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THE GENERA CASMARIA, GALEODEA, PHALIUM AND CASSIS IN THE WESTERN ATLANTIC

BY
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This number concludes the genera of the family Cassididae that are known to occur in the Western Atlantic. (See Johnsonia, No. 9.)

Members of this family are not common as individuals. Though specimens of any one species may not be rare, they seldom if ever occur in profusion. I have seen *Cassis tuberosa* in fair numbers at Settlement Point, Grand Bahama Island, but they occurred far more infrequently than the large *Strombus gigas* which could be had actually by the boat load. Cassids exist in all tropical seas and some species extend well into the temperate zones. About 140 species, subspecies, and forms are known, the largest number existing in the vast Indo-Pacific area. The large cassids of the Western Atlantic are generally found in fairly shallow water, though *Cassis madagascariensis spinella* of the Lower Florida Keys is in water generally deeper than 2 fathoms.

Both *Cassis* and *Phalium* present many very difficult problems in naming. Both genera are exceedingly variable, particularly in size, and this character has but little relative significance. Sculpture is also variable, and extremes in this character show rather remarkable differences. Large series of specimens do show, however, individuals that connect the rather divergent elements by a smooth series of gradations.

Adults among the cassids, especially *Cassis* and *Phalium*, are difficult to determine. The production of a lip is merely a stage in the growth and not an index that final growth has been reached as it is among most other gastropods. The development of a lip indicates a period of rest in the growth of the individual; when new growth starts again, the outer margin of the lip remains behind as a cicatrix. Even this character is variable and not all specimens show the same rate of growth, or produce the same number of lips during a life span. Under "measurements," the "small" specimens measured are only a stage in size, though we selected those having strong and heavy lips, as probably adult.

Similar to other large and attractive shells, the cassids were sought after by the early European collectors and named by their describers with a certain reckless abandon which has left many nomenclatorial problems as yet unsolved. Many published reports are unreliable as confusion has existed, especially in differentiating *C. tuberosa* and *C. flammea*. The same can be said for the *Phalium* complex where variation is equally extensive. The plates show typical examples of each species, the specimen figured having been selected to show a mid point in the several types of variation that exist for each species.

Genus **Casmaria** *H. and A. Adams*

Cassidea Swainson 1840 [in part]. Treatise on Malacology, p. 299 (*non Cassidea* Bruguière 1789; *non Cassidea* Link 1807).

Casmaria H. and A. Adams 1853, Genera of Recent Mollusca, **1**, p. 216.

Genotype, *Buccinum vibex* Linné (subsequent designation, Harris 1897).

This genus differs from typical *Phalium* in possessing rather highly polished shells, having the spire somewhat extended and not possessing a parietal shield. The parietal wall in *Casmaria* consists of a smooth, thickened glaze without the outer margin being raised. The lower parietal wall is never papillose or rugose as in *Phalium*, and in addition, the lower outer lip in *Casmaria* is flaring. The false umbilicus is closed.

Casmaria atlantica, new species, Plate 1, fig. 1–2

Description. Shell rather solid, imperforate, shining and reaching a length of about 45 mm. (about 2 inches). Whorls 8 to 9, somewhat globose and regularly increasing in size. Nuclear whorls smooth and glass-like. Color a light reddish cream to patchy pale buff, overlaid with six spiral bands of squarish spots of light yellow-brown. The spots of the top band just below the sutures are generally a darker brown and more irregularly formed. The spots are prominent and dark brown along the outer edge of the reflected lip of the shell. Spire acute and somewhat produced, cast at an angle of 56° to 58°. Aperture rounded below and narrow above. Outer lip reflected and thickened, generally with four to six small prickle-like spines near the base of the lip. Parietal wall thinly glazed. Columella broad, twisted and sharply truncated below, its base forming the inner margin of the recurved siphonal canal. There may be one to three weak plications or lamellae on the inner side of the columella. Axial sculpture consists of numerous, exceedingly fine growth lines and the spiral sculpture of microscopic incised lines which are barely visible with a 14 power lens. No varices present on our specimens. Canal short and strongly recurved. False umbilicus closed in both adult and young. Suture slightly indented. Periostracum absent. Operculum unknown.

	length	width	aperture	
(large)	42	23	9×21.5 mm.	Puerto Sosúa, Hispaniola
(average)	32.5	18.5	7.5×20.5	Matthewtown, Great Inagua, Bahamas

Types. Holotype, Museum of Comparative Zoölogy, no. 57284, from Puerto Sosúa, Hispaniola. Paratypes from Monte Cristi, Hispaniola; Matthewtown, Great Inagua and Abrahams Bay, Mariguana Island, Bahamas; 4–5 miles N.N.E. of The Elbow, Key Largo, Florida in 50–83 fathoms.

Common name. Atlantic Agate Helmet.

Remarks. This rare species is the only representative of the genus *Casmaria* in the Western Atlantic. It is remarkably close in all its characters to *Casmaria vibex* Linné of the Indo-Pacific region, but sufficiently different in its more reddish color, thinner shell, constantly poor development of its few prickle-like teeth on the lower outer lip and in its generally smaller size to warrant the status of species. Superficially *Casmaria atlantica* resembles *Sconsia striata* Lam., but the former's recurved siphonal canal, lighter structure and smooth surface readily separate the two genera. The young of the more bulbous-shaped *Phalium cicatricosa* Meuschen and the young of the more elongate-shaped *C. atlantica* are readily separated. *C. cicatricosa* possesses a reticulated sculpture on the spire, small pustules on the plicated columella and, if sufficiently adult, numerous plicate teeth across the outer lip edge and development of the *Phalium* parietal shield.

Range. Lower Florida, Bahamas, Greater Antilles and possibly as far south as Venezuela.

Records. Florida: 4–5 miles N.N.E. of The Elbow, Key Largo in 50–83 fathoms (L. A. Burry). Bahamas: Abrahams Bay, Mariguana Island; Matthewtown, Great Inagua. Hispaniola: Monte Cristi; Puerto Sosúa (all MCZ).

Galeodea *Link*

Galeodea Link 1807, Besch. Nat.-Samml. d. Univ. zu Rostock, p. 113.

Morio Denys de Monfort 1810, Conchyliologie Systematique **2**, p. 479; *non* Lamarck 1817.

Echinora Schumacher 1817, Ess. Vers test. p. 75, 249 [*Echinora tuberculosa* Sch. = *Buccinum echinophorum* Linné].

Cassidaria Lamarck 1822, Animaux s. Vert. **7**, p. 215.

Genotype *Buccinum echinophorum* Linné (monotypic).

Shell subglobose, rather solid and generally sculptured with strong spiral ridges which may possess rather large tubercles. Parietal shield well developed, smooth and reflected over the false umbilicus. Outer lip reflected, thickened and usually smooth.

The several names considered as synonyms above are all based upon *Buccinum echinophorum* Linné except *Cassidaria* Lamarck. I have been unable to find a type citation for *Cassidaria* other than that of Bucquoy, Dantzenberg and Dollfus in 1882, who were in error in selecting *Cassidaria striata* Lamarck which had been previously selected as a

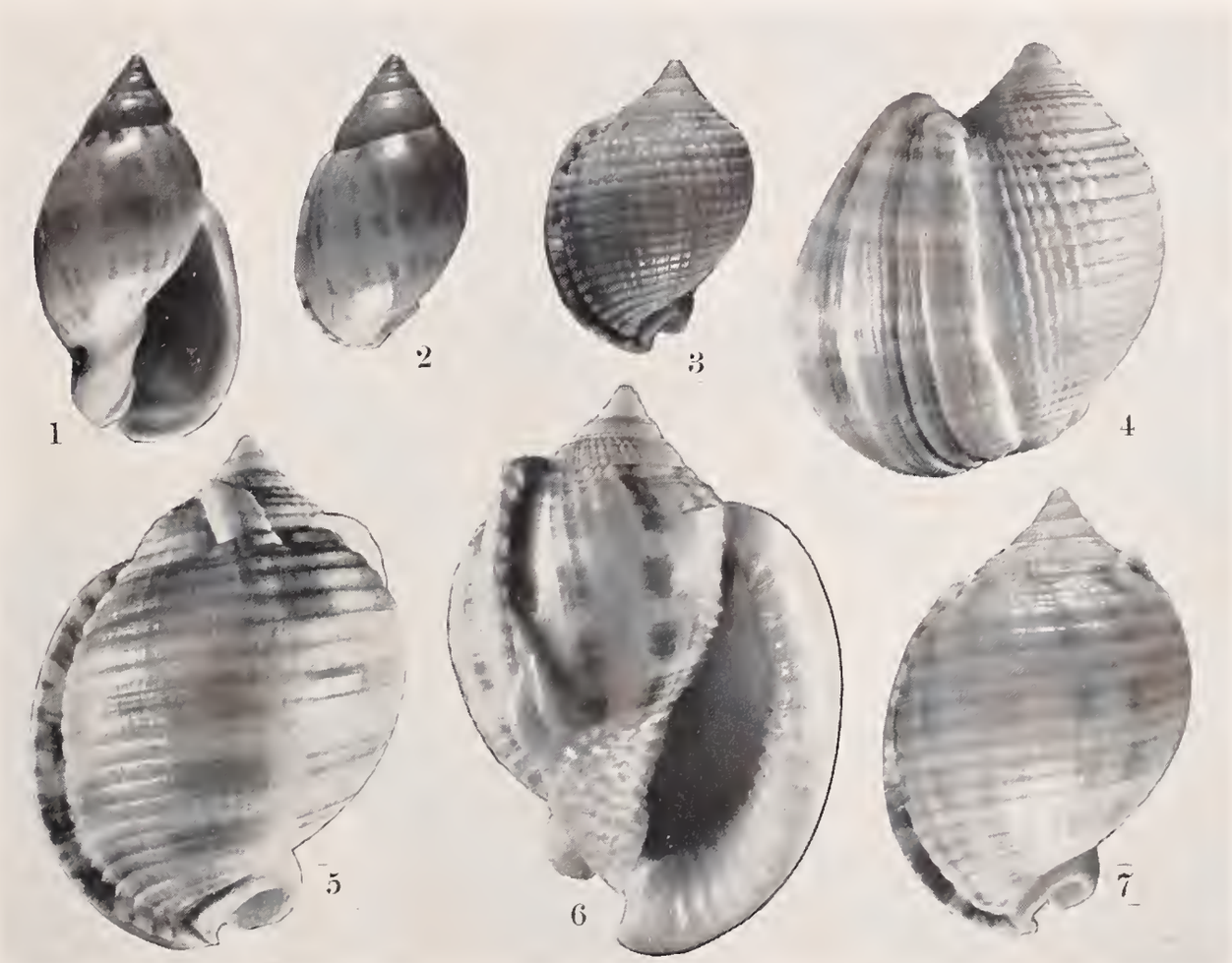

Plate 1, fig. 1, *Casmaria atlantica* Clench, Puerto Sosúa, Hispaniola (Holotype). Fig. 2, *Casmaria atlantica* Clench, Matthewtown, Great Inagua, Bahamas (Paratype). Fig. 3, *Phalium granulatum* Born, San Lorenzo, mouth of Chagres River, Canal Zone. Fig. 4, *Phalium granulatum* Born, West Indies. Figs. 5–6, *Phalium granulatum* Born, Delray Beach, Palm Beach Co., Florida. Fig. 7, *Phalium granulatum* Born, Puerto Plata, Hispaniola (all natural size).

genotype for *Scousia* by Gray in 1847. We here select *Buccinum echinophorum* Linné as the genotype of *Cassidaria* Lamarck, thus making this genus an absolute synonym of *Galeodea* Link which has fifteen years priority.

Galeodea coronadoi *Crosse*, Plate 2

Cassis coronadoi Crosse 1867, Jour. de Conchy. **15**, p. 64, pl. 4, fig. 1; pl. 5, fig. 1 (Matanzas, Cuba).

Description. Shell 100 to 120 mm. (about 4 to 5 inches) in length, solid with globose to subglobose whorls, $8\frac{1}{2}$ in number, the nuclear whorls smooth. Color a dull chestnut. Outer lip reflected and nearly smooth, parietal wall glazed and forming a parietal shield which is raised or reflected over the false umbilicus. The shield is smooth or only faintly rugose at its lower extremity. Canal short and slightly recurved. Spiral sculpture consists of fairly coarse ridges or threads, uneven in size and unevenly spaced. A few rather large tubercles are developed, particularly on the superior portion of the whorls over which 3 or 4 of the spiral threads pass. Axial growth lines are coarse and form a lace-like pattern with the spiral sculpture. Operculum unknown.

length	width	
99	85 mm.	Matanzas, Cuba
118	81	off Cape Fear, North Carolina

Types. The holotype is stated by Watson to be in the collection of H. Crosse which I believe became the property of the Journal de Conchyliologie. The type locality is Matanzas, Cuba.

Remarks. So far as now known, only 2 specimens of this very rare species have been obtained. It is larger than the Eastern Atlantic species, *Galeodea echinophora* Linné to which it appears related. It also appears close in its relationship to *Galeodea weyvillei*

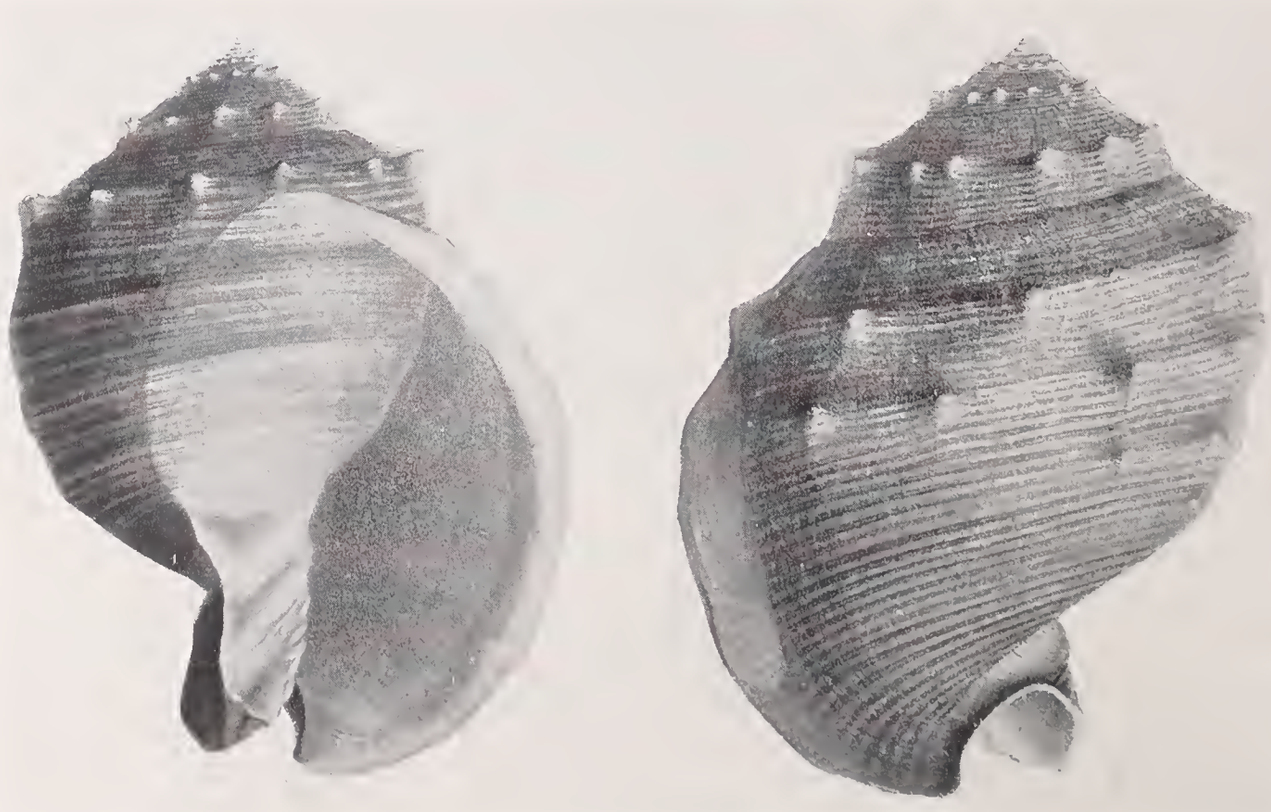

Plate 2. *Galeodea coronadoi* Crosse, Holotype from The Jour. de Conchy. **15**, pl. 4, fig. 1, pl. 5, fig. 1, Matanzas, Cuba.

Watson from the Philippines. Excellent comparative notes are given by Watson for both these species, based upon the actual specimens (Challenger Reports, **15,** p. 409, 1886).

Range. North Carolina south to the Greater Antilles.

Records. North Carolina: 40 miles off Cape Fear in 40 fathoms (USNM). Cuba: Matanzas (H. Crosse).

Genus **Phalium** *Link*

Phalium Link 1807, Beschr. Natur.-Samm. d. Univ. zu Rostock, p. 112.
Bezoardica Schumacker 1817, Essai nouv. Syst. Vers test. p. 248.
Cassidea Swainson 1840 [in part] Treatise on Malacology, p. 299; *non Cassidea* Bruguière 1789.

Genotype, *Buccinum glaucum* Linné (subsequent designation, Dall, 1909, United States Geol. Survey, Prof. Paper 59, p. 62).

Shells are medium in size from about one to five inches in length, globose to moderately lengthened and smooth to fairly coarsely sculptured. Aperture rather large with a strongly reflected lip. On the outer base of the lip there are four or five short but rather sharp spines (subgenus *Phalium* s.s.); those without the palatal spines are grouped in the subgenus *Semicassis.* Parietal area generally with a reflected margin or shield. Lower portion of the parietal area smooth, papillose or finely rugose.

We have retained the use of *Phalium* Link as a genus for our Western Atlantic species, inasmuch as the characters upon which the lesser categories have been segregated do not appear to be of generic value. *Semicassis* Mörch was segregated from *Phalium* on the basis that *Phalium* possessed 4 or 5 small spike-like processes on the lower margin of the outer lip, a character absent in *Semicassis.* The size of these little processes varies, however, not only among the few species of *Phalium* s.s. but even among specimens of the same species. This same character is possessed by *Casmaria* in which the variation exists from completely smooth forms to those in which the processes are well developed. *Tylocassis* Woodring was described as a subgenus under *Semicassis* to contain the American (and European) species which possess a pustulose area on the parietal shield as opposed to the Indo-Pacific species which have a rugose parietal shield area. Again we are dealing with a somewhat variable character. A few specimens of *Phalium granulosum* Born which we have seen show both pustulose and rugose areas on the same shell. In full justification to Woodring, however, this character is fairly constant, and most specimens could be assigned to their geographic areas on the basis of this single character.

Key to the groups of *Phalium*

1.	Basal area of outer lip with 4 or 5 spines	*Phalium* s.s.[1]
	Basal area of outer lip without spines	2
2.	Lower parietal area rather finely papillose	*Tylocassis*
	Lower parietal area rather finely rugose	*Semicassis*

Subgenus **Semicassis** *Mörch*

Semicassis Mörch 1852, Catalogus Conchy. Comes de Yoldi, **1,** p. 112.
Faurotis Jousseaume 1888, Soc. Zool. France, **1,** p. 188.
Echinophoria Sacco 1890, Mem. del Real. Acad. Sci. Torino (2) **11,** p. 39.
Bezoardica Dall 1909, United States Geol. Survey, Prof. Paper No. 59, p. 62: *non Bezoardica* Schumacher 1817.

Genotype, *Cassis japonica* Reeve (by subsequent designation, Harris 1897).

[1] *Phalium* s.s. Indo-Pacific; *Semicassis* s.s. Indo-Pacific; *Tylocassis* Western Atlantic, Eastern Atlantic and Eastern Pacific.

Species of this subgenus are similar to *Phalium* but lack the small spines along the outer base of the palatal lip.

Section **Tylocassis** *Woodring*

Tylocassis Woodring 1928, Carnegie Inst. Washington, pub. No. 385, p. 306.

Section type, *Buccinum inflatum* Shaw, = *P. granulosum* Born (original designation).

Species in this section differ from *Semicassis* by possessing a papillose rather than a rugose sculpture on the lower parietal area. All of the American forms are members of this section.

Phalium (Semicassis) granulatum *Born*, Plate 1, fig. 3–7; Plate 3, fig. 1–4

Buccinum granulatum Born 1780, Testacea Musei Caesari Vindobonensis, p. 248 (Mediterranean; Amboyna).

Buccinum gibbum Gmelin 1791, Syst. Nat. ed. 13, p. 3476, (locality unknown) [refers to Lister, pl. 999, fig. 64].

Cassis malum Röding 1798, Museum Boltenianum, p. 31 (refers to Lister, pl. 1056, fig. 9).

Cassis sepa Röding 1798, Museum Boltenianum, p. 31 (refers to *Buccinum gibbum* Gmelin).

Cassis globulus Röding 1798, Museum Boltenianum, p. 31 (refers to Lister, pl. 999, fig. 64).

Buccinum inflatum Shaw 1811, Naturalists Miscellany **22**, pl. 959, text (Indian and African Seas): Reeve 1848, Conch. Icon., **5**, **Cassis**, pl. 9. fig. 22c; *non B. inflatum* Lamarck 1822.

Cassis abbreviata Lamarck 1822, Anim. s. Vert., **7**, p. 224 (Coast of Portugal): *non abbreviatum* Gmelin 1790.

Cassis granulosa Lamarck 1822, Anim. s. Vert. **7**, p. 227, (Mediterranean).

Cassis laevigata Menke 1830, Synopsis Methodica Molluscorum p. 144 (Barbados).

Cassis tessellata Pfeiffer 1840, Krit. Register zu Martini u. Chemnitz's Syst. Konchyl.-Kab. p. VIII; *non tessellatum* Gmelin 1791.

Description. Shell varying from 25–100 mm. in length (about 1–4 inches), solid and rather strong. Whorls 6–8½ and strongly convex. Ground color china white to cream, overlaid with spiral bands that are broken into a series of squares rather uniformly disposed. These color squares of yellow to brown are also arranged in an axial pattern. Inner lip consisting of a glazed area which adheres to the body whorl, the lower portion reflected, forming a shield-like process. The upper portion of the shield possesses a series of ridges which extend back well within the aperture. Lower portion of shield rather coarsely papillose. Outer lip thickened and reflected, the reflected portion turning backwards against the whorl. Occasionally this thickening may extend back one inch. The outer edge of the lip is regularly and rather coarsely crenulated. Each crenulation follows back within the aperture as a pronounced ridge. Spire moderately extended, occasionally concave in profile. Nuclear whorls smooth and glass-like. Spiral sculpture consisting of numerous and rather deeply incised grooves. Axial sculpture consisting of faint ridges which cross the grooves, forming a reticulated pattern. Occasional specimens are rather finely tuberculate on the shoulder of the whorls. One to three varices may be developed. Operculum unknown.

	length	width	
(large)	91	60 mm.	Jamaica
(average)	34	43	Delray Beach, Florida
(small)	30	20.5	Cartagena, Colombia

Types. The type figures, here selected, are those of Martini 1773, Conchy.-Cab. (1) **2**, pl. 32, fig. 344-345. These same figures were referred to by Lamarck for his *Cassis granulosa*. As Born's localities of Mediterranean Sea and Amboyna are in error, we select that of Puerto Plata, Hispaniola, as the type locality.

Common name. Scotch Bonnet (Florida); Granulated Helmet Shell.

Remarks. Born made reference to four sets of figures, those of Martini being the best. These figures represent very clearly the West Indian shell which has been known under several names. Lamarck's name, *abbreviata*, has been used to designate the very small specimens, but in our opinion, it is impossible to draw any satisfactory line of demarkation between the various sizes that occur in this species. Large specimens have been known under the name of *inflata* Shaw, but again, these grade imperceptibly with the more abundant middle sized specimens. In addition to their size variation, there are considerable differences exhibited in both the sculpture and the color markings. The small and intermediate specimens have the spiral sculpture strongly developed, while the larger forms, though still possessing it, have it developed to a lesser extent. The larger specimens generally have the color spots more pronounced. Varices are occasionally formed and appear to be more abundant in specimens from certain localities. On young shells and small adults there is a tendency to have the shoulder area of the body whorl somewhat nodulose, generally at the intersections of the spiral and axial ridges. In addition, the small and middle sized specimens are proportionately heavier in structure than the larger forms and the outer or palatal lip much thicker. We figure a specimen (plate 1, fig. 4) which developed a remarkably thick lip, the reflected portion being 25 mm. (1 inch) in length.

The figure by Shaw in the Naturalists Miscellany is much too highly colored, a character that prevails in most of his illustrations.

As stated above, all of the several characters are exceedingly variable and exist in about all of the possible combinations, many of the variations occurring at a single locality. This factor, of course, has given rise to the rather extended synonymy possessed by this species.

Range. North Carolina, the Gulf of Mexico, West Indies, and south to Brasil.

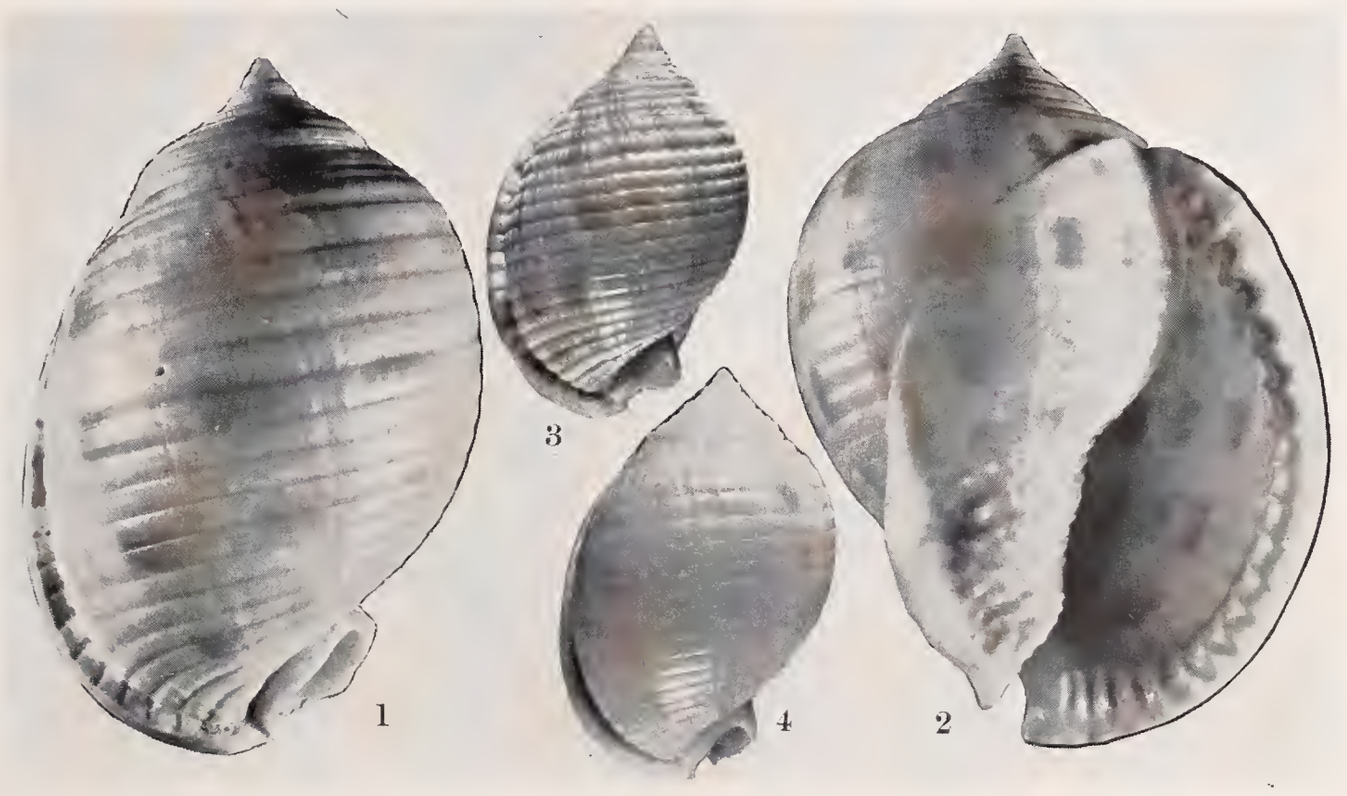

Plate 3. *Phalium granulatum* Born. Fig. 1, Capers Id., South Carolina. Fig. 2, Point-à-Pierre, Trinidad. Fig. 3, Veracruz, Mexico. Fig. 4, Puerto Plata, Hispaniola (all natural size).

Records. North Carolina: Ocracoke Id. (Charleston Museum). South Carolina: 3½ mi. off Dewee's Id.; Isle of Palms; Cape Romain; Caper's Id.; Botany Bay; Bird Key; Folly Beach (all Charleston Museum). Florida: Jenson Beach (M. Cannon); Palm Beach; Lake Worth (both MCZ); Delray Beach (P. McGinty); Pompano; Tortugas; Naples; Estero Id.; Sanibel Id.; St. Petersburg (all MCZ). Texas: Matagorda Bay; Port Aransas; Padre Id. (all MCZ). Bahamas: Smith Point, Grand Bahama; Bimini Islands; Andros Id.; New Providence; Little San Salvador; Clarencetown, Long Id. (all MCZ). Hispaniola: Monte Cristi; Puerto Plata (both MCZ). Puerto Rico: Ponce (MCZ); Río Herrara (R. Kenk). Jamaica: (MCZ). Lesser Antilles: San Fernando; Point-à-Pierre and Cedros, Trinidad (H. G. Kugler). Mexico: Veracruz (M. E. Bourgeois). Honduras: Puerto Cortés (Univ. of Michigan). Panama: San Lorenzo (J. Zetek). Colombia: Cartagena (MCZ). Venezuela: Tucacas Bay (H. G. Kugler). British Guiana: Georgetown (H. G. Kugler). Brasil: Manguinhos, Ilha de Itaparica, Est. da Bahía (A. Oliveira).

Phalium (Semicassis) cicatricosum *Meuschen*, Plate 4, figs. 1–5.

Cassis cicatricosa Meuschen 1787, Museum Geversianum, p. 392, no. 1290 [refers to Meuschen 1781, Zoophylacium Gronovianum,[1] p. v, pl. 19, figs. 1–2 (Sea of the Indies)].

Buccinum cicatricosum Gmelin 1790, Syst. Nat. ed. 13, p. 3475 (India) [refers to the same plate and figures in the Museum Gronovianum above].

Buccinum recurvirostrum Gmelin 1790, Syst. Nat. ed. 13, p. 3477 (Barbados) [refers to Lister 1688, Historiae Conchyliorum, **2**, pl. 1016, fig. 75].

Buccinum abbreviatum Gmelin 1790, Syst. Nat. ed. 13, p. 3478 [refers to Chemnitz 1737, Conchy.-Cab. (1) **10**, pl. 153, fig. 1465-1466]; *non Cassis abbreviata* Lamarck 1822.

Cassis lactea Kiener 1835, Coquilles Vivantes **8**, p. 35, pl. 16, fig. 35 (locality unknown).

Cassis recurvirostrum 'Wood' Reeve 1848, Conch. Icon. **5, Cassis,** no. 16 (Raine's Island, Torres Strait [Queensland]).

Xenogalea lucrativa Iredale 1927, Records of the Australian Museum **15**, p. 347, pl. 32, fig. 11 (North Australia, Raine's Island, Torres Strait).

Semicassis cicatricosa peristephes Pilsbry and McGinty 1939, Nautilus **52**, p. 76, pl. 5 (Peanut Island, Lake Worth, Florida).

Description. Shell varying from 20 to 60 mm. in length (about 1–2½ inches) rather thin but strong. Whorls 6 to 8 and rather strongly convex. Ground color white or cream and generally overlaid with light buff. In addition there is a series of small dark brown and irregular squares of color marking that are in both spiral and axial arrangement. Inner lip consisting of a thickened glazed area, the parietal shield, which is raised or reflected at its base. The lower area of the shield rather finely papillose, the upper portion having a few short fine spiral ridges. Outer lip thickened and reflected, its inner margin supporting a series of ridges or teeth. Spire not greatly extended. Nuclear whorls smooth and glass-like, following whorls finely reticulated, body or last whorl generally smooth, with the whorl shoulder finely reticulated or possessing small nodules. Axial growth lines may be somewhat coarse on the shoulder area of the body whorl. Some of the larger specimens possess a distinctive malleated surface and have a few incised spiral grooves near the base of the whorl. One to three varices may occur, but the forming of varices appears to be rather uncommon.

[1] Meuschen's Zoophylacium Gronovianum is not considered binomial and his species, *Cassis cicatricosa*, must date from his later publication.

	length	width	
(large)	60	41 mm.	N. Bimini Id., Bahama Islands
(average)	40	28	Virgin Gorda, Virgin Islands
(small)	22.5	15	Little Inagua, Bahama Islands

Types. The type figure is that of Meuschen cited above in the Zoophylacium Gronovianum. The type locality is Barbados, Lesser Antilles as first localized by Gmelin.

Common name. The Scarred Helmet Shell (in reference to the scar-like malleations).

Remarks. This species does not appear to be quite as abundant as *P. granulatum* and may have a more restricted range. In most of its characters it approximates *P. granulatum*, though I have seen no specimens that could be called intermediates or that could not be readily assigned to the proper species. The significant difference between the two species is that *C. cicatricosum* possesses a nearly smooth or malleated surface on the body whorl and *P. granulatum* has a moderate to very strong reticulated surface on the body whorl. In addition, *P. cicatricosum* is somewhat more attenuated and does not reach the size that is occasionally reached by *P. granulatum*.

In regard to certain of the synonyms, the names *abbreviatum* Gmelin, *lactea* Kiener, and *peristephes* Pils. and McG. all refer to the small and nodulose specimens. The name, *lucrativa* Iredale, appears from the description and remarks to be based only on the figure of Reeve, which had been published as *recurvirostrum* and with the locality of Raine's Island, Torres Strait. This was a specimen in the Cuming collection and the above locality is certainly open to question. The papillose condition on the base of the shield is a character which is known to occur only in specimens from the Americas and the Eastern Atlantic. This character is clearly indicated in Reeve's figure. (See under *Tylocassis*).

Range. Florida, the Bermudas, Bahamas and south to the Lesser Antilles. Our record from Bermuda is open to question. It is not given by Piele in his list of marine shells from these islands (Proc. Malac. Soc. **17,** p. 80, 1926).

Records. Florida: Peanut Id., Lake Worth (Pilsbry and McGinty). Bermuda: (MCZ). Bahamas: North Bimini Id.; Arthurstown, Cat Id.; Simms, Long Id.; Wat-

Plate 4. *Phalium cicatricosum* Meuschen. Fig. 1, St. Johns, Virgin Ids. Figs. 2 and 5, North Bimini Id., Bahamas. Fig. 3, Puerto Plata, Hispaniola. Fig. 4, Port de Paix, Hispaniola (all natural size).

ling Id.; Fortune Id.; Matthewtown, Great Inagua; North West Point, Little Inagua (all MCZ). CUBA: Guantánamo Naval Base (MCZ); Cayo Francés, Caibarién (P. J. Bermúdez). HISPANIOLA: Puerto Sosúa; El Canal, Cabo Macorís, Puerto Plata; Monte Cristi (all MCZ); Port de Paix (W. J. Eyerdam). VIRGIN ISLANDS: St. Thomas; St. John (both MCZ); Virgin Gorda; Tortola (both M. W. Dewey); St. Croix (H. A. Beatty). LESSER ANTILLES: Barbados (MCZ).

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Notes

Buccinum undulatum Gmelin 1791, Systema Naturae, 13 ed., p. 3475 based on Lister 1688, Historia Conchyliorum, **2**, pl. 996, fig. 61 (Barbados).

We agree with Pilsbry and McGinty (Nautilus **52**, 1939, p. 77) that this species is unrecognizable either from Gmelin's description or Lister's figure. There appears to be nothing in the Western Atlantic that approximates the figure. European writers have accepted this name for a Mediterranean species. See Buquoy, Dautzenberg and Dollfus, 1882, Moll. Marins de Roussillon, **1**, p. 66, pl. 7, fig. 3–4.

Phalium centiquadrata Valenciennes from the Eastern Pacific is exceedingly close in its relationships with our Western Atlantic *P. granulatum* Born. Specimens of *centiquadrata* from West Mexico appear to be more nodulose on the body whorl shoulder than specimens of *granulatum*, but certain specimens appear to be indistinguishable.

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Cassis *Scopoli*

Cassida Brünnich 1772, Fund. Zool., p. 248; *non Cassida* Linné 1758; *non Cassida* Agassiz 1846.
Cassis Scopoli 1777, Introductio Historiam Naturalem, p. 393.
Cassidea Bruguière 1792, Ency. Méth. Vers **1**, pt. 2, p. 414; *non Cassidea* Link 1807.
Cassinia Rafinesque 1815, Analyse de la Nature, p. 145.
Goniogalea Mörch 1857, Catalogus Conch. I.M.N.Suenson, p. 21.
Fimbriola 'Megele von Mühlfeld' Scudder 1882, Nomenclator Zoologicus, p. 138.
Galeodocassis Sacco 1890, Mem. del Real. Accad. Sci. Torino (2) **11**, p. 18.
Cassisoma Roverto 1899, Atti. Soc. Ligustica, **10**, p. 107.

Genotype, *Buccinum cornutum* Linné (by subsequent designation, Denys de Montfort 1810).

Shells of *Cassis* s.s. are large, strong, and thick in structure, particularly the outer lip and parietal shield. The spire is much depressed and generally slightly convex with the early whorls very small. The thickened lips form a flattened area on the entire base or apertural side of the shell. The aperture is long and narrow, its lower margin recurved backwards to form a short siphonal canal. Both inner and outer margins of the lip are strongly dentate. The operculum is much smaller than the aperture, is somewhat lengthened, rounded at both ends, and possesses a marginal nucleus. Growth lines on the operculum are rather coarse and concentric.

The radula consists of small centrals, small laterals and rather lengthened marginal teeth. (See A. H. Cooke 1895, Cambridge Natural History, **3**, p. 223.) The family dates from the Cretaceous period.

These large shells have been held in high esteem, not only for their beauty, but also for their use in cameo cutting. This art was developed in Italy and later in France. A detailed account of this art is given by Tryon 1883, Structural and Systematic Conchology, Philadelphia, **2**, p. 200.

Cassis tuberosa *Linné*, Plate 5

Buccinum tuberosum Linné 1758, Syst. Nat. ed. 10, p. 735 (locality unknown); Linné 1767, Syst. Nat. ed. 12, p. 1198 (American Ocean) [refers to Gaultieri 1742, Index Test. Conch., pl. 41].

Buccinum striatum Meuschen 1787, Museum Geversianum, p. 302.

Cassidea tuberosa Bruguière 1792, Encyclopédie Méthodique 1, pt. 2, p. 436 (Guadeloupe; Martinique and Santo Domingo).

Cassis catuadata Perry 1811, Conchology, London, pl. 33, fig. 1, text (Coast of America and the West Indies).

Description. Adult shell varying from 100 to 230 mm. in length (4 to 9 inches). Solid and generally heavy. Whorls 7 to 10 and globose. Color brownish cream and mottled with patches of dark brown on the lip and a large patch of brown on the mid parietal area. Outer surface of shell has a series of deep crescent-like brownish marks which are in spiral arrangement and have the horns of the crescents directed toward the aperture. Interior of siphonal canal diffused with brown. Aperture long and rather narrow. Umbilicus visible at the base of the siphonal canal. False umbilicus consisting of small shallow depression underneath the parietal shield. Siphonal canal short and recurved. Outer lip rather broad, thickened and slightly reflected, with its inner margin possessing 10 to 12 strong, white and rounded teeth, the spaces in between generally being blotched with dark brown. Parietal shield broad, covering the entire bottom area of the shell, and reflected along its outer margin. Upper and outer corner of the parietal shield generally drawn out into a rounded point. Entire inner margin of parietal area possessing a series of long, narrow ridge-like teeth. Spire depressed and rather sharply pointed. Nuclear whorls exceedingly small. Suture irregular, not prominent. Spiral sculpture consisting of numerous low ridges which are crossed by fine axial threads which produce a fine but definite reticulated surface. There are generally three rows of blunt spines or tubercles,

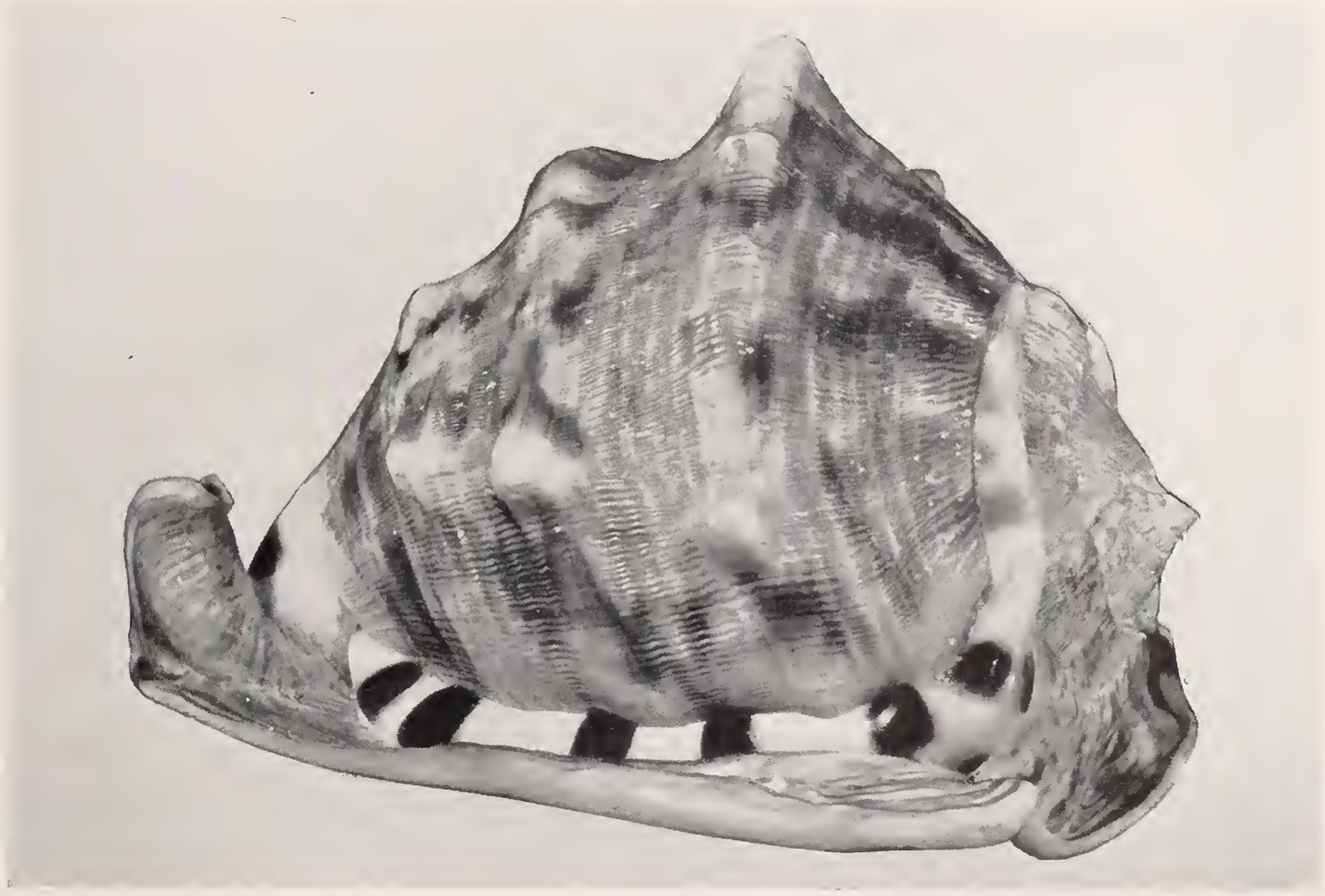

Plate 5. *Cassis tuberosa* Linné, Orange Creek, Cat Id., Bahamas (reduced one-third).

the first row formed at the shoulder of the whorl, the other two rows developed at about the mid area of the whorl. The topmost tubercle, or spine of the first row is generally the largest. No periostracum. Operculum about 1/5 the length of the aperture, narrowing, more or less rounded at both ends and sculptured with rather coarse growth lines.

	length	width	
(large)	220	175 mm.	Cat Island, Bahamas
(average)	178	140	Grand Bahama Island, Bahamas
(small)	122	101	Little San Salvador Island, Bahamas

Types. The type figure, here selected, is that of Gaultieri 1742 (Index Test. Conch., pl. 41) as cited by Linné in ed. 12 of the Syst. Nat., p. 1198. The type locality of Hispaniola [Santo Domingo] is here designated. This was one of the three localities given by Bruguière in 1792, the first to localize this species.

Common name. King Helmet.

Remarks. Cassis tuberosa is the most abundant and probably the most widely distributed of the Western Atlantic species in this genus. It differs from both *C. flammea* and *C. madagascariensis* by possessing a fine reticulated surface on mature shells and having a point to the parietal shield on the upper and outer margin. Small specimens are quite similar to *C. flammea* but again can be differentiated by the reticulated pattern of the sculpture on *C. tuberosa* and by the presence of the brownish color that appears between the teeth on the outer lip. General coloration in the two forms is very similar.

Cassis tuberosa differs materially from *C. madagascariensis* in the possession of a very fine, netted sculpture as opposed to an indefinite and much coarser reticulated sculpture in *C. madagascariensis.* The coloration of *C. tuberosa* consists of an indefinite buff overlaid with rather dark brownish crescent-like marks while the color of *C. madagascariensis* is generally a uniform pale cream with the parietal shield and outer lip a definite salmon color.

Range. Cape Hatteras, North Carolina (Dall 1889, p. 134) and south to Brasil.

Records. Florida: Pompano; Lake Worth, Boynton (both MCZ): Ft. Lauderdale in 10 fathoms; off Ft. Walton in 15 fathoms (both L.A.Burry). Bahamas: Eight Mile Rock, Grand Bahama Id.; Adelaide, New Providence; Cat Cay, Bimini Ids.; Little San Salvador Id.; Orange Creek, Cat Id.; Clarencetown, Long Id.; Savannah Sound, Eleuthera; Abrahams Bay, Mariguana Id.; Matthewtown, Gt. Inagua (all MCZ). Cuba: Guantánamo Bay; Gavilán, Cienfuegos (both MCZ). Isle of Pines (MCZ). Hispaniola: Puerto Plata; Santa Bárbara de Samaná; Jérémie (all MCZ). Brasil: Fernando de Noronha (MCZ); Manguinhos, Ilha de Itaparica, Bahía (P. de Oliveira).

Cassis flammea *Linné*, Plate 6

Buccinum flammeum Linné 1758, Syst. Nat. ed. 10, p. 786 (locality unknown) [refers to Rumphius 1741, Rariteitkamer, pl. 23, fig. 2]; Gmelin 1790, Syst. Nat. ed. 13, p. 3473 (American Ocean).

Cassidea flammea Bruguière 1792, Encycl. Méth., Vers 1, pt. 2, p. 429 (no locality).

Cassis alba Perry 1811, Conchology, London, pl. 33, fig. 2, text (locality unknown).

Cassis flammea Lamarck 1822, Anim. s. Vert. 7, p. 220 (Indian Ocean).

Description. Adult shell varying from 80 to 130 mm. in length (3 to 5 inches). Solid and strong. Whorls 8–10, globose. Color yellowish cream and mottled with patches of brown on the lip and a large patch of brown on the mid parietal area. Outer surface of shell possesses a series of deep crescent-like brownish marks which are in spiral arrangement and have the horns of the crescent directed toward the aperture. Interior of siphonal

canal stained with brown. Aperture long and rather narrow. Umbilicus visible at base of the siphonal canal. False umbilicus consisting of smallish shallow depressions underneath the parietal shield. Siphonal canal short and recurved upward. Outer lip rather broad, thickened and slightly reflected, with its inner margin possessing 10 to 12 strong but rounded teeth, which are white, spaces in between being uncolored. Parietal shield broad, covering the entire bottom area of the shell and reflected along its outer margin. Upper and outer corner of parietal shield generally rounded. Entire inner margin of parietal area has a series of long, narrow, ridge-like teeth. Spire depressed, and rather sharply pointed, nuclear whorls exceedingly small. Suture irregular and not prominent. Sculpture consisting of numerous axial growth lines which are not cut by spiral ridges, the result being a moderately smooth surface. There are generally three rows of blunt spines or tubercles, the first formed at the shoulder of the whorl, the other two rows developed at the mid area of the whorl. The topmost tubercle or spine of the first row is generally the largest. No periostracum. Operculum about 1/5 the length of the aperture, narrow, more or less rounded at both ends and sculptured with rather coarse growth lines.

	length	width	
(large)	135	100 mm.	Grand Bahama Island, Bahamas
(average)	109	82	Cat Island, Bahamas
(small)	72	50	Puerto Sosúa, Hispaniola

Types. The type figure, here selected, is that of Rumphius 1741, Rariteitkamer, pl. 23, fig. 2. This is one of the two references given by Linné. His reference to Bonanno

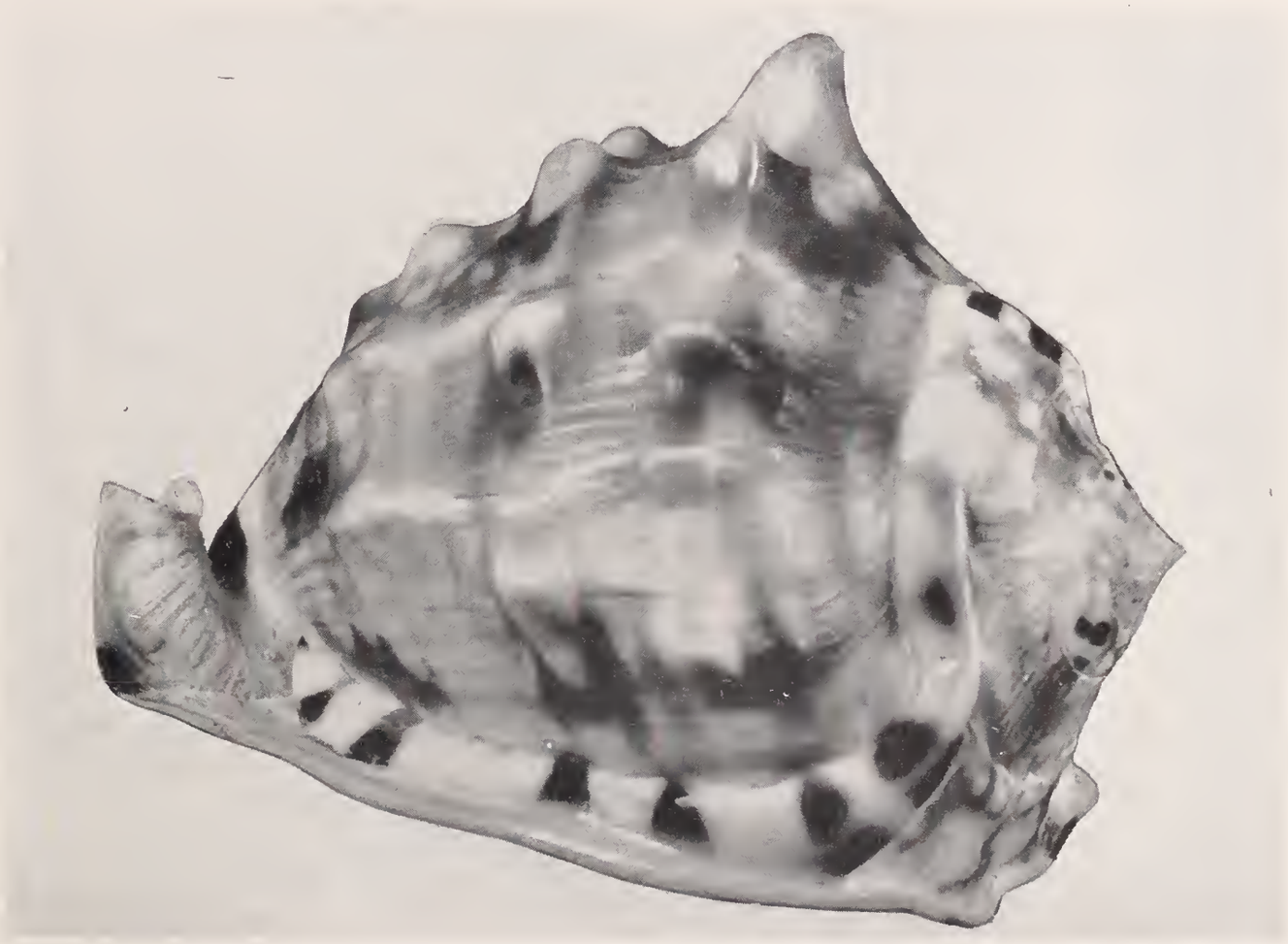

Plate 6. *Cassis flammea* Linné, Alicetown, North Bimini Id., Bahamas (natural size).

1684, Recreatio Mentis et Oculti, p. 61, fig. 161, is quite a different species. The type locality, here selected, is Cape St. Maria, Long Island, Bahama Islands.

Common name. Flame Helmet.

Remarks. Cassis flammea is characterized mainly by lacking reticulated sculpture and by possessing a parietal shield and outer lip of yellowish cream, with no blotches of brown between the teeth on the outer lip and by its smaller size. (See remarks under *C. tuberosa*).

Range. The Bahamas and south to the Lesser Antilles.

Records. Bahamas: Settlement Point, Grand Bahama; Alicetown, North Bimini Id.; Governors Harbour, Eleuthera Id.; Arthurstown, Cat Id.; Cape St. Maria, Long Id. (all MCZ). Cuba: Punta de los Colorados, Cienfuegos; Guantánamo Bay (both MCZ). Hispaniola: Le Mole, Cape St. Nicholas; Puerto Sosúa; Monte Cristi; (all MCZ); Grand Cayamite Id. (W.J. Eyerdam). Isle de la Gonave: (W.J. Eyerdam). Lesser Antilles: Carriacou Id., Grenadines (H.G. Kugler).

Cassis madagascariensis *Lamarck*, Plate 7

Cassis madagascariensis Lamarck 1822, Anim. s. Vert. **7**, p. 219 (Seas of Madagascar; Lamarck 1844 [Deshayes edition]) Anim. s. Vert. **10**, p. 20 [refers to Kiener 1835, Coquilles Vivantes **8**, p. 7, pl. 2, fig. 2].

Cassis cameo Stimpson 1860, American Jour. Science and Arts (2) **29**, p. 443 (Beaufort, North Carolina).

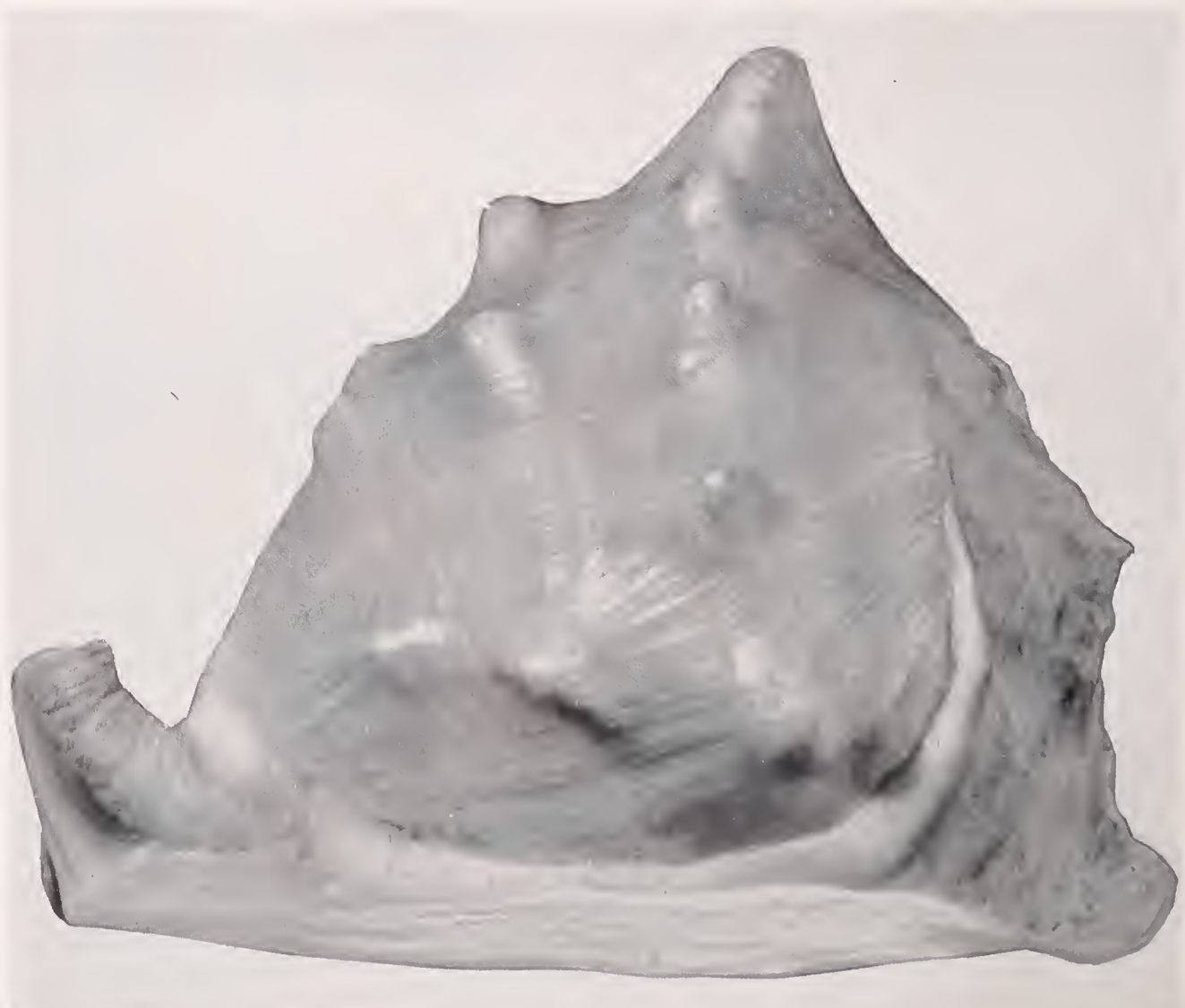

Plate 7. *Cassis madagascariensis* Lamarck, Alicetown, North Bimini Id., Bahamas (slightly reduced).

Description. Adult shell varying from 100 to 230 mm. in length (4 to 9 inches). Solid and strong. Whorls 7–10, globose. Color pale cream on outer surface with the patch of dark brown on parietal area of the aperture, remaining portion of parietal shield and outer lip pale to deep salmon. Interior of siphonal canal stained with brown. Aperture long and rather narrow. Umbilicus visible at base of the siphonal canal. False umbilicus consisting of small, shallow depression underneath the parietal shield. Siphonal canal short and recurved upwards. Outer lip rather broad, thickened and slightly reflected, with its inner margin possessing 10 to 12 strong but rounded teeth which are white, the spaces in between occasionally being blotched with dark brown. Parietal shield broad, covering the entire bottom area of the shell and reflected along its outer margin. Upper and outer corner of parietal shield generally rounded. Entire inner margin of parietal area has a series of long, narrow ridge-like teeth. Spire depressed and rather sharply pointed. Nuclear whorls exceedingly small. Suture irregular and not prominent. Spiral sculpture consisting of numerous flattened ridges which are crossed by axial growth lines, both forming a rather indistinct reticulated surface. There are generally three rows of blunt spines or tubercles, the first formed at the shoulder of the whorl, the other two rows developed at the mid area of the whorl. The topmost tubercle or spine of the first row is generally the largest. No periostracum. Operculum about 1/5 the length of the aperture, narrow, more or less rounded at both ends and sculptured with rather coarse growth lines.

	length	width	
(large)	216	162 mm.	Jamaica
(average)	162	133	Alicetown, North Bimini Id., Bahamas
(small	115	106	Settlement Pt., Grand Bahama Id., Bahamas

Types. The type figure is that of Kiener here selected (1835, Coquilles Vivantes **8**, pl. 2, fig. 2) as given by Lamarck in the second edition of his Animaux sans Vertèbres (see above). As the original locality of Madagascar was in error, Beaufort, North Carolina can be accepted on the basis of Stimpson's record.

Remarks. Cassis madagascariensis is mainly characterized by its cream colored exterior and having the parietal shield colored a rather deep salmon. (See also under *C. tuberosa.*)

Range. North Carolina (Stimpson 1860) south to the Lesser Antilles.

Records. Florida: Lake Worth, Boynton (P. McGinty). Bahamas: Settlement Point, Grand Bahama Id., North Bimini Id. (both MCZ). Jamaica: (MCZ).

Cassis madagascariensis spinella, new subspecies, Plate 8

Description. Shell similar in all respects to *C. madagascariensis* except in the formation of the tubercles on the outer surface of the shell. In this new subspecies the tubercles occur generally in three spiral rows, are much smaller, almost uniform in size and far more numerous than the tubercles that exist on *C. madagascariensis.* To judge by the few specimens of this subspecies in our possession, the adults probably reach a much larger size than the typical form. Young specimens have rather faint brownish marks which are crescent shaped and form four rather indistinct spiral bands on the body whorl. On the spire these color marks are disposed more irregularly.

	length	width	
(large)	280	210 mm.	Florida Keys
(average)	200	190	Sand Key, Florida
(small)	125	81	off Key Largo, Florida

Types. Holotype from Tortugas, Florida, Museum of Comparative Zoölogy, no. 140761 (Sister Marie Caroline). Paratypes from Sand Key, off Key West, Florida, (James Miller); Pelican Shoals, Key West (J. Schwengel); 5½ miles off The Elbow, Key Largo, Florida in 92–100 fathoms (L. A. Burry).

Remarks. This new subspecies differs from typical *C. madagascariensis* in its larger size and in the possession of smaller, more regular and far more numerous tubercles. It appears to be a geographical race of the far more wide-spread typical form.

Range and Records. Known only from the Lower Florida Keys. (See under types.)

Plate 8. *Cassis madagascariensis spinella* Clench, Tortugas, Florida (Holotype) (reduced one-half).

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