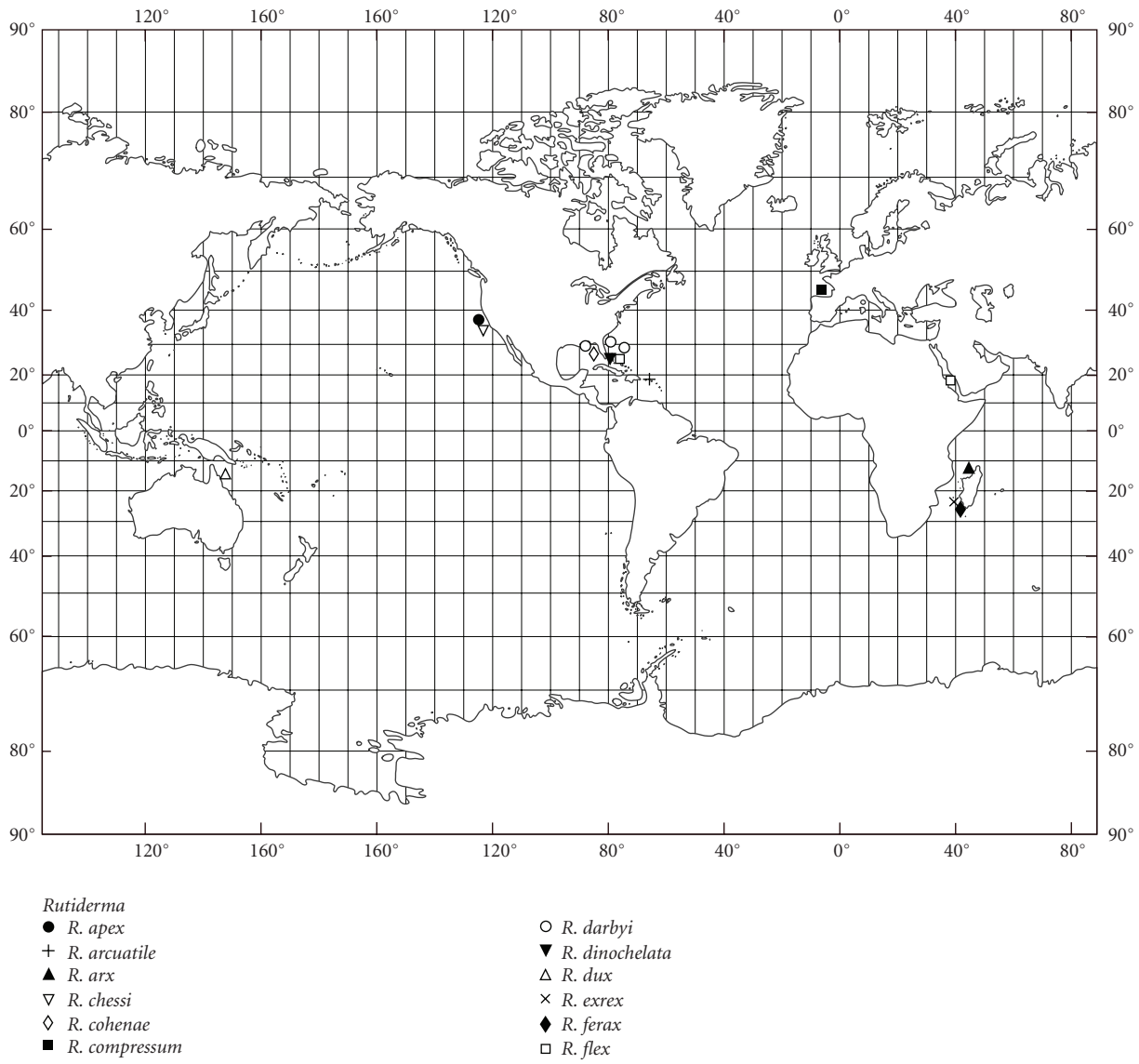


Figure 11

Distribution. Belize.

Habitat. Spur and groove, lagoon plankton, outer fore-reef, 30 m. Sand trough.

6.4. Rutiderma Species L Cohen [20]. Cohen [20, pages 324, 326].

Distribution. Belize.

Habitat. Sand and rubble zone, lagoon plankton.

6.5. Rutiderma sp. Spears and Abele [93]. Rutiderma sp. Spears and Abele [93, pages 172, 175 (GenBank accession number L81942)].

Remarks. This is the first study of a myodocopid using DNA sequencing.

Distribution. Near LTS buoy (fore-reef and groove), Discovery Bay Laboratory, Jamaica, 50 ft.

6.6. Scleraner Kornicker [15]. Scleraner Kornicker [13, pages 645, 646, 648 Figures 405, 656 Figures 411, 678. (Type species by original designation: *Rutiderma (Rutiderma) chacaoi*] Hartmann [60]. Gender: masculine, Kornicker [54, page 40 (mentions)], Kornicker [37, pages 114, 115, 123], Parker [39, page 105], Kornicker and Harrison-Nelson [43, pages 429, 465, 467].

6.7. Scleraner chacaoi [60] (Figure 9(g)). Rutiderma (Rutiderma) chacaoi Hartmann in Hartmann-Schröder and Hartmann [8, pages 328–332, Figures 36–44].

Rutiderma chacaoi. Hartmann-Schröder and Hartmann [8, pages 24, 30, 33, (station data and ecology), Table 3], Hartmann [26, page 129, Figure 73i (according to Hartmann 1959), 183, 184: Figure 73i, 106e (according to Hartmann 1965); 1975: page 68, Figure 398a (after Hartmann 1965)], Hartmann and Petersen [79, page 228 (location of types)], Kornicker and Harrision-Nelson [43, page 467, Tables 8, 9].

Scleraner chacaoi (Hartmann). Kornicker [13, pages 16, 24, 29, 47, 60, 62, 70, 80, 650, 656, 678–682, Figure 428],

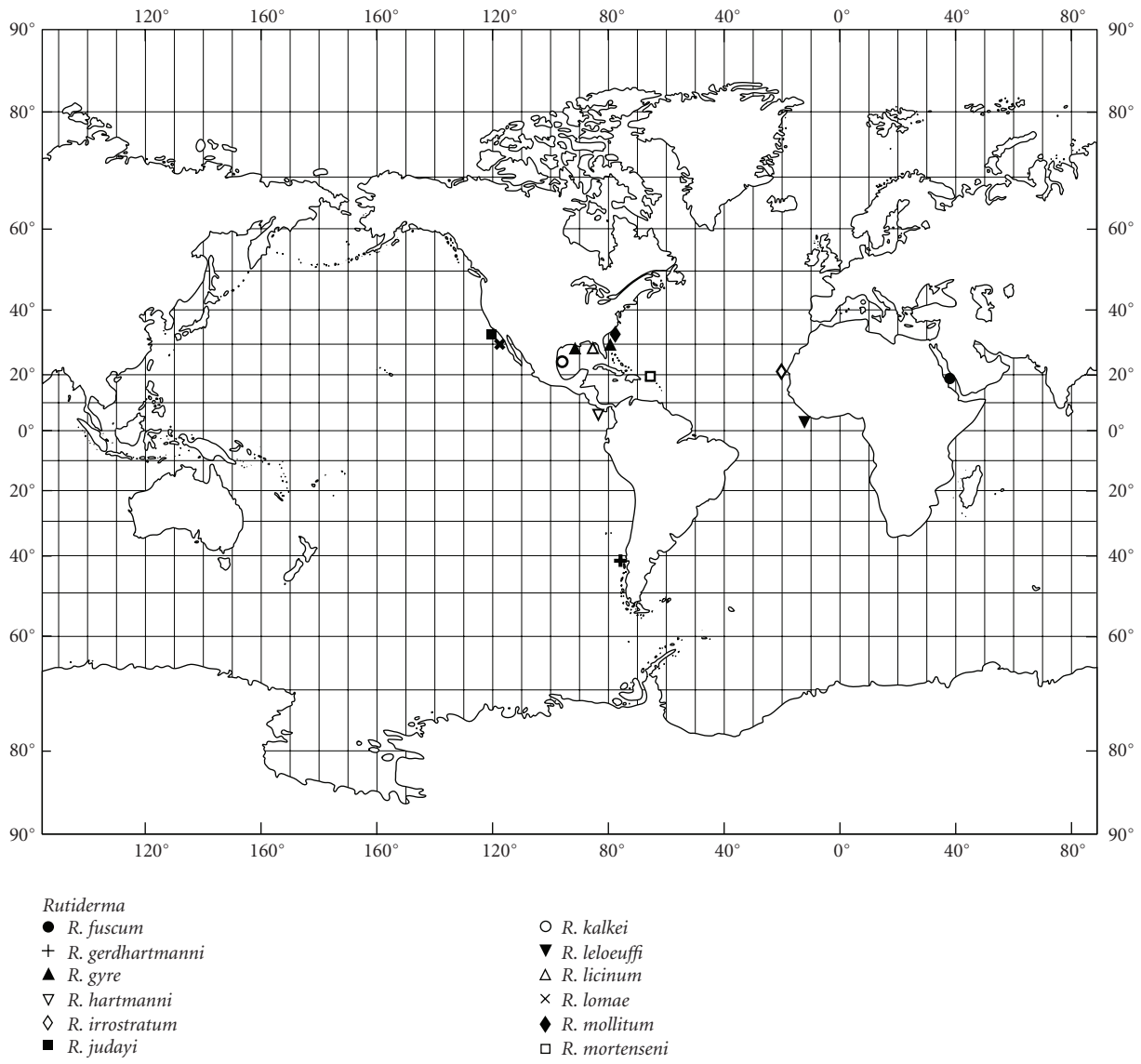


Figure 12

Kornicker [16, page 12 (misspelling)], Kornicker and Cohen [29, page 8], Kornicker [37, page 123], Kornicker and Harrison-Nelson [43, page 467, Tables 8, 9].

Holotype. K 27302 A-l juvenile female, Hamburg Zoological Museum.

Type Locality. Gulf of Corcovado, Canal of Chacao, South Chile.

Distribution. Southeast Pacific: Chile: Gulf of Chacao; 53°41′40″S, 72°0′45″W (shelf), Fortescue Bay, Straits of Magellan; 50°16′42″S, 74°48′28″W (shelf).

Habitat. Benthic; 190 m; fine-grained sand with mud, detritus and rocks, temperature about 11°C, O_2 about 3.5 ml/l, 21.3 and 30 m, bottom coarse with much red algae and bottom of pea gravel with mud.

Life History and Ontogeny. A-1 female, A-1 male, juveniles.

6.8. Scleraner trifax Kornicker [37] (Figure 9(h)). *Scleraner trifax* Kornicker [37, pages 115–123, 192, Tables, 1, 2, Figures 64e, 65–68, Appendices 1, 2], Parker [39, Figure J], Kornicker and Harrison-Nelson [43, page 467, Tables 1, 8, 9].

Holotype. Ovigerous female in the collection of the Museum of Victoria, Australia.

Type Locality. Slope 1, 34°59.52′S, 151°5.94′E, off Nowra, New South Wales, 204 m.

Distribution. Type locality and Slopes 21, 22, 48, 204–400 m.

Habitat. Coarse shell, muddy shell.

Life History and Ontogeny. Adult male and female, A-1 male, juveniles, from 2 to 3 eggs.

Comparisons. The carapace of *S. trifax* differs from that of *S. chacaoi* in having lateral ribs. The second segment of the endopodite of the female second antenna differs in having 1 instead of 2 bristles. Each lamella of the furca of *S. trifax*

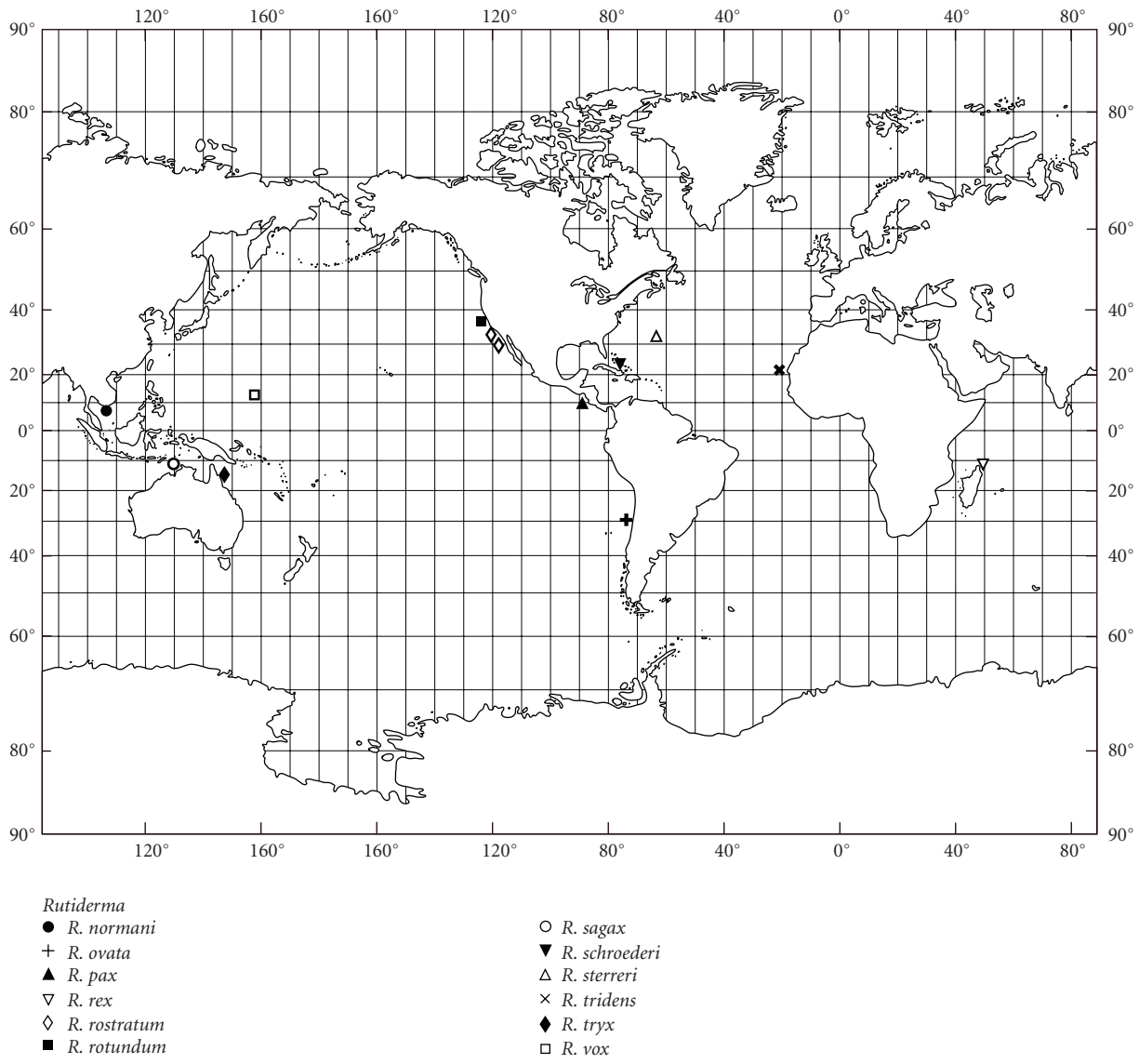


Figure 13

has 3 primary claws followed by 3 secondary claws; that of *S. chacaoi* has 4 primary claws followed by 5 secondary (Kornicker [37, page 123]).

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