



SEA SHELLS OF SRI LANKA

INCLUDING FORMS SCATTERED THROUGHOUT
THE INDIAN AND PACIFIC OCEANS

by Parakrama Kirtisinghe



THE SEAS around Sri Lanka provide an ideal environment for a rich variety of shell-bearing molluscs. Bathed by the warm waters of the Indian Ocean, Sri Lanka's coastline is dotted with sandy banks and reefs of coral and sandstone inhabited by many fascinating species of marine life. From this source of shell specimens, Parakrama Kirtisinghe has gathered about 500 species for his book. In photographs and clearly written text, each is shown and described with shape, color, size, and distinguishing characteristics indicated for easy identification by the reader. Plates and text are arranged and indexed for rapid reference by the collector.

Although all shells shown in this book were collected in the seas surrounding Sri Lanka, these species are by no means indigenous to that country alone. Most can be found throughout the Arabian Sea, southward to the coast of Australia, and a long way eastward into the western Pacific. "Where sea shells are concerned," the author has said, "one cannot speak of shells belonging to a single country. In the sea, barriers to the dispersal of animals are not as severe as barriers on land."

To both the casual shell collector and the serious student of conchology, this is an important book, not only as a source of valuable information and as an aid to identification, but also as a presentation of the natural beauty of shells.



P. Kirtisinghe
14th July 1978.

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TO

MY WIFE AND CHILDREN

*recalling the many happy days we have squandered
by the sea*

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*... so many precious things
of colour glorious and effect so rare*

—MILTON

PREFACE

SEVERAL KINDS OF MARINE ANIMALS CONSTRUCT FOR themselves skeletons or shells to support and also to protect their soft parts. However, when we speak of sea shells, we generally mean the hard, calcareous skeletons of the various types of molluscs living in the sea. Sea shells are to be found in so many diverse forms and in such exquisite colour combinations that their great natural beauty has appealed to man from earliest times. Prehistoric man used them for personal adornment and as charms; even at the present time, many tribes in still-developing areas of the world wear strings of sea shells for like purposes. Before money was invented, primitive man used certain kinds of sea shells in barter. During the last four or five centuries, sea shells have been a favourite collectors' item, and there must be thousands of shell collectors throughout the world today.

Shell-secreting molluscs inhabit nearly all the dif-

ferent regions of the sea, from the cold polar regions to the warm equatorial belt, from surface waters and intertidal beaches down to abyssal depths. As is only to be expected, the warmer, shallower seas where reefs and rocks abound are most thickly populated by these molluscs. It has been reckoned that more than 100,000 sea shells from all over the world are known to us at the present time. Tucker Abbott, the eminent malacologist, states that more than 6,000 different kinds of marine shells have been collected off the western and eastern coasts of the United States. Tetsuaki Kira, a famous conchologist, believes that about 5,000 species of sea shells are to be found around the Japanese archipelago. Coming closer to Sri Lanka, James Hornell listed 325 species of marine and river molluscs from the neighbourhood of Bombay. According to T. Satyamurti, about 700 species of molluscs have been recorded from the sea around Madras and about 450 species from a much smaller area in the neighbourhood of Krusadai Island. He is firmly of the opinion that further intensive collecting will bring to light a number of that area's species that have not so far been discovered.

Like the sea around Krusadai Island, the sea around Sri Lanka contains many submerged rocks, sand banks, and extensive sandstone and coral reefs which remain partly exposed at low tide. These habitats are densely populated by molluscs, yet the highest number of species of shell-bearing molluscs recorded from the sea around Sri Lanka is 520! Although notices of sea shells from Sri Lanka are scattered here and there in zoological journals and in the records of oceano-

graphic surveys, there have been only two studies that approach any degree of comprehensiveness. Sir Emerson Tennant, in his *Natural History of Ceylon* (1861), includes a list of about 400 sea shells; the *Report of the Ceylon Pearl Oyster Fisheries* (1906) records the 520 species referred to above. Tennant's list was compiled with the assistance of an outstanding conchologist, Sylvanus Hanley, who expressed his conviction that the study did not represent anything like a complete list of the sea shells to be found in that area. Tennant himself thought that, with careful collection, over 1,500 sea shells could be found there. Judging from the greatly improved collecting that has recently been done in the more popular shell groups, such as the cowries and cones, with the application of modern diving techniques, even this estimate of Tennant's would appear to be too conservative.

Lists that merely give the names of shells without any descriptions or illustrations are of little help to collectors who require a ready means of identifying the shells they collect. I have in this book briefly described and pictured a little over 450 sea shells from Sri Lanka in the hope that my effort will be of some help to shell collectors in this part of the world. I hope also that this book will serve as a foundation on which to build a more complete and much needed study of the shells to be found in the sea near by.

With all its defects and limitations, this book could not have been readied for publication but for the fact that I was very fortunate in having had at hand the

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ever-willing and generous help of a number of young shell collectors. In particular, I wish to mention Rodney Jonklaas, a pioneer modern diver and renowned undersea explorer, who has encouraged me all along in this work. He has presented me with many duplicates of shells from his extensive collection. In frequent conversations with him, I have derived from his wide acquaintance with the living animals in their natural habitats much information concerning shell-bearing marine molluscs.

Others to whom I am greatly indebted for similar assistance are Langston Pereira, Cedric Martenstyn, Ranjit Perera, and Rex de Silva—all experienced divers and undersea collectors. Miss Moonyeen de Silva has also supplied me with shells. The photographs were taken by H. de Vere Claasz and Dr. C. Kirtisinghe. To all of these good people I give my sincerest thanks.

Finally, I must apologise for my failure to determine the specific names of a handful of the shells included in this book. This shortcoming is due to the limited availability of works of reference on sea shells in our local libraries—a handicap that workers in developing areas must face.

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Colombo, Sri Lanka



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PART

I

SHELLS OF
PELECYPODA

or Bivalve Molluscs

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(See p. 114 for plate.)

1. ***Glycymeris rotunda* (Dunker)** Nearly round shell, somewhat drawn-out at postero-ventral margin; outer surface lightly marked by radial and concentric grooves. Brown zigzag patterns on white background. Length 40 mm. (1.57 in.).
2. ***Lithophaga cinnamomea* (Lamarck)** Rather small, inflated shell with slight convexity of dorsal margin and more noticeable concavity of ventral margin; umbones a little in front of anterior level of shell margin; outer surface bears concentric lines. Colour dark chestnut. Length 15 mm. (.59 in.).
3. ***Lithophaga nigra* (d'Orbigny)** Elongate, almost cylindrical shell with slight angulation nearly at middle of hinge line; outer surface has faint concentric lines. Brown, usually covered over with chalk from coral into which the animal has bored. Length 53 mm. (2.87 in.).
4. ***Modiolus metcalfei* (Hanley)** Shell of moderate size, roughly triangular in outline; umbones close behind anterior margin; upper margin markedly angular at about its middle, posterior margin rounded; raised keel runs obliquely down from umbo to hind end of lower margin. Horny brown. Length 44 mm. (1.73 in.).
5. ***Modiolus tulipa* (Lamarck)** Comparatively large shell, nearly twice as long as high; keel runs down from umbo to hind end of lower margin; lower margin slightly concave at about its middle; outer surface of shell marked by dense concentric striae. Brown to olive green. Length 75 mm. (2.95 in.).

6. *Septifer virgatus* (Wiegmann) Elongate shell; outer surface marked by divaricating radial ribs and a few concentric grooves; margin of shell crenulate. Colour variable—green, pink, or purplish. Length 43 mm. (1.69 in.).
7. *Septifer bilocularis* (Linnaeus) Trigonal shell; outer surface marked by divaricating cords and a few concentric grooves. Colour variable—orange, pink, or green. Length 35 mm. (1.38 in.).
8. *Mytilus viridis* Linnaeus Shell trigonal, sometimes attaining comparatively large size; dorsal margin angularly convex near middle, posterior margin broadly rounded, ventral margin slightly concave; outer surface marked by concentric lines. Covered with blackish green periostracum, brighter at margin. Length 78 mm. (3.71 in.).
9. *Mytilus edulis* Linnaeus Elongate trigonal shell; beak with a few teeth inside umbo; outer surface marked by concentric growth lines. Bluish black. Length 61 mm. (2.40 in.).
10. *Mytilus crassitestatus* Lischke Broadly trigonal shell; tooth inside umbo; outer surface marked by dense concentric lines. Brown to greenish. Length 56 mm. (2.20 in.).

2

(See p. 115 for plate.)

1. *Pecten townsendi* Sowerby Thin, nearly round, a little expanded posteriorly; left valve slightly concave, raised towards umbo and having about 30 large rays with narrower interrays. Peripherally reddish, more

proximally dark grey, blotched with white. Height and length equal, 43 mm. (1.69 in.).

2. ***Decatopecten striatus* (Schumacher)** Fairly thick shell; about five broader and two narrower ribs and fine radial striae over surface; ears equal. Brownish orange with whitish blotches and streaks. Height and length equal, 30 mm. (1.18 in.).
3. ***Pecten nodosus* Linnaeus** Shell with nine knobbed rays. Red splashed on white background. Height and length equal, 35 mm. (1.38 in.).
4. ***Gloripallium pallium* (Linnaeus)** Surface of shell has about 14 elevated tripartite ribs, white close to umbo, concentric alternate white and purplish maculations distally. Ears unequal, rayed with a few scaly cords. Height and length equal, 4.5 mm. (.18 in.).
5. ***Chlamys nobilis* (Reeve)** About 20 radial ribs bearing concentrically arranged scales. Ears unequal, rayed. Surface purplish. Height 75 mm. (2.95 in.), length 73 mm. (2.87 in.).
6. ***Chlamys pelseneeri* Dautzenberg and Bavay** Little inflated shell with 18 radial ribs separated by fairly wide interspaces bearing scaly ridges; ears unequal, striated; byssal notch has ctenidium of five teeth. Orange fasciations on whitish background. Height 34 mm. (1.34 in.), length 30 mm. (1.18 in.).
7. ***Chlamys distans* (Lamarck)** Flat shell with 11 radial ribs separated by grooves of about same width as ribs; ears unequal. Black and brown spots along ribs and grooves. Height and length equal, 30 mm. (1.18 in.).
8. ***Chlamys gloriosus* Reeve** Shell with numerous unscaly tripartite radial ribs. Dark purplish. Height 44 mm. (1.73 in.), length 41 mm. (1.61 in.).

9. *Chlamys* sp. Shell deeply oval to an uncommon degree; 23 radial ribs; ears unequal, striated. Reddish maculations on yellowish background. Height 32 mm. (1.26 in.), length 25 mm. (.98 in.).
10. *Chlamys pyxidata* (Born) Valves nearly circular, left valve more inflated than right; 30 flat ribs separated by narrow grooves; ears unequal, striated. Slate-coloured. Height and length equal, 45 mm. (1.77 in.).
11. *Chlamys asperulata* (Adams and Reeve) Shell ovate, bearing 23 ribs beset with small nodules; ears unequal, striated. Reddish with a few white spots. Height 22 mm. (.87 in.), length 18 mm. (.71 in.).
12. *Chlamys tranquebarica* (Gmelin) Valves rounded, a little inflated, carrying 19 ribs; ears triangular, unequal, striated. Broad, chestnut transverse bands on white background. Height and length equal, 34 mm. (1.34 in.).

3

(See p. 116 for plate.)

1. *Arca navicularis* Bruguière Boat-shaped shell with wide space between opposing umbones; radiating ribs of varying size with narrow riblets between; also faint growth lines. Wavy orange stripes on light background. Length 52 mm. (2.47 in.).
2. *Arca arabica* Philippi Rectangular shell, somewhat inflated; radiating ribs and growth lines more distinct towards outer margin; distinct oblique ridge from beak to posterior margin. Dirty grey. Length 23 mm. (.91 in.).

3. *Arca ventricosa* Lamarck Elongate shell, broader anteriorly; granular radial ribs and growth lines; beak closer to anterior end; oblique ridge from beak to posterior margin. Faint wavy orange lines anteriorly and many broader, nearly transverse orange bands posteriorly. Length 35 mm. (1.38 in.).
4. *Arca lienosa* Elongate shell with about 40 ribs, many, especially the more anterior ones, divided by fine line. Periostracum dark. Length 71 mm. (2.80 in.).
5. *Arca bistrigata* Dunker Oblong shell with twin ribs; umbones closely opposed; anterior margin rounded, posterior oblique. Dirty grey. Length 47 mm. (1.85 in.).
6. *Barbatia virescens* (Reeve) Shell narrow anteriorly, expanded posteriorly; fine ribs; growth lines well marked. Covered with dark periostracum. Length 40 mm. (1.57 in.).
7. *Barbatia virescens obtusoides* (Nyst) Anterior margin of shell obtuse, posteriorly broader and more expanded than former species. Covered with dark periostracum. Length 43 mm. (1.69 in.).
8. *Arca boucardi* Jousseaume Upper and lower margins of shell nearly parallel; umbones a little anterior; numerous ribs and a few growth lines. Covered with dark periostracum. Length 34 mm. (1.34 in.).
9. *Barbatia bicolorata* (Dillwyn) Shell with granular ribs crossed by growth lines. Distinguished by three white rays on purplish brown background; uppermost ray short. Length 41 mm. (1.61 in.).
10. *Barbatia lima* (Reeve) Anterior margin of shell rounded, posterior margin oblique; numerous riblets crossed by growth lines; umbones slightly anterior. Periostracum dark. Length 39 mm. (1.54 in.).

4

(See p. 117 for plate.)

1. ***Malleus malleus* (Linnaeus)** Irregularly T-shaped; outer surface uneven, contorted, usually encrusted with sponges and other growths. When encrustations removed, outer surface quite black and uneven. Towards hinge, shell takes on colour of horn. Interior dark, nacreous. Length of hinge line 202 mm. (7.95 in.), height of shell 190 mm. (7.48 in.).
2. ***Vulsella vulsella* (Linnaeus)** Shell slightly arched, narrowing distally; outer surface radially striated and marked by concentric growth lines. Light reddish brown exterior; interior pearly. Height 43 mm. (1.69 in.).
3. ***Isognomon isognomum* (Linnaeus)** Shell with discernible posterior wing; hinge plate deeper anteriorly; outer surface has irregularly concentric growth lines. Greenish brown. Length 100 mm. (3.94 in.), height 110 mm. (4.33 in.).
4. ***Isognomon ehippium* (Linnaeus)** Shell purse-shaped; hinge plate short, of nearly uniform height; outer surface has irregularly concentric growth lines. Outer surface dark; inner surface nacreous. Length 112 mm. (4.41 in.), height 90 mm. (3.54 in.).

5

(See p. 118 for plate.)

1. ***Pinctada margaritifera* (Linnaeus)** Shell rather flat and squarish; outer surface covered with concen-

tric layers of scaly periostracum bearing whitish and dark lines. Length and height nearly equal, 105 mm. (4.13 in.).

2. ***Pinctada vulgaris* (Schumacher)** Left shell more inflated than the right. A few radiating lighter bands on dark brown periostracum. Length 57 mm. (2.24 in.), height 65 mm. (2.56 in.).
3. ***Pteria penguin* (Röding)** Rather heavy shell; long posterior wing. Outer surface dark, almost black, marked by numerous concentric growth striae; inner surface pearly, with black marginal zone. Left valve a little deeper than right one. Length 69 mm. (2.72 in.), height 110 mm. (4.33 in.).
4. ***Pteria chinensis* (Leach)** Beak oblique; posterior extension of hinge margin extends well beyond wing tip, leaving open sinus behind. Periostracum brown, carrying lighter growth lines. Length 61 mm. (2.40 in.), height 24 mm. (.94 in.).
5. ***Pteria inquinata* (Reeve)** Beak oblique; posterior margin broadly sinuate beneath hind prolongation of hinge which hardly extends beyond level of wing tip. Brown periostracum of outer surface marked by growth lines. Length 65 mm. (2.56 in.), height 30 mm. (1.18 in.).

 6

(See p. 119 for plate.)

1. ***Pinna muricata* Linnaeus** Shell heavy; dorsal and ventral margins irregular; widely placed longitudinal ribs proximally, obscured by concentric growth lines

distally. Dark brown to blackish. Height 235 mm. (9.25 in.).

2. *Pinna muricata* Linnaeus A younger specimen of the species. Elongate trigonal; dorsal margin slightly concave, ventral margin almost straight, posterior margin convex, about half length of shell; outer surface has radial ribs. Horny brown. Height 90 mm. (3.54 in.).
3. *Pinna bicolor* Gmelin Dorsal margin straight, ventral margin convex, arched over to dorsal margin. Distinguished by several broad bands, black and lighter, radiating from umbo. Height 195 mm. (7.68 in.).



(See p. 120 for plate.)

1. *Streptopinna saccata* (Linnaeus) Thin shell; dorsal margin nearly straight, ventral margin bilobed; posterior margin truncate and somewhat gaping; surface ribbed. Light brown. Height 55 mm. (2.17 in.).
2. *Atrina vexillum* (Born) Thick, heavy shell, broadly expanded above pointed umbo; surface has radial ribs and concentric growth lines. Almost black. Specimen larger than that shown in figure has height of 310 mm. (12.20 in.).
3. *Atrina pectinata* (Linnaeus) Shell nearly trigonal in shape; dorsal margin straight, ventral margin curves distally, merges with convex posterior margin; surface has concentric growth lines and radial ribs. Ribs distally provided with raised, spinous processes. Colour dark. Height 88 mm. (3.46 in.).

4. *Atrina pectinata* (Linnaeus) More slender and lighter coloured specimen than former. Height 110 mm. (4.33 in.).

8

(See p. 121 for plate.)

1. *Placuna placenta* (Linnaeus) Nearly round, flat shell with silvery outer surface marked by concentric growth lines and pearly interior. Height 140 mm. (5.51 in.).
2. *Anomia achaeus* Gray Thin, flat, glassy shell, nearly oval; left valve a little inflated, bearing muscle scars on inner surface, right valve perforate. Pearly white. Height 34 mm. (1.34 in.).
3. *Amusium pleuronectes* (Linnaeus) Thin, flat, nearly round shell valves; ears nearly equal; internal surfaces of valves have prominent ribs, left valve reddish, right valve white. Height 53 mm. (2.87 in.).
4. *Plicatula* sp. Spatulate shell bearing about 24 ribs, margin wavy. Reddish brown outer surface with scattered whitish patches. Height 52 mm. (2.47 in.).

9

(See p. 122 for plate.)

1. *Trisidos tortuosa* (Linnaeus) Shell elongate, characteristically twisted, left valve more twisted and larger than right; outer surface marked by numerous

radiating riblets and by growth lines. White. Length 73 mm. (2.87 in.).

2. ***Anadara pilula* Reeve** Shell much inflated, nearly spherical; about 25 radial ribs with small connecting ridges. Russet-coloured, with four or five longitudinal whitish bands. Length 28 mm. (1.10 in.).
3. ***Anadara troscheli* (Dunker)** Thick, squarish shell, rounded in front, posterior margin oblique; umbo prominent, beak-like; ridge extends from it obliquely to posterior margin; about 27 stout ribs, more anterior ones markedly granular. Drab white. Length 47 mm. (1.85 in.).
4. ***Anadara maculosa* (Reeve)** Thick, heavy shell, postero-ventrally extended; anterior margin rounded, posterior oblique; about 35 multifid ribs. Periostracum dark, velvety. Length 75 mm. (2.95 in.).
5. ***Anadara granosa* (Linnaeus)** Fairly thick, oval shell, somewhat inflated; beak a little in front of middle of hinge margin; 18 to 19 strongly elevated, granular ribs. White. Length 35 mm. (1.38 in.).
6. ***Anadara satowi* Dunker** Thin, somewhat inflated shell, rounded anteriorly, oblique posteriorly; beak well in front of middle of hinge margin; about 35 ribs. Off-white. Length 34 mm. (1.34 in.).
7. ***Scapharca inaequivalvis* (Bruguière)** Shell thin, a little longer than wide, rounded anteriorly, oblique and wider posteriorly; umbo a little in front of middle of hinge margin; left valve slightly overlaps right. Covered with brown periostracum. Length 39 mm. (1.54 in.).
8. ***Cucullaea granulosa* Jonas** Large shell, inflated, left valve larger than right valve, valves rounded anteriorly, more oblique posteriorly; outer surface marked by

faint radial and concentric lines. Internally, projecting septum for posterior adductor muscle. Umbo at about middle of hinge margin. Reddish-to-purplish-to-greenish outer surface. Length 75 mm. (2.95 in.).

 10

(See p. 123 for plate.)

1. *Spondylus layardi* Reeve Thick, irregular shell; exterior of left valve has rows of flattened processes generally somewhat broad, a few narrower; sometimes a few nodules. Pink. Height 51 mm. (2.01 in.), length 46 mm. (1.81 in.).
2. *Spondylus cruentus* Lischke Irregularly ovate shell; surface of left valve has numerous fine ribs bearing spines and, more distally, scuta. Pinkish. Height 42 mm. (1.65 in.), length 43 mm. (1.69 in.).
3. *Spondylus versicolor* Schreibers Shell irregularly oval, somewhat inflated near umbo; outer surface of left valve has rows of spinous ribs, some of them bearing broad scales at valve margin. Chestnut-coloured. Height 43 mm. (1.69 in.), length 41 mm. (1.61 in.).
4. *Spondylus nicobaricus* Schreibers Shell oval; outer surface of left shell has numerous rows of spinous ribs, some of them, at intervals, bearing more prominent scale-like spines. Pinkish, lighter in colour close to umbo. Height and length equal, 55 mm. (2.17 in.).
5. *Spondylus imperialis* Chemnitz Shell valves round; outer surface of left valve has radial rows of spines, some spines short and fine, others stouter and much longer, projecting well beyond shell margin. Del-

icate pink on short spines; long spines and shell surface whitish. Height 45 mm. (1.77 in.), length 43 mm. (1.69 in.).

6. ***Lima lima* (Linnaeus)** Shell obliquely ovate; anterior margin straight, posterior margin indented below auricle and then rounded. Outer surface has radial ribs bearing scales which become larger towards distal margin of shell. Pale pink. Height 44 mm. (1.73 in.), length 26 mm. (1.02 in.).

11

(See p. 124 for plate.)

1. ***Ostraea madrasensis* Preston** Shell of variable shape; outer surface of valves covered with overlapping laminae; hinge area narrow; left valve deeper than right. Impression of adductor muscle reniform and marginally jet black. Width 88 mm. (3.46 in.), length 55 mm. (2.17 in.).
2. ***Gryphaea mordax* (Gould)** Shape variable; right valve forms lid to deeper left valve; shell margin dentate. Dirty white. Width 30 mm. (1.18 in.), length 23 mm. (.91 in.).
3. ***Saxostreaa forskalli* (Gmelin)** Shape variable; attaching left valve thick, heavy, and rather deep; thinner lid-like right valve hinged some distance away from margin of free surface; valves have wavy margin. Dirty white, shading to colour of rock to which oyster is attached. Width 88 mm. (3.46 in.), length 35 mm. (1.38 in.).
4. ***Saxostreaa forskalli* (Gmelin)** More oval form of

species. Dirty white, shading to colour of rock to which oyster is attached. Width 72 mm. (2.83 in.), length 50 mm. (1.97 in.).

5. ***Lopha cristagalli* (Linnaeus)** Shell with strongly dentate margin, attached to substratum by lobed processes of ventral valve; outer surface has granular striae. Pinkish brown. Width 49 mm. (1.93 in.), length 69 mm. (2.72 in.).
6. ***Dendrostraea hyotis* (Linnaeus)** Shell valves folded to form several radial ridges, lower valve attached to substratum by leg-like processes. Purplish. Width 42 mm. (1.65 in.), length 37 mm. (1.46 in.).
7. ***Chama reflexa* Reeve** Nearly round shell; rows of spines on surface of free valve, some of the spines foliaceous. Reddish. Length and width equal, 30 mm. (1.18 in.).
8. ***Chama fragum* Reeve** Valves thick; free valve has large swelling close to hinge and irregularly rounded outline; surface of this valve concentrically lamellate and bears scale-like processes, most developed close to outer margin. Reddish brown. Width 45 mm. (1.77 in.), length 35 mm. (1.38 in.).
9. ***Chama dunkeri* Lischke** Free valve elongated oval, narrowing towards distal margin and bearing rows of whitish tubercles on red background. Length 28 mm. (1.10 in.), width 22 mm. (.87 in.).

~~~~~ 12 ~~~~~

(See p. 125 for plate.)

1. ***Cardita variegata* Bruguière** Anterior shorter ribs

narrower and with more close-set scales than posterior stouter ribs. White with reddish brown spots over ribs. Length 39 mm. (1.54 in.), height 25 mm. (.98 in.).

2. *Cardita* sp. Valves somewhat inflated, few ribs; ventral margin indented so that there appears to be lobe below umbo. White with brownish spots over ribs. Length 30 mm. (1.18 in.), height 17 mm. (.67 in.).
3. *Cardita bicolor* Lamarck Thick trigonal shell; ribs narrow proximally, broader and flatter distally, separated by deep grooves. Outer surface white, marked by reddish brown bands over ribs. Length 40 mm. (1.57 in.), height 30 mm. (1.18 in.).
4. *Trapezium rostrata* Lamarck Elongate shell; prominent ridge extends obliquely backwards from umbo forming point at posterior margin of valve; hinge margin straight, free margin convex. White. Length 23 mm. (.91 in.), height 12 mm. (.47 in.).
5. *Anodontia edentula* (Linnaeus) Dorsal margin of shell in front of umbo short and rounded off to front margin; concentric growth lines on surface. Whitish. Length 26 mm. (1.02 in.), height 25 mm. (.98 in.).
6. *Diplodonta semiasperatoides* Nomura Circular, rather inflated shell; concentric growth lines close together. Whitish. Length 26 mm. (1.02 in.), height 23 mm. (.91 in.).
7. *Ctene divergens* (Philippi) Shell moderately inflated; numerous radiating ribs, divaricating at anterior and posterior margins of valves; a few growth lines widely separated from each other; umbo pointed. White. Length 17 mm. (.67 in.), height 15 mm. (.59 in.).
8. *Vasticardium rubicundum* (Reeve) Shell somewhat inflated; ribs well developed with fine serrations

which become tubercular on more posterior ribs. White, with pink blotches. Length 38 mm. (1.50 in.), height 48 mm. (1.89 in.).

9. *Vasticardium arenicola* (Reeve) Numerous narrow ribs; anterior margin of shell more rounded than posterior; free margin somewhat flared in comparison with narrow umbonal region. Irregular patches of red on white background. Length 26 mm. (1.02 in.), height 31 mm. (1.22 in.).
10. *Vasticardium lacunosum* (Reeve) Shell moderately inflated, tending to be rather squarish in outline; 31 distinctly raised ribs, anterior ribs arcuately crenated, middle ribs smooth above, finely crenulated on sides, more posterior ribs tuberculate. Yellow with brown patches. Length 27 mm. (1.06 in.), height 30 mm. (1.18 in.).
11. *Afrocardium setosum* (Redfern) Obliquely elongate shell; ribs have flattened surface, faint tubercles on more anterior and posterior ones. Yellowish, with brown patches which tend to be concentric in arrangement. Length 29 mm. (1.14 in.), height 22 mm. (.87 in.).
12. *Afrocardium latum* (Born) Elongate oval shell; ribs somewhat flat, crossed by growth lines. White with brown blotches roughly concentric, darker on postero-ventral area. Length 44 mm. (1.73 in.), height 29 mm. (1.14 in.).
13. *Fulvia australis* (Sowerby) Shell inflated, posterior margin slightly angulate; ribs inconspicuous near umbo, leaving it smooth. Whitish; purplish near umbo. Length and height equal, 24 mm. (.94 in.).
14. *Fulvia asiatica* (Bruguière) Valves thin, shell rather inflated, slightly drawn-out posteriorly; ribs narrow,

separated by deep grooves. Whitish. Length 25 mm. (.98 in.), height 22 mm. (.87 in.).

15. *Lunulicardia subretusa* (Sowerby) Moderately solid shell with strongly incurved lunule in front of umbo; ribs low, bearing a number of granules; grooves between ribs narrow and punctated. White. Length 21 mm. (.83 in.), height 26 mm. (1.02 in.).

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(See p. 126 for plate.)

1. *Vasticardium enode* (Sowerby) Fairly large, thick shell with flattened ribs covered with scales; grooves between ribs deep and narrow. Yellowish with reddish brown maculations. Length 80 mm. (3.15 in.), height 104 mm. (4.09 in.).
2. *Vasticardium flavum* (Linnaeus) Shell of moderate size, rather oblique in outline; front margin very nearly straight, hind margin more evenly rounded; about 28 strong ribs with transverse ridges and fairly deep grooves between ribs. Surface of shell usually marked by a few growth lines. Yellowish to brownish. Length 45 mm. (1.77 in.), height 51 mm. (2.01 in.).
3. *Vasticardium assimile* (Reeve) Shell higher than long and slightly oblique; about 30 transversely ridged ribs, grooves between them deep; more anterior and posterior ribs toothed distally; margin has wavy appearance. Yellowish to brownish. Length 41 mm. (1.61 in.), height 45 mm. (1.77 in.).
4. *Tridacna maxima* (Röding) Heavy, oblong shell; umbo slightly posterior; surface of valve has seven

stout ribs bearing regularly placed large scales. Whitish. Length 176 mm. (6.93 in.), height 91 mm. (3.58 in.).

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(See p. 127 for plate.)

1. ***Meretrix lusoria* (Röding)** Shell trigono-ovate, covered with smooth periostracum. Mainly white with chestnut patches in umbonal and anterior region, extending into a few incomplete concentric narrow bands; dark brown band along posterior margin. Length 69 mm. (2.72 in.), height 61 mm. (2.40 in.).
2. ***Callista chinensis* (Holten)** Nearly oval shell, broader anteriorly, narrowing posteriorly. Covered with smooth and polished periostracum which, when removed, reveals near-white surface of shell with concentric striae and purple radiating bands. Length 54 mm. (2.13 in.), height 40 mm. (1.57 in.).
3. ***Pitar ceylonensis* (Sowerby)** Somewhat inflated trigono-ovate shell; umbo turned obliquely forwards; yellowish surface of shell bears numerous fine concentric striae and a few reddish brown radiating bands running from umbo to margin. Length 43 mm. (1.69 in.), height 35 mm. (1.38 in.).
4. ***Callista erycina* Lamarck** Heavy, ovate shell with well-marked concentric striae on yellowish surface. Several radiating bands of light brown and a few purplish bands. Length 74 mm. (2.91 in.), height 54 mm. (2.13 in.).
5. ***Pitar striata* (Gray)** Somewhat inflated trigono-ovate shell; umbo turned obliquely forwards. Surface

dirty yellow with a few concentric bands varying from green to blue to purplish brown. Posterior bears streak of bands' colour. Length 40 mm. (1.57 in.), height 32 mm. (1.26 in.).

6. *Anomalocardia donacina* (Lamarck) Shell nearly trigonal, a little drawn-out posteriorly; inner margin of shell slightly crenulated. Outer surface smooth, yellow, with numerous brownish rays and a few broader, brown concentric bands closer to margin. Length 33 mm. (1.30 in.), height 25 mm. (.98 in.).

7. *Anomalocardia producta* Kuroda and Habe Shell rounded in front, very drawn-out posteriorly. Outer surface marked with radial lines and concentric striae, latter more distinct peripherally, their crossings forming lattices; inner margin of shell crenulated. Golden brown. Length 51 mm. (2.01 in.), height 25 mm. (.98 in.).

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SPECIAL COLLECTION

(See p. 128 for plate.)

1. *Dosinia puella* Angas Shell a little inflated, margin nearly circular but for angulation at about middle of posterior margin; outer surface has somewhat raised concentric ridges crested towards anterior and posterior margins. Pale yellowish brown. Length and height equal, 26 mm. (1.02 in.).
2. *Dosinia trigona* (Reeve) Shell fairly thick, moderately inflated; umbo turned forwards; hind margin angular at about middle; outer surface concentrically striated. Whitish. Length and height equal, 26 mm. (1.02 in.).
3. *Dosinia cretacea* (Reeve) Moderately thick shell,

- somewhat inflated; umbo turned forwards like beak; angulation on middle of posterior margin; concentric ridges on outer surface close together. White. Length 30 mm. (1.18 in.), height 31 mm. (1.22 in.).
4. *Dosinia biscocla* (Reeve) Shell thick, rather inflated; umbo hooked forwards; angulation on middle of posterior border; surface has numerous concentric ridges. White. Length 27 mm. (1.06 in.), height 26 mm. (1.02 in.).
 5. *Dosinia juvenilis* Chemnitz Shell moderately thick and inflated; umbo hooked forwards; concentric ridges on surface not so close together. Lunule brown; brownish triangular patches radially placed on white background. Length 27 mm. (1.06 in.), height 26 mm. (1.02 in.).
 6. *Antigona lamellaris* Schumacher Shell elongate; outer surface has erect, concentric, frilled lamellae traversed by radial ridges. Brown blotches radially arranged on whitish background of outer surface; inner surface tinged with bright orange. Length 33 mm. (1.30 in.), height 25 mm. (.98 in.).
 7. *Periglypta reticulata* Linnaeus Thick shell; outer surface closely reticulate throughout with concentric and radial ridges; front margin narrower than truncated hind margin. Brown spots and blotches which tend to be radially arranged; hinge teeth orange. Length 54 mm. (2.13 in.), height 45 mm. (1.77 in.).
 8. *Callanaitis disjecta* Perry Thin, subquadrately oval shell; outer surface has about six frill-like lamellae with small spurs rising on them along oblique line from umbo to posterior hind corner. White. Length 22 mm. (.87 in.), height 16 mm. (.63 in.).
 9. *Venus toreuma* Gould Shell fairly thick, inflated

and round; outer surface has concentric ridges. Brown angular markings on white background. Length 33 mm. (1.30 in.), height 32 mm. (1.26 in.).

10. *Lioconcha dautzenbergi* Prashad Moderately solid, rather inflated, triangulo-ovate shell with close-set concentric striae on outer surface which bears zig-zag brown markings and radiating brown bands on yellowish background. Length 43 mm. (1.69 in.), height 35 mm. (1.38 in.).
11. *Lioconcha castrensis* (Linnaeus) Solid shell; posterior margin rounded, anterior margin narrower. Outer surface has angular and tent-shaped dark brown markings on white background. Length 41 mm. (1.61 in.), height 38 mm. (1.50 in.).

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(See p. 129 for plate.)

1. *Lioconcha fastigiata* (Sowerby) Triangular shell, umbo a little anterior of middle; front margin slightly concave, posterior and ventral margins convex, with postero-ventral end slightly drawn-out. Dark triangular markings on yellowish background. Length 36 mm. (1.42 in.), height 32 mm. (1.26 in.).
2. *Paphia textile* Gmelin Elongate shell, rounded at both ends; outer surface polished and bearing faint concentric striae. Pinkish wire-mesh design on yellowish to white background. Length 56 mm. (2.20 in.), height 33 mm. (1.30 in.).
3. *Paphia malabarica* (Chemnitz) Shell trigonal, somewhat inflated; outer surface has coarse concentric ridges. Yellowish brown, sometimes with

sparce, radially arranged brown spots. Length 74 mm. (2.91 in.), height 52 mm. (2.05 in.).

4. ***Tapes deshayesi* (Hanley)** Shell rather light, rounded in front, obliquely pointed at posterior margin; outer surface has concentric ridges which fade away near umbo. Light brown with five rays of dark blotches. Length 60 mm. (2.36 in.), height 36 mm. (1.42 in.).
5. ***Tapes radiata* (Chemnitz)** Shell nearly rectangular in shape, but proportion of its length to height seems somewhat variable; outer surface bears radial ridges and grooves crossed by a few concentric growth lines. Outer surface light brown with two obliquely radiating white bands on either side of which are rows of black spots; interior surface stained orange on posterior area. Length 40 mm. (1.57 in.), height 26 mm. (1.02 in.).
6. ***Tapes litterata* (Linnaeus)** Squarely oblong shell marked on outer surface with concentric grooves which fade away close to umbo. Background yellowish brown with dark reticulations and radiating rows of three or four dark spots in each row. Length 75 mm. (2.96 in.), height 47 mm. (1.85 in.).
7. ***Circe scripta* Linnaeus** Flattened shell, angular in umbonal region but curving around anteriorly and posteriorly; posterior margin may be slightly truncate; outer surface has concentric grooves and ridges. Straw-coloured with two broad, divaricating reddish bands and some triangular reddish spots. Length 51 mm. (2.01 in.), height 49 mm. (1.93 in.).

(See p. 130 for plate.)

1. *Gafrarium divaricatum* (Gmelin) Shell trigono-ovate; in addition to usual concentric ridges, surface covered with two sets of divaricating ribs. Dark brown or orange blotches arranged more or less radially and concentrically. Length 50 mm. (1.97 in.), height 44 mm. (1.73 in.).
2. *Gafrarium dispar* (Dillwyn) Somewhat oval shell; surface bears concentric ridges and only one set of divaricating ribs over posterior half. Small brown dots or zigzag markings on pale yellow background. Length 33 mm. (1.30 in.), height 25 mm. (.98 in.).
3. *Gafrarium tumidum* Röding Trigono-ovate shell with nodulous, radiating ribs which bifurcate distally. Outer surface bears irregular purplish markings, tending to be concentrically arranged on whitish or yellowish background. Length 31 mm. (1.22 in.), height 26 mm. (1.02 in.).
4. *Sunetta effosa* Hanley Wedge-shaped, somewhat inflated shell with concentric grooves more marked close to umbo, fading gradually towards shell margin. Large purplish concentric blotches and arrowhead markings on whitish background. Length 38 mm. (1.50 in.), height 28 mm. (1.10 in.).
- 5, 6. *Sunetta scripta* (Linnaeus) Wedge-shaped shell, umbo slightly posterior; surface has faint concentric grooves. Pattern of purplish arrowhead markings on whitish background which sometimes shows white radiating bands. Length 33 mm. (1.30 in.), height 23 mm. (.90 in.).

7. *Sunetta scripta* (Linnaeus) Rather flat, wedge-shaped shell with slight radial depression on surface close to posterior margin and small indentation on distal margin. Faint concentric ridges on surface, which is white with brownish arrowhead markings which may be either numerous and close-set, or few and farther apart. Length 26 mm. (1.02 in.), height 18 mm. (.71 in.).
- 8, 9. *Sunetta meröe* (Schumacher) Wedge-shaped shell, umbo very slightly posterior; outer surface has distinct concentric grooves. Brown arrowhead markings on cream background. Length 24 mm. (.94 in.), height 18 mm. (.71 in.).
10. *Sunetta scripta* (Linnaeus) Wedge-shaped shell with umbo nearly equidistant from anterior and posterior margins; surface has very distinct concentric grooves. Dark brown zigzag markings on light brown background. Length 32 mm. (1.26 in.), height 23 mm. (.91 in.).
11. *Sunetta meröe* (Schumacher) Wedge-shaped shell, anterior margin rounded, posterior margin slightly truncated; surface bears distinct concentric grooves and purplish arrowhead or zigzag markings on light brown background. Length 37 mm. (1.46 in.), height 25 mm. (.98 in.).

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(See p. 131 for plate.)

1. *Mesodesma glabratum* (Lamarck) Thick, triangular shell with rounded front margin and somewhat

pointed hind end; outer surface concentrically striated. Covered with yellowish brown periostracum, especially towards margin. Length 36 mm. (1.42 in.), height 25 mm. (.98 in.).

2. ***Mactra complanata*** Deshayes Thin, fragile, rather flat, triangular shell; anterior and posterior margins about equal in length, lower margin regularly arched; umbo slightly hooked. White, covered with thin, yellowish periostracum. Length 78 mm. (3.07 in.), height 60 mm. (2.36 in.).
3. ***Mactra turgida*** Gmelin Strongly inflated, triangulo-ovate shell; outer surface covered with thin, brownish periostracum. As this is worn away, shell is polished white, except for umbonal area which is pinkish violet. Some concentric striae towards margin. Length 55 mm. (2.17 in.), height 47 mm. (1.85 in.).
4. ***Mactra cuneata*** Chemnitz Triangulo-ovate shell, anterior margin slightly broader than posterior. Outer surface brownish yellow, mainly smooth but with concentric striae towards margin; umbo and its neighbourhood bluish violet. Length 31 mm. (1.22 in.), height 25 mm. (.98 in.).
5. ***Mactra mera*** Reeve Moderately thick, inflated, triangulo-ovate shell, outer surface mostly glossy, but concentric striae visible close to margin. Shell straw-coloured, rayed with white and brown diverging bands; umbo bluish violet. Length 40 mm. (1.57 in.), height 47 mm. (1.85 in.).
6. ***Spisula*** sp. Thick, a little inflated, triangulo-ovate shell, anterior margin a little narrower than broad posterior margin. Outer surface dull; narrow concentric striae visible through thin, yellowish periostracum. Length 61 mm. (2.40 in.), height 47 mm. (1.85 in.).

(See p. 132 for plate.)

1. ***Oxyperas triangularis* (Lamarck)** Shell a little inflated, almost an isosceles triangle in outline; outer surface marked by concentric grooves. Dark brown spots scattered on lighter brown background. Length 65 mm. (2.56 in.), height 37 mm. (1.46 in.).
2. ***Macrinula laevis* (Chemnitz)** Somewhat inflated, wedge-shaped shell; anterior margin narrower and more rounded than broader, plicate posterior margin; umbo a little closer to posterior end, plaited; broadly plaited anteriorly and posteriorly, medially smooth; fine concentric striae. White. Length 60 mm. (2.36 in.), height 47 mm. (1.85 in.).
3. ***Lutraria maxima* Jonas** Elongated, oval shell with umbo at anterior third of dorsal margin; outer surface marked by concentric growth lines which become rougher towards margin. Yellowish brown. Length 82 mm. (3.23 in.), height 44 mm. (1.73 in.).
4. ***Semele radiata* Ruppel** Shell almost round; umbo a trifle closer to posterior end; outer surface has fine concentric and radial striae. Background white with two or three purplish concentric bands crossed by radial pink bands of varying width and fanning out from umbo. Length 30 mm. (1.18 in.), height 27 mm. (1.06 in.).
5. ***Asaphis dichotoma* (Anton)** Broadly ovate shell with dividing radial ridges on outer surface crossing a few concentric grooves. Purplish patch on inner and outer surfaces close to posterior margin. Length 59 mm. (2.32 in.), height 42 mm. (1.65 in.).
6. ***Solecurtus exaratus* Philippi** Elongate shell with

umbo much closer to nearly square front margin than to rounded hind margin. Outer surface has concentric grooves crossed by striae which are parallel to hind margin at posterior end but become more nearly transverse and then oblique as they approach anterior end. White. Length 61 mm. (2.40 in.), height 25 mm. (.98 in.).

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(See p. 133 for plate.)

1. *Tellinella virgata* (Linnaeus) Shell rounded anteriorly, acuminate posteriorly, bearing flexure running from umbo to postero-lateral corner; outer surface covered with concentric striae. Purplish rays on yellow background. Length 70 mm. (2.76 in.), height 40 mm. (1.57 in.).
2. *Macalina bruguièrei* (Hanley) Shell fairly solid, trigono-ovate; postero-dorsal margin somewhat curved in; outer surface mainly smooth but concentric growth lines visible towards margin. Dull white. Length 38 mm. (1.50 in.), height 32 mm. (1.26 in.).
3. *Tellinides timorensis* (Lamarck) Flat, ovate shell, rounded anteriorly, more obliquely rounded posteriorly; depression on outer surface runs out obliquely close to posterior margin; outer surface covered with concentric striae. Periostracum thin. Whitish. Length 57 mm. (2.24 in.), height 40 mm. (1.57 in.).
4. *Tellina coarctata* Philippi Moderately thin, inflated, trigono-ovate shell; shallow radial depression extends from umbo down to middle of ventral margin; another more defined depression runs between this and posterior margin; outer surface has concentric striae. White. Length 72 mm. (2.83 in.), height 60 mm. (2.36 in.).

5. *Tellina angulata* Gmelin Thin, inflated, trigono-ovate shell; anterior and posterior margins rounded; umbo posterior to middle; oblique keel and corresponding depression run from umbo to posterior margin; outer surface smooth close to umbo but with concentric grooves more distally. White. Length 63 mm. (2.48 in.), height 54 mm. (2.13 in.).
6. *Gastrana polygona* (Hanley) Fairly solid, nearly oval shell; anterior margin rounded, posterior more pointed due to two keels and corresponding depressions running out obliquely from umbo to postero-ventral margin; outer surface bears concentric ridges. Concentric bands of black and grey to white or of brown and white. Length 60 mm. (2.36 in.), height 39 mm. (1.54 in.).

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(See p. 134 for plate.)

1. *Pharaonella* sp. Shell elongate with broadly rounded front margin and acuminate hind margin; deepest at about level of umbo; outer surface has numerous concentric striae. Purple. Length 113 mm. (4.45 in.), height 53 mm. (2.09 in.).
2. *Gari maculosa* (Lamarck) Elongate oval shell, rounded anteriorly, subtruncate posteriorly; outer surface has concentric striae. Dark purple obliquely radiating bands on light purple background. Length 39 mm. (1.54 in.), height 23 mm. (.91 in.).
3. *Scutarcopagia linguafelis* (Linnaeus) Somewhat inflated oval shell; umbo much closer to hind end; keel

runs from umbo to postero-ventral corner; outer surface roughened all over. Rosy spot on umbo and often a few rosy rays spreading out from it; background white. Length 36 mm. (1.42 in.), height 28 mm. (1.10 in.).

4. *Latona incarnata* (Chemnitz) Shell triangular with keel from umbo to postero-ventral margin; outer surface has concentric striae which are rough behind keel and faint in front of it where faint radial striae also present. Concentric bands of purple on pinkish yellow background. Length 39 mm. (1.54 in.), height 29 mm. (1.14 in.).
5. *Latona cuneata* (Linnaeus) Triangular shell with keel from umbo to postero-ventral margin; outer surface has radial and concentric striae, both striae more distinct posterior to keel. Purplish brown and white diverging radial bands. Length 39 mm. (1.54 in.), height 27 mm. (1.06 in.).
6. *Donax scortum* Linnaeus Solid, inflated shell with sharp, curved keel from umbo to postero-ventral margin; outer surface of shell marked by prominent concentric ridges which are crossed by finer radial ridges on anterior and posterior areas. Dirty white; bluish on umbo and pale violet on posterior margin. Length 68 mm. (2.68 in.), height 42 mm. (1.65 in.).
7. *Latona faba* (Gmelin) Shell triangulo-ovate, outer surface marked with concentric striae. Colour highly variable; rays spreading out from umbo. Length 21 mm. (.83 in.), height 15 mm. (.59 in.).

(See p. 135 for plate.)

1. ***Anadara lateralis* (Reeve)** Moderately inflated shell of medium thickness, somewhat drawn-out postero-ventrally; one and a half times as long as broad, bearing about 28 nongranulate ribs. Brown on umbo, becoming lighter towards margin. Length 30 mm. (1.18 in.), width 20 mm. (.79 in.).
2. ***Anadara complanata* (Chemnitz)** Shell of about same thickness and inflation as former and, though drawn-out posteriorly, not so markedly postero-ventrally; since hinge line behind beak short, hind margin of shell rather oblique. About 25 radial ribs. Colouration same as in above shell. Length 22 mm. (.87 in.), width 15 mm. (.59 in.).
3. ***Chlamys asperulata* ssp.** Shell thin, a little inflated; about 24 roundly elevated radial ribs. Reddish brown, marked with wavy bands of white and dark brown running close together. Length 24 mm. (.94 in.), height 28 mm. (1.10 in.).
- 4, 5. ***Chlamys irregularis* (Sowerby)** Shell thin, a little inflated, triangulo-orbicular in shape. Surface bears numerous serrate radial cords and is light coloured in central part but has darker broad peripheral area. Colour variable—yellow, purplish, or reddish. Inner surface nacreous. Length 30 mm. (1.18 in.), height 35 mm. (1.38 in.).
6. ***Paphia amabilis* Philippi** Fairly thick, elongate oval shell whose shiny surface bears numerous concentric grooves. Background light brown with greenish brown network, more prominent towards margin, and

four radiating rows of brown patches of which hindmost row narrowest. Length 86 mm. (3.39 in.), height 50 mm. (1.97 in.).

7. *Paphia alapapilionis* Röding Elongate oval shell; surface bears weak concentric grooves, also weak oblique grooves on middle part. Off-white-to-purple background on which brown lines form latticework pattern. Length 56 mm. (2.20 in.), height 37 mm. (1.46 in.).
8. *Anodontia ovum* (Reeve) Strongly inflated, round shell with fairly thick valves bearing concentric growth lines. White. Diameter 33 mm. (1.30 in.).
9. *Pitar sulfureum* (Pilsbury) Somewhat inflated, triangular shell with prominent, anteriorly oblique umbo; surface has fine concentric lines which become coarser near margin. Yellow. Length 24 mm. (.94 in.), height 21 mm. (.83 in.).
10. *Codakia punctata* (Linnaeus) A little inflated, nearly circular white shell marked on outer surface by a few concentric rings crossed by numerous radial grooves. Length 28 mm. (1.10 in.), height 26 mm. (1.02 in.).
11. *Semele cordiformis* (Holten) Nearly flat, thin, oval shell. Surface faintly marked by growth lines and radial threads which branch to form fine network. Background white. Length 30 mm. (1.18 in.), height 28 mm. (1.10 in.).
12. *Solen strictus* Gould Shell obliquely truncated anteriorly, narrowing almost imperceptibly towards gently rounded posterior end. Surface covered with light brown periostracum. Length 57 mm. (2.24 in.), height at anterior end 10 mm. (.39 in.).

(See p. 136 for plate.)

1. ***Siliqua radiata* (Linnaeus)** Thin, fragile, oblong shell; anterior and posterior margins rounded, former slightly narrower; outer surface marked with concentric striae and much finer radial striae. White bands radiating out from umbo on purple background. Length 62 mm. (2.44 in.), height 26 mm. (1.02 in.).
2. ***Ensiculus philippianus* (Dunker)** Thin, elongate shell, curving a little dorsally and rounded at both ends. Outer surface coloured with brownish purple maculations. Length 45 mm. (1.77 in.), height 12 mm. (.47 in.).
3. ***Solen exiguus* Dunker** Elongate shell, narrowing slightly hindwards; anteriorly truncated, posteriorly rounded; antero-ventral surface has transverse striae, dorso-posterior surface has striae which are nearly vertical, almost parallel to posterior margin. Outer surface olivaceous. Length 89 mm. (3.50 in.), height 18 mm. (.71 in.).
4. ***Solen lamarcki* Deshayes** Elongate shell, obliquely truncated anteriorly and rounded posteriorly; outer surface has striae roughly parallel with ventral and posterior margins of shell. Outer surface olivaceous. Length 100 mm. (3.94 in.), height 20 mm. (.79 in.).
5. ***Ensis* sp.** Long shell, curved dorsally and obliquely truncated at both ends; outer surface bears striations parallel with ventral and posterior margins and covered with olive-coloured periostracum. Length 119 mm. (4.69 in.), height 23 mm. (.91 in.).

PART

II

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SHELLS OF  
GASTROPODA  
or Snail-like Molluscs

(See p. 138 for plate.)

1. ***Sanhaliotis varia* (Linnaeus)** Elliptic shell with five or six perforations. Reddish brown with green patches. Length 55 mm. (2.17 in.), width 35 mm. (1.38 in.).
2. ***Sanhaliotis planata* (Sowerby)** Oval shell, more depressed than former species. Much the same colouration as former shell. Length 44 mm. (1.73 in.), width 28 mm. (1.10 in.).
3. ***Macroschisma* sp.** Elongate oval shell, broader anteriorly; raised along median line and somewhat compressed laterally; foramen of moderate size. Light brown; four darker radiating double bands. Length 12 mm. (.47 in.), width 7 mm. (.28 in.).
4. ***Diodora mus* (Reeve)** Oval shell with foramen a little anterior to midpoint on dorsal surface. Brownish blotches on white and six darker radiating bands. Length 19 mm. (.75 in.), width 12 mm. (.47 in.).
5. ***Diodora lima* (Sowerby)** Broadly oval shell, rather tall; foramen anterior to midpoint of dorsal surface. Light brown with several darker radiating bands. Length 23 mm. (.91 in.), width 17 mm. (.67 in.).
6. ***Scutum unguis* (Linnaeus)** Elongate oval shell, broader posteriorly; anterior margin carries shallow notch; surface has concentric ridges. Tinged with brown. Length 38 mm. (1.50 in.), width 21 mm. (.83 in.).
7. ***Hipponyx pilosus* Deshayes** Shell oval in outline, apex closer to hind border; surface marked by concentric and radial striae and covered with hairy processes. Dull brown. Length 18 mm. (.71 in.), width 14 mm. (.55 in.).

8. *Amathina tricarinata* (Linnaeus) Conical shell, apex directed backward, slightly coiled; surface has three distinct ribs. Covered with brown epidermis. Length 19 mm. (.75 in.), width 14 mm. (.55 in.).
- 9, 10. *Crucibulum extincitorium* (Lamarck) Thin, conical shell with pointed, central apex; folded internal appendage much compressed. Outer surface has fine concentric striae. Whitish, with obliquely radiating reddish brown bands. Diameter of base 22 mm. (.87 in.).
- 11-14. *Clypidina notata* (Linnaeus) Low cone, oval in outline; apex nearly central. In juvenile stages, apex white with two lateral black spots and black lines radiating from apex to periphery; as shell grows older apical white area enlarges and black rays get shorter and thicker. Length 24 mm. (.94 in.), width 20 mm. (.79 in.).

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(See p. 139 for plate.)

- 1-4. *Umbonium vestiarum* (Linnaeus) Depressed spire and flattened body whorl. Very large range of variation in colour and colour pattern. Diameter of base 10 mm. (.39 in.).
5. *Monilea callifera* Lamarck Spire somewhat depressed, umbilicus open; outer surface has granular spiral ridges. Dark brown transverse wavy bands on light brown background. Length 20 mm. (.79 in.), height 13 mm. (.51 in.).
6. *Euchelus atratus* (Gmelin) Shell whorls inflated, body whorl markedly so; strongly developed granular spiral ridges on each whorl. Irregularly oblique rows

of purplish brown spots; background lighter purple, white spots on ridges. Length 26 mm. (1.02 in.), height 20 mm. (.79 in.).

7. ***Trochus radiatus* Gmelin** Shell with nearly straight sides; outer surface has spiral rows of small tubercles; basal surface has granulated spiral ridges. Dark red transpiral bands on white background. Width of base 24 mm. (.94 in.), height 18 mm. (.71 in.).
8. ***Trochus callicoccus* Reeve** Low cone with sharp basal angle; in upper whorls there is row of tubercles on suture and spiral rows of granules on whorls, but this distinction less marked on lower whorls; columella toothed; basal surface has granulated spiral striae. Transpiral red patches on brownish background. Width of base 30 mm. (1.18 in.), height of shell 20 mm. (.79 in.).
9. ***Trochus maculatus* Linnaeus** Thick cone with nearly straight sides, covered with spiral rows of tubercles of varying size; basal margin angular; surface of base has granulated striae. Outer surface pink; basal surface has pink dots on white background. Width of base 38 mm. (1.50 in.), height of cone 27 mm. (1.06 in.).
10. ***Trochus maculatus* Linnaeus** Conical shell with slightly convex sides; outer surface covered with spiral rows of tubercles which are vertically elongate lower down on surface; base has granulated striae. Pink areas on white near top; surface lower down olivaceous; basal surface carries red radial bands on white background. Width of base 43 mm. (1.69 in.), height of cone 37 mm. (1.46 in.).
11. ***Trochus maculatus* Linnaeus** Still another form of the species. Conical shell with slightly convex sides; tubercles on spirals elongate lower down on surface.

Pink areas on white; base mainly white with wavy pink rays. Width of base 42 mm. (1.65 in.), height of cone 35 mm. (1.30 in.).

12. *Trochus tentorium* Gmelin Sides of shell nearly straight, and lower row of tubercles on each whorl enlarged, forming discontinuous transpiral ribs. Radiating reddish patches, more conspicuous on lower half of shell surface; background greenish. Length of base 30 mm. (1.18 in.), height of cone 23 mm. (.91 in.).
13. *Trochus gibberulus* Adams Thick, heavy, hive-shaped shell, strongly spirally grained, grains nodulated; base close-grained. White, with pink or crimson nodules and crimson streaks close to base. Width of base 45 mm. (1.77 in.), height of cone 35 mm. (1.38 in.).
14. *Tectus pyramis* (Born) Tallish cone with straight sides; outer surface has spiral rows of tubercles; suture slightly grooved; columella screwed in so as to form tooth-like structure at inner end of basal lip. Outer surface green; basal surface mostly white with radiating green bands. Width of base 49 mm. (1.93 in.), height of cone 45 mm. (1.77 in.).

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(See p. 140 for plate.)

- 1, 2. *Penepatella stellaeformis* (Reeve) Flat shell with irregular margin and many unequal radial ribs. A few dark brown spots on light background. Length 27 mm. (1.06 in.), width 22 mm. (.87 in.).
- 3, 4. *Patelloida saccharina lanx* (Reeve) Flat shell, star-shaped with about eight main ribs and several

more slender ribs in between. Brown or black blotches on white background. Length 27 mm. (1.06 in.), width 23 mm. (.91 in.).

5. *Penepatella optima* (Pilsbury) Moderately tall shell, oval, narrower in front than behind. Large number of fairly prominent radiating ribs. Brown or black blotches on white background. Length 28 mm. (1.10 in.), width 21 mm. (.83 in.).
- 6, 7. *Cellana eucosmia* (Pilsbury) Shell with oval or nearly circular margin; apex nearly central; upper surface bears fine concentric striae. Alternate dark and light radial bands, dark bands made up of chevron-shaped markings. Length 31 mm. (1.22 in.), width 25 mm. (.98 in.).
8. *Cellana radiata* (Born) Rather low, oval shell, apex slightly in front of centre. Surface of shell has fine concentric striae and 11 radiating brown bands with lighter brown radii in intervening spaces. Length 20 mm. (.79 in.), width 16 mm. (.63 in.).
- 9, 10. *Cellana radiata* (Born) Somewhat tall cone with oval margin; apex slightly anterior. Upper surface bears concentric striae. Numerous dark radiating lines on olivaceous background. Length 27 mm. (1.06 in.), width 24 mm. (.94 in.).
11. *Cellana radiata* (Born) Moderately tall cone with oval margin and apex a little in front of centre. Surface of shell covered with fine concentric striae and coloured by 12 radiating brown bands with lighter brown rays between. Length 29 mm. (1.14 in.), width 19 mm. (.75 in.).
12. *Cellana radiata* (Born) Low, oval shell with apex anterior to centre. Upper surface of shell white with

brown half-rays around periphery. Length 15 mm. (.59 in.), width 12 mm. (.47 in.).

13. *Acmaea* sp. Low cone with oval margin slightly wavy; apex acentral, a little anterior. Outer surface with alternately larger and smaller radiating ribs. White, with circle of small black dots around apex. Length 16 mm. (.63 in.), width 13 mm. (.51 in.).
14. *Cellana luchuana* (Pilsbury) Low, oval shell with apex nearly central. Upper surface white, almost covered by dense, dark brown rays. Grey peripheral zone on lower surface. Length 12 mm. (.47 in.), width 9 mm. (.35 in.).
15. *Notacmaea* sp. Low, oval shell with pointed apex closer to anterior end. Upper surface bears fine concentric striae and dark chevron markings pointing towards apex; background light brown. Inner surface white. Length 11 mm. (.43 in.), width 9 mm. (.35 in.).
16. *Cellana radiata* (Born) Low, conical shell with apex very nearly central and margin almost regular. Upper surface with numerous radiating ribs of about equal size. Shell yellowish above and below. Length 17 mm. (.67 in.), width 13 mm. (.51 in.).

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## 27

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(See p. 141 for plate.)

1. *Liotinaria cidaris* (Reeve) Whorls bear raised transpiral ribs connected by finer spiral ridges; row of depressions on basal surface. White. Width 14 mm. (.55 in.), height 9 mm. (.35 in.).

2. ***Astraliium semicostatum* (Kiener)** Conical shell, lowermost part of each whorl carries row of short, spine-like tubercles somewhat obliquely elongated. Green. Width of base 21 mm. (.83 in.), height 14 mm. (.55 in.).
3. ***Astraliium costatum* (Kiener)** Fairly tall cone; spine-like tubercles on lower end of whorls comparatively stout. Brownish green. Width 24 mm. (.94 in.), height 19 mm. (.75 in.).
4. ***Angaria rugosa* (Kiener)** Solid shell with flat spire; tubercles on body whorl with rows of short spines. Red. Width of base 28 mm. (1.10 in.).
5. ***Neritopsis radula* (Linnaeus)** Spiral ridges on body granular; callus on inner lip slightly expanded at posterior end. White. Width 34 mm. (1.34 in.).
6. ***Ritena maura* (Récluz)** Surface of shell has flat spiral ridges; teeth on inner lip of aperture. Black with transpiral rows of white spots or bands. Length of base 35 mm. (1.38 in.).
7. ***Ritena plicata* (Linnaeus)** Surface of shell has strong spiral ridges; strong teeth on inner and outer lip. A few black transverse bands on white background. Length of base 24 mm. (.94 in.).
8. ***Amphinerita polita* (Linnaeus)** Shell with fine transverse striae, otherwise smooth and glossy surface. Dark spiral bands and irregular patterns on whitish background. Length of base 30 mm. (1.18 in.).
9. ***Ritena chameleon* (Linnaeus)** Surface has spiral ridges and ridges extending on to callus; teeth on anterior and posterior lips of aperture. Surface black with transverse white bands. Length of base 22 mm. (.87 in.).

10. *Thliostyra albicilla* (Linnaeus) Outer surface has transverse grooves; fine teeth on inner and outer lip of aperture; callus on columellar side granular. Black and white markings on surface. Length of base 23 mm. (.91 in.).
11. *Nerita insculpta* Récluz Surface has spiral ridges; callus smooth; single tooth on outer margin of aperture. Three black spiral bands on dirty white background. Length of base 17 mm. (.67 in.).
12. *Planaxis sulcatus* (Born) Shell with rather blunt apex, moderate spire, and spirally ridged whorls; outer lip spirally ridged on inside; columellar border callous. Bands brown and white, irregularly transpiral bands. Length 20 mm. (.79 in.).
13. *Littoraria scabra* (Linnaeus) Shell with pointed apex, well-developed spire, and inflated body whorl; whorls spirally ridged, larger spiral ridge from upper edge of lip marks off body whorl into upper region and lower region in proportion of about two to one. Surface has dark brown oblique maculations on white background. Length 16 mm. (.63 in.).
14. *Gyroscala perplexa* (Pease) Moderately thick shell; costae longitudinally continuous through whorls; base has single spiral rib without umbilicus. White. Length 27 mm. (1.06 in.).

(See p. 142 for plate.)

1. *Turbo intercostalis* Menke Shell with comparatively moderate apex and spire, and inflated whorls;

outer surface has spiral grooves and ridges, ridge on base and on shoulder of whorls usually stronger than the others; aperture large, round; operculum calcareous, circular, flat on inner and convex on outer surface. Dark brown radiating patches alternate with lighter streaks. Height 40 mm. (1.57 in.).

2. ***Turbo stenogyrus* Fischer** Spire moderate, comparatively large body whorl; whorls have granular spiral ridges, some of them bearing nodules. Brown transpiral patches on yellow background, and white spots on basal surface. Height 28 mm. (1.10 in.).
3. ***Turbo petholatus* Linnaeus** Whorls fairly inflated, body whorl large, deeper than spire. Light brown with rows of large chocolate brown patches and spiral cords alternately narrow and broad and made up of discontinuous spots or streaks. Operculum green on outer surface. Height 60 mm. (2.36 in.).
4. ***Turbo marmoratus* Linnaeus** Large, heavy shell; ridge on shoulder of body whorl. Green with spirally arranged white spots. Interior pearly. Width of base 130 mm. (5.12 in.).

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(See p. 143 for plate.)

1. ***Turritella duplicata* Lamarck** Heavy shell; number of whorls may reach up to about 20; two prominent, levelled spiral ridges on middle of each whorl. Horn-coloured. Length 133 mm. (5.24 in.).
2. ***Neohaustator columnaris* (Kiener)** Up to about 15 whorls; numerous spiral ridges on each whorl with

nearly smooth spiral which looks like flat band on middle. Wavy, brown transpiral marks on yellowish background. Length 65 mm. (2.56 in.).

3. *Architectonica laevigata* (Lamarck) Spiral grooves and transverse striae on whorls. Creamy white with rows of cinnamon-coloured spots above and below suture and above edge of body whorl. Diameter of base 40 mm. (1.57 in.).
4. *Heliacus variegatus* (Gmelin) Shell depressed; whorls spirally grooved and transversely striated. Radiating pattern of white and dark brown. Diameter 15 mm. (.59 in.).
5. *Philippia hybrida* (Linnaeus) Shell with small umbilicus; encircling brown band below suture from which radiating bands divide white surface into irregular areas. Diameter 15 mm. (.59 in.).
6. *Architectonica perspectiva* (Linnaeus) Shell rather depressed; whorls have straight sides; upper surface transpirally striated, basal surface has fine radial striae; lower edge of body whorl sharply angular. Band at bottom of each whorl raised, spotted alternately with white and dark brown; white spiral band below suture bounded above and below by dark brown spiral bands; raised marginal band on basal surface and umbilical margin spotted with brown. Diameter 50 mm. (1.97 in.).
7. *Siliquaria cumingi* Mörch Apically whorls compact and spiral but, lower down, tube loosely coiled and finally becomes irregularly wound. Surface of tube bears longitudinal threads and row of tiny holes. Purple. Length 49 mm. (1.93 in.).
8. *Siliquaria anguina* (Linnaeus) Tubular shell, more

closely coiled apically, less coiled distally; surface bears longitudinal ridges armed with spines. White. Length 115 mm. (4.53 in.).

9. ***Rapa bulbiformis* Sowerby** Spire almost flat; body whorl inflated, siphon stout; faint transpiral ridges on body whorl, becoming more distinct and lying obliquely on siphon. White. Length 47 mm. (1.85 in.).

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### 30

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(See p. 144 for plate.)

1. ***Unedogemmula unedo* (Kiener)** Shell with strong spiral ridge below shoulder; deep notch on posterior part of outer lip. Creamy white with wavy, longitudinal brown bands. Length 74 mm. (2.91 in.).
2. ***Turricula javana* (Linnaeus)** Shell with spiral row of tubercles on shoulder and notch at posterior end of aperture. Brownish yellow. Length 59 mm. (2.32 in.).
3. ***Brachytoma crenularis* (Lamarck)** Surface of whorls spirally ridged, shoulders carry row of short transpiral ribs; notch close to hind end of outer lip. Brownish; darker brown in spaces between ribs. Length 39 mm. (1.54 in.).
4. ***Cerithium sowerbyi* Kiener** Shell with long spire, flattened spiral ridges on whorls; tubercles on whorls form discontinuous longitudinal wrinkles; siphon comparatively long. Dirty white with black spots. Length 67 mm. (2.64 in.).
5. ***Clypeomorus chemnitzianus* (Pilsbury)** Short, fat

shell with spiral ridges carrying nodules; nodules tend to run together to form transpiral ribs. Dirty white. Length 22 mm. (.87 in.).

6. ***Ochetoclava* sp.** Shell in which whorls bear spiral beaded ridges and also scattered varices. Dirty brown; varices whitish. Length 37 mm. (1.46 in.).
7. ***Cerithium obeliscus* Bruguière** Shell surface sculptured with spiral rows of tubercles; upper row of each whorl has stout, pointed tubercles. Brownish to white. Length 37 mm. (1.46 in.).
8. ***Cerithium echinatum* Lamarck** Stout, heavy shell with spiral rows of tubercles and ridges; some of tubercles backwardly directed spinous processes. Creamy white. Length 48 mm. (1.89 in.).
9. ***Solidula solidula* (Linnaeus)** Ovate shell with small spire; whorls bear flat spiral cords. Red dots on spiral cords, background white. Length 24 mm. (.94 in.).
10. ***Hydatina physis* (Linnaeus)** Many fine dark brown spiral lines on surface of last whorl and a few transpiral bands of same colour. Background whitish. Length 21 mm. (.83 in.).
11. ***Lamprohaminoea cymbalum* (Quoy and Gaimard)** Shell thin and transparent. White. Length 27 mm. (1.06 in.).
12. ***Bulla ampulla* Linnaeus** Rather thick, polished shell. Brown mottlings on greyish brown background. Length 37 mm. (1.46 in.).
13. ***Hydatina velum* Gmelin** Thin, fragile shell; last whorl light brown with median spiral white band bordered by two thinner dark bands; two more white

bands anteriorly and posteriorly bordered by single dark band each. Length 32 mm. (1.26 in.).

## 31

(See p. 145 for plate.)

1. ***Sinum planulatus* (Récluz)** Flat, disc-like shell; upper surface has fine transpiral striae crossing growth lines, more anterior of which are furrowed. White. Length 34 mm. (1.34 in.).
2. ***Sinum javanicum* (Griffith and Pidgeon)** Shell somewhat inflated with thin margin to its lip; transpiral striae on surface crossing growth lines. White. Length 38 mm. (1.50 in.).
3. ***Polinices pyriformis* (Récluz)** Shell oblong, spire distinct; parietal callus fills up well-developed funicular pad; polished surface has faint growth lines. Horn-coloured. Length 32 mm. (1.26 in.).
4. ***Polinices conica* Lamarck** Heavy shell of long, conical shape with prominent spire; polished surface has faint growth lines; callus nearly covers over entire umbilical region. Horn-coloured. Length 49 mm. (1.93 in.).
5. ***Mammilla simiae* (Deshayes)** Shell with distinct apex; broad, light-coloured spiral band over middle of last whorl and brownish areas on either side of it; narrower light band on body whorl above suture. Length 25 mm. (.98 in.).
6. ***Polinices powisianus* (Récluz)** Apex scarcely prominent; shiny white surface and faint growth lines,

small funicular pad and shallow furrow around it. Length 28 mm. (1.10 in.).

7. *Polinices albumen* (Linnaeus) Compressed shell with expanded body whorl having smooth surface with faint growth lines; funicular pad large and flat with depression around it. Light brown on dorsal side, white on ventral. Length 36 mm. (1.42 in.).
8. *Naticarius lineata* (Lamarck) Younger and more beach-worn shell of species than that in Fig. 10, with same colouration. Length 24 mm. (.94 in.).
9. *Naticarius alapapilionis* (Röding) Body whorl encircled by four white bands spirally, has brown spots. Lower part of columella elongated forwards. Length 34 mm. (1.34 in.).
10. *Naticarius lineata* (Lamarck) Apex pointed; body whorl inflated. Outer surface glossy, marked with wavy, close-set, brown transpiral lines. Whorls of spire purplish grey. Length 33 mm. (1.30 in.).
11. *Neverita didyma* (Röding) Body whorl glossy, marked with growth lines; umbilicus widely open; purple funicular pad has median groove. Purplish. Length 62 mm. (2.44 in.).

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## 32

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(See p. 146 for plate.)

1. *Laevistrombus canarium* (Linnaeus) Heavy shell with thick outer lip. Outer surface covered with wavy brown streaks on white background. Length 59 mm. (2.32 in.).
2. *Euprotomus aurisdianae* (Linnaeus) Each whorl

bears thick spiral ridges and longitudinal ribs with tubercles; outer lip has blunt backward projection at shoulder and notch close to siphon. Inside of aperture orange. Length 72 mm. (2.83 in.).

3. ***Gibberulus gibberulus* (Linnaeus)** Shell spindle-shaped; body whorl bears faint longitudinal ridges crossed by spiral striae; striae more distinct near outer edge of lip; outer lip bears deep notch below, interior finely transversely wrinkled. Shell pale yellowish white with brownish spots. Length 58 mm. (2.28 in.).
4. ***Canarium mutabilis* (Swainson)** Stubby shell with short spire and thick lip. Outer surface of body whorl has dark brown bands alternating with white areas. Length 28 mm. (1.10 in.).
5. ***Canarium dentatus* (Linnaeus)** Spire rather tall; outer surface has longitudinal folds rising to tubercles on shoulder of body whorl; lip margins bear fine threads and furrows. Length 29 mm. (1.14 in.).
6. ***Dolomena marginata* (Linnaeus)** Spire short; body whorl has spiral striae and angular shoulder below suture; upper end of outer lip extends for considerable distance over spire. Brownish spiral bands and arrowhead-shaped markings on white background. Length 48 mm. (1.89 in.).
7. ***Dolomena variabilis* (Swain)** Spire moderate; upper end of outer lip extends halfway up spire; shoulder of body whorl faintly raised, bearing one tubercle. Outer surface of body whorl light brown, bearing four or five white spiral lines crossed by brown transpiral lines. Length 56 mm. (2.20 in.).
8. ***Strombus klineorum* Abbot** Each whorl has row of tubercles on shoulder; spiral grooves on anterior

part of body whorl. Aperture black along inner margins of both lips. Generally brownish or olive, with two or three white spiral bands dotted with brown. Length 44 mm. (1.73 in.).

9. ***Conomurex luhuanus* (Linnaeus)** Spire stout. Outer surface of body whorl has reticulated pattern of brown and white spiral bands crossed by white transpiral lines. Aperture orange or salmon pink. Length 64 mm. (2.51 in.).
10. ***Conomurex decorus*** Spire short and body whorl cone-shaped. Wavy, brown transpiral bands on white background. Length 56 mm. (2.20 in.).

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## 33

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(See p. 147 for plate.)

1. ***Phalium canaliculatum* (Bruguère)** External surface of body whorl has spiral grooves. Bluish purple with five spiral rows of squarish faint brown patches. A few white patches on brown anterior lip. Length 45 mm. (1.77 in.).
2. ***Phalium areola* (Linnaeus)** Body whorl has strong varix and four series of squarish brown patches on finely reticulated bluish surface. Length 51 mm. (2.01 in.).
3. ***Casmaria erinacea* (Linnaeus)** Surface of shell smooth, but thickened anterior lip bordered by a few small spines. Brownish white with brown spots on suture and along lip. Length 36 mm. (1.42 in.).
4. ***Phalium glaucum* (Linnaeus)** Inflated shell; whorls have shoulders set with tubercles; columellar lip

broadly expanded, lower part wrinkled; anterior end of outer lip produced into three spines. Pale bluish grey with pale orange marks on lips. Length 64 mm. (2.52 in.).

5. *Phalium fimbria* (Gmelin) Longitudinal folds on surface of oval body whorl ending in tubercles on shoulder. Wavy longitudinal bands of brown and white on body and brown areas on outer lip and on varix. Anterior part of outer lip forms three spines. Length 82 mm. (3.23 in.).
6. *Septa rubecula* (Linnaeus) Whorls have beaded spiral cords and longitudinal varices. Reddish brown interzones and white spiral bands. Siphon moderate. Length 45 mm. (1.77 in.). (Syn. *Cymatium rubeculum* Linnaeus.)
7. *Cymatium lotorium* (Linnaeus) Thick, heavy shell of distorted shape; outer surface has some fine and some larger spiral ribs; row of tubercles on shoulders and very thick varices; outer lip much thickened and toothed; siphon long. Outer surface light brown; varices have alternate light and dark bands. Length 84 mm. (3.31 in.).
8. *Septa pilearis* (Linnaeus) A longish spindle; surface has longitudinal and spiral ridges with nodules at crossings; a few varices; siphon somewhat long. Surface dark with one lighter band on body whorl and parts of other light spiral bands here and there. Length 57 mm. (2.24 in.).
9. *Septa aquatilis* (Reeve) Outer surface has intersecting spiral and longitudinal ridges with granules at intersections; varices present; paired teeth on outer lip in two rows; siphon slightly curved. Brown, with white bands. Hairy epidermis. Length 78 mm. (3.07 in.).

(See p. 148 for plate.)

1. ***Cymatriton nicobaricum* (Röding)** Heavy shell; spiral striae on whorls crossed by transpiral ridges forming nodules; varices present. Ashy blue with brown patches; orange aperture. Length 51 mm. (2.01 in.).
2. ***Cymatium spengleri* Chemnitz** Stoutish shell with strong spiral ribs crossed by fine transpiral striae; row of nodules on shoulders. Mainly cream in colour; grooves between spiral ribs brown; aperture white. Length 73 mm. (2.87 in.).
3. ***Distorsio anus* (Linnaeus)** Surface of shell has spiral rows of ribs crossed by transpiral striae with tubercles at points of crossing; enlarged tubercles on shoulders; columellar side of aperture covered by caloused area; siphon reflexed backwards. Brown spiral bands or areas on white background. Length 58 mm. (2.28 in.).
4. ***Guttarium muricinum* (Röding)** Surface of shell has spiral striae and six transpiral rows of tubercles; siphon fairly long; outer lip and columella covered with enamel. Bluish grey on surface, reddish within aperture. Length 40 mm. (1.57 in.).
5. ***Ranularia retusa* Lamarck** Shell with short spire and long siphon; surface covered with spiral ribs which become tubercular on shoulder; outer lip has two rows of teeth; columella has numerous folds. Light brown with a few darker spots. Length 34 mm. (1.34 in.).
6. ***Colubrellina granularis* (Röding)** Spire elevated;

outer surface of shell has spiral rows of granules; row of varices on each side; aperture ovate. Mainly brown with dashes of white on varices. Length 43 mm. (1.69 in.).

7. ***Bursa crumenoides* Blainville** Shell with fin-like rows of varices on both sides; outer surface has spiral striae, those on shoulder and two more anterior rows on body whorl bear spine-like tubercles; callus on inner lip spreads onto body whorl. Grey. Length 66 mm. (2.60 in.).
8. ***Bursa rana* (Linnaeus)** Shell with fin-like rows of varices, bearing spines, on both sides; spiral ridges on surface, those on shoulders carry spine-like tubercles; posterior canal opens between body whorl and last spine on margin of outer lip; no callus on inner lip. Light brown and white. Length 86 mm. (3.39 in.).

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(See p. 149 for plate.)

1. ***Bursa lampas* (Linnaeus)** Heavy shell with well-developed spire; outer surface has spiral rows of tubercles; inner lip has wrinkles and callus; varices present. Whitish. Length 214 mm. (8.43 in.).
2. ***Cypraecassis rufa* (Linnaeus)** Spire short; body whorl large with spiral ribs, some four of which, near shoulder, bear large knobs and two, most anterior, have longitudinal folds; spiral ribs crossed by transpiral striae; aperture long and narrow, both lips toothed; reflexed outer lip margin thick; callus on inner lip extends over ventral surface of shell. Outer surface brown with darker brown blotches on upper

surface of outer lip; ventral surface orange brown. Length 146 mm. (5.75 in.).

## 36

(See p. 150 for plate.)

1. ***Cypraea tigris* Linnaeus** Heavy, oval shell, inflated; base slightly concave; large teeth on outer lip; surface polished. Large dark brown spots on white or yellow background on dorsum; ventrally white. Length 95 mm. (3.74 in.).
2. ***Arestorides argus* (Linnaeus)** Cylindrical shell. Background of dorsal surface fawn-coloured, with three broad, brown transverse bands; scattered over all are small brown circles of varying size; light brown base also has two dark brown blotches on each lip. Lips have strong ribbed teeth. Length 76 mm. (2.99 in.).
3. ***Arabica arabica* (Linnaeus)** Heavy, oval shell, inflated; somewhat margined at base. Wavy, interrupted brown lines, most of them longitudinal, against dirty white background of dorsal surface; brown spots on margins extend onto lateral edges of base, which is flat and flesh-coloured; teeth brown. Length 60 mm. (2.36 in.).
4. ***Peribolus mauritianus* (Linnaeus)** Heavy shell with humped back, margined; base slightly concave. Dark brown or nearly black irregular markings separated by lighter areas on dorsal surface; margins and ventral surface quite black. Length 75 mm. (2.95 in.).

(See p. 151 for plate.)

1. ***Mystaponda nivosa* (Broderip)** Oval shell, body inflated. Numerous white spots and longitudinal whitish streak on grey background dorsally; ventral surface whitish. Length 58 mm. (2.28 in.).
2. ***Talparia talpa* (Linnaeus)** Shell cylindrical; polished surface dorsally brown, crossed by three lighter transverse bands; ventral surface very dark brown, nearly black; lighter between teeth. Length 59 mm. (2.32 in.).
3. ***Mystaponda vitellus* (Linnaeus)** Oval shell. Dorsal surface brown with scattered white spots and faint traces of lighter transverse bands; sides have vertical brown streaks on callus; base rounded and whitish. Length 53 mm. (2.09 in.).
4. ***Adusta onyx* (Linnaeus)** Oval shell. Dorsal surface varies from dark brown to near white with longitudinal streak in different specimens; sides and ventral surface nearly black. Length 45 mm. (1.77 in.).
5. ***Arabica histrio* (Gmelin)** Rather cylindrical shell with meshwork of brown enclosing lighter spots on dorsal surface; dark spots on both sides; base whitish; teeth brown. Length 48 mm. (1.89 in.).
6. ***Peribolus depressus* (Gray)** Ovate, solid, margined shell; dorsum not much inflated, ventral side flat. Brown reticulations enclose yellowish spots and wavy longitudinal line on dorsal surface; lateral margins partly brown, partly white, with dark brown spots; base yellowish. Length 42 mm. (1.65 in.).

7. *Lyncina lynx* (Linnaeus) Pear-shaped shell with humped back and flat ventral surface. Dorsal surface clouded with bluish and yellowish colours and black spots on white background; orange dorsal line; ventral surface white with orange; red between teeth. Length 41 mm. (1.61 in.).
8. *Arabica scurra* (Gmelin) Cylindrical shell with pattern of brown reticulations and dorsal line on bluish grey background; ventral surface whitish, brown spots on side of outer lip. Length 38 mm. (1.50 in.).
9. *Erosaria erosa* (Linnaeus) Elongate oval, somewhat flat shell; base strongly marginate. Dorsum has fine brown reticulations and brown spots on bluish grey background; dorsal line a little to right side; dark brown rectangular spot at about middle of each side; base white. Teeth on outer lip strong, extending to margin of side. Length 42 mm. (1.65 in.).

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(See p. 152 for plate.)

***Cassis cornuta* (Linnaeus)** Heavy, solid shell, spire almost flat; large body whorl with spiral ridges, some of which carry tubercles; ridge on shoulder carries large, horn-like tubercles; both lips toothed, callus on them expands like thick plate around narrow aperture. Dorsal surface usually covered with calcareous deposit; ventral surface flesh-coloured. Length 248 mm. (9.76 in.).

(See p. 153 for plate.)

1. ***Tonna tessalata* Lamarck** Spire short; body whorl inflated; shell thin. Large spiral ribs fairly widely spaced, intervening striae. Generally bluish; large spiral ribs white with brown spots, evenly spaced. Length 78 mm. (3.07 in.).
2. ***Tonna sulcosa* Born** Spire short; body whorl inflated and has spiral ribs and alternately brown and white spiral bands. Length 78 mm. (3.07 in.).
3. ***Tonna perdix* Linnaeus** Spire short; moderately large, oval body whorl; surface covered by flat, spiral ribs. Background light purplish brown, a few longitudinal streaks of purple, scattered white patches on spiral ribs. Length 69 mm. (2.72 in.).
4. ***Malea pomum* (Linnaeus)** Rather solid shell with low spire; body whorl has spiral ribs. Aperture narrow with ribbed teeth on inside of outer lip. Background white; brown spots on spiral ribs. Length 36 mm. (1.42 in.).
5. ***Ficus ficus* (Linnaeus)** Spire short, body whorl swollen; spiral ribs and less prominent longitudinal striae give fine reticulated outer surface. Brown with white bands and darker brown spots. Length 57 mm. (2.24 in.).
6. ***Ficus subintermedius* (d'Orbigny)** Narrower shell than the former; surface of body whorl has distinct reticulations. Brown with white bands and darker brown spots. Length 50 mm. (1.97 in.).
7. ***Murex ternispina* Lamarck** Spire moderate; long anterior siphon. Surface of shell has spiral striae

crossed by three varices bearing long pointed spines alternating with shorter spines. White. Length 79 mm. (3.11 in.).

8. ***Murex haustellum* Linnaeus** Spire short; body whorl rounded; anterior siphon long and straight. Body whorl has spiral striae, tubercles, longitudinal folds, and three varices; pointed tubercles on shoulders. Round aperture, lips ventrally produced. Background light brown with darker brown patches on striae; inside of aperture orange. Length 92 mm. (3.62 in.).

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## 40

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(See p. 154 for plate.)

1. ***Chicoreus torrefactus* (Sowerby)** Spire well developed; surface of shell covered with spiral ribs that extend over spines on three rows of varices; a few tubercles and longitudinal folds between varices; spines have short branches but are not terminally expanded; aperture oval. Generally brown with some white. Length 78 mm. (3.07 in.).
2. ***Chicoreus adustus* (Lamarck)** Spire short; branched spines on dorsal and right lateral varices better developed than on left lateral varix; three large tubercles alternate with three varices. Mainly black with a little white on right side of each varix. Length 67 mm. (2.64 in.).
3. ***Chicoreus palmarosea* (Lamarck)** Spire well developed; body whorl and anterior siphon longer than spire; spines branched, some terminally expanded. Brown on spiral ribs on a background of light brown to white; aperture white. Length 108 mm. (4.25 in.).

4. *Chicoreus virgineus* (Röding) Spire moderate; body whorl rather bulbous; surface covered with close spiral striae crossed by longitudinal folds; three tubercular folds on shoulder alternate with varices; single spine on each varix, posteriorly; fronds sparsely placed more anteriorly on varices. Light brown to whitish; dark brown spiral band on middle of body whorl. Length 87 mm. (3.43 in.).
5. *Chicoreus ramosus* (Linnaeus) Spire small to moderate; body whorl large; surface covered by close spiral striae crossed by longitudinal folds which tend to develop tubercles; fronds on varices well developed along their length; fronds on shoulder grow to be stout spines. White; pinkish around margin of aperture. Length 87 mm. (3.43 in.).

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## 41

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(See p. 155 for plate.)

1. *Ovatipsa caurica dracaena* Born Subcylindrical shell with rather wide aperture. Dorsal side greenish yellow, covered with brown spots tending to run together to form three transverse bands and clouded patch in middle; a few large dark brown spots along sides. Inner lip short posteriorly; teeth ridged; callus on both edges. Specimen figured is late bulla stage of this subspecies. Length 39 mm. (1.54 in.).
2. *Ovatipsa caurica* (Linnaeus) Shell fusiform, rather depressed; aperture fairly wide, guarded by coarse teeth extending across base. Dorsal surface has greenish yellow background speckled with brown spots which run together to form three transverse bands and

cloudy patch over middle; dark brown spots along calloused sides; base and spaces between teeth flesh-coloured. Length 34 mm. (1.34 in.).

3. *Ravitrona caputserpentis* (Linnaeus) Oval shell with humped back and rather flattened margins. Marginal zones deep reddish brown; brown reticulations enclosing white spots of varying size extend onto dorsum; whitish dorsal line in some specimens; reddish brown of margins fades away on base so that teeth are white. Length 34 mm. (1.34 in.).
4. *Ponda carneola* (Linnaeus) Oval, somewhat inflated shell; ventral side rounded. Dorsal surface flesh-coloured, crossed by reddish transverse bands; callus on sides has fine brown reticulation. Teeth purple. Length 33 mm. (1.30 in.).
5. *Talostolida teres* (Gmelin) Oblong shell, marginated on right side. Background of dorsum greyish, covered over by brown mottlings which form three broad and two narrow transverse bands; dark spots along right side, similar spots on left side less numerous; ventral surface white. Length 33 mm. (1.30 in.).
6. *Erosaria ocellata* (Linnaeus) Oval shell with humped back; sides covered with callus through which numerous brown spots visible. Dorsally brown with white spots, some of which have black centres. Length 34 mm. (1.34 in.).
7. *Luria isabella* (Linnaeus) Light, cylindrical shell. Fawn to light brown on dorsal surface with black dots forming longitudinal rows or interrupted lines; pair of orange blotches at each end; base white; teeth very small. Length 31 mm. (1.22 in.).
8. *Monetaria annulus* (Linnaeus) Oval shell with

rather low sides. Flesh-coloured ventrally and on sides; yellow ring encloses bluish grey dorsum. Length 26 mm. (1.02 in.).

9. *Monetaria moneta* (Linnaeus) Shell nearly triangular, margins thickened, with tubercles towards base. Yellow with greenish yellow dorsum which may carry three greenish transverse bars; sometimes altogether yellow or yellow with reddish ring around dorsum. Length 26 mm. (1.02 in.).
10. *Erronea erronea* (Linnaeus) Oval shell; upper surface bluish, mottled with brown and bearing irregularly shaped blotch of brown about centre and brown spot on inner extremity; base and sides light flesh-colour. Aperture fairly wide; outer lip nearly straight; teeth on middle of inner lip short. Length 28 mm. (1.10 in.).
11. *Erosaria helvola* (Linnaeus) Oval shell; sides have callus, right one better developed, faintly violet at tips. Bluish grey dorsally with numerous white specks and some brown spots; reddish brown lateral bands; lower surface rust-coloured. Teeth rough. Length 24 mm. (.94 in.).
12. *Cribraria cribraria* (Linnaeus) Rather elongate oval shell with marginated right side. Dorsal surface brown with nearly round white spots of different sizes placed close together. Base and sides white. Length 24 mm. (.94 in.).
13. *Staphylaea nucleus* (Linnaeus) Oval shell; dorsal surface bears many nodules and nearly median longitudinal crease; ventral surface has transverse grooves on lips. White. Length 25 mm. (.98 in.). (See Plate 54, Fig. 6.)

(See p. 156 for plate.)

1. *Blasicrura interrupta* (Gray) Cylindrical shell. Dorsal surface light blue with small brown spots and three interrupted transverse rows of rectangular brown patches. Ventral side white with callus on sides and brown rows showing through callus on left side. Length 22 mm. (.87 in.).
2. *Ravitrana gangranosa* (Dillwyn) Small shell. Dorsum fulvous, dotted with white and a few brown spots. Shell has pair of larger spots at each end, sometimes confluent. Length 15 mm. (.59 in.).
3. *Melicerona felina* (Gmelin) Obovate shell. Bluish grey background of dorsal surface clouded over with brown spots; two dark spots at each end and smaller dark spots along sides. Base white, some dark bands showing through callus on left side. Length 19 mm. (.75 in.).
4. *Palmadusta asellus* (Linnaeus) Oval, white shell with three brown bands across back. Bands show through callus on left side. Length 17 mm. (.67 in.).
5. *Erosaria poraria* (Linnaeus) Oval shell, slightly margined on right side. Brownish dorsal surface with small light spots and light longitudinal line; laterally violet, fading onto white ventrally. Length 19 mm. (.75 in.).
6. *Palmadusta clandestina* (Linnaeus) Oval shell. Pinkish cream on dorsal surface with two transverse faint cream bands; sides and base white. Teeth comparatively strong. Length 16 mm. (.63 in.).

7. *Derstolida hirundo* (Linnaeus) Oval shell. Dorsally blue with brown blotchings, two transverse white lines, pair of black spots at each end and small brown spots on sides; base white; teeth rough. Length 16 mm. (.63 in.).
8. *Palmadusta punctata* (Linnaeus) Oval shell. White, with brown spots on upper surface. Length 12 mm. (.47 in.).
9. *Pustularia globulus* (Linnaeus) Oval shell drawn out at both ends, back humped; no dorsal sulcus; callus on spire. Yellow with brown spots on back. Length 18 mm. (.71 in.).
10. *Pustularia cicerula* (Linnaeus) Oval shell drawn out at both ends, humped back grooved along middle of granulated dorsal side. Light brown. Teeth extend over base. Length 18 mm. (.71 in.).
11. *Staphylaea staphylaea* (Linnaeus) Oval shell covered with granules on dorsal side and with nearly median longitudinal groove. Purplish brown on dorsal surface, extremities tipped with brown. Teeth extend across whole base, which has brownish tinge. Length 19 mm. (.75 in.). (See Plate 54, Fig. 5.)
12. *Trivirostra oryza* (Lamarck) Oval shell, rather inflated. Fine transverse grooves across surface of whole shell which also bears dorsal longitudinal groove. Pure white throughout. Length 10 mm. (.39 in.).
13. *Ovula ovum* (Linnaeus) Oval, thick, porcelain-like shell. Shiny white on outside, inside of aperture purplish brown. Outer lip has many irregular folds. Length 78 mm. (3.07 in.).
14. *Volva brevirostris* (Schumacher) Slender shell with elongated canals at both ends; outer lip margin

thickened. External surface smooth. Rose-coloured. Length 39 mm. (1.54 in.).

15. *Calpurnus verrucosus* (Linnaeus) Oval shell with ridge across back and small granule at each end of dorsal surface; teeth only on outer lip. White all over except for violet tint at both ends of aperture. Length 28 mm. (1.10 in.).
16. *Calpurnus lacteus* (Lamarck) Oval shell with ridge across dorsum. Teeth on outer lip only. White all over. Length 14 mm. (.55 in.).

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(See p. 157 for plate.)

1. *Thais bufo* (Lamarck) Thick shell with low spire and inflated body whorl; surface spirally grooved; row of rounded tubercles on shoulder and row of smaller tubercles lower down; anterior to large tubercles, two somewhat raised spiral ridges carry dark and white transverse dashes. Outer lip crenulate, notched at upper end. Length 46 mm. (1.81 in.).
2. *Thais rudolphi* (Lamarck) Spire small; body whorl spindle-shaped, with flat spiral ridges separated by narrow grooves; a few spiral ridges better developed than others, ridge on shoulder best developed, with thickenings which do not quite become tubercular. Outer lip transversely grooved and slightly notched at outer end. Blackish brown surface with sparce whitish blotches; columella pink. Length 54 mm. (2.13 in.).
3. *Thais mutabilis* (Link) Spire conical; umbilical excavation between spire and body whorl; surface of

whorls with transverse striae and large spiny nodules. Outer surface greyish; aperture yellow. Length 57 mm. (2.24 in.).

4. ***Thais intermedia* (Kiener)** Spire small; shell thick; body whorl oval; outer surface has spiral striae crossed by longitudinal grooves; several spiral rows of stout, spiny tubercles; outer lip notched at upper end and margin dentate. Light brown to pink. Length 41 mm. (1.61 in.).
5. ***Thais tissoti* (Petit)** Spire moderate; middle of each whorl has spiral row of spiny tubercles; body whorl has four spiral rows of spiny tubercles, row on shoulder best developed. Outer surface covered with spiral striae; edge of outer lip crenulate. Brown to yellowish. Length 37 mm. (1.46 in.).
6. ***Nassa francolinus* (Bruguière)** Fusiform shell, body whorl making up about three-fourths of total length; outer surface has fine spiral striae and more marked but sparser longitudinal grooves; aperture wide. Brown with white band around middle of body whorl and a few scattered white spots. Length 34 mm. (1.34 in.).
7. ***Drupa ricinus* (Linnaeus)** Swollen, triangular shell; surface of body whorl has five spiral rows of black-tipped, blunt spines; row of well-developed spines along outer lip; aperture has teeth on both sides. Background white. Length 29 mm. (1.14 in.).
8. ***Drupa morum* (Röding)** Solid and heavy shell; spiny processes on outer surface short and stout; teeth on sides of aperture large. Aperture characteristically violet. Length 31 mm. (1.22 in.).
9. ***Drupa serriallis* (Laborde?)** Fusiform shell, apex

pointed, spire fairly developed; outer surface has about eight slightly oblique longitudinal grooves and has spiral striae which at almost regular intervals carry transversely elongate low tubercles; outer lip crenulate with row of teeth on inner margin. Generally dark brown to lighter brown; tubercles black, a few having white spots; inside of aperture grey. Length 28 mm. (1.10 in.).

10. *Rapana bulbosa* Solander Spire low, body whorl greatly inflated; surface has fine, close-set spiral striae; row of tubercles on shoulder of whorls; suture grooved; aperture large, produced anteriorly into canal; umbilicus has wide opening. Outer surface light brown. Length 83 mm. (3.27 in.).
11. *Drupa granulata* (Duclos) Solid, fusiform shell with pointed apex and moderate spire; body whorl has six spiral rows of squarish black tubercles separated by longitudinal grooves; inner edge of outer lip has two large and two smaller teeth. Length 23 mm. (.91 in.).
12. *Drupa musiva* (Kiener) Shell with small spire and moderate body whorl; outer surface has close-set, narrow spiral striae, shallow longitudinal grooves and several spiral rows of tubercles or blunt spines; aperture wide, outer lip crenate. Brown. Length 17 mm. (.67 in.).
13. *Drupa margariticola* (Broderip) Solid, fusiform shell; tubercles on shoulder of whorls; body has longitudinal furrows crossed by fine spiral striae; blunt teeth within outer lip. Dark brown; some of spiral striae white. Length 19 mm. (.75 in.). (See Plate 47, Fig. 12.)

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(See p. 158 for plate.)

1. ***Hemifusus pugilinus* (Born)** Spire moderate, body whorl swollen, narrowing anteriorly; strong tubercles on shoulder of whorls; suture grooved; spiral striae on surface. Nearly uniform light brown. Length 65 mm. (2.56 in.).
2. ***Pleuroploca filamentosa* (Lamarck)** Large, spindle-shaped shell with well-developed spire and elongate anterior canal; shoulders of whorls feebly developed and may or may not bear little-developed tubercles; interior of elongate aperture has yellowish spiral ridges; surface of shell has shallow spiral grooves in pairs. Brown. Length 105 mm. (4.13 in.).
3. ***Fusinus nicobaricus* (Lamarck)** Shell elongated spindle with turreted spire; anterior canal long; flat spiral ridges on surface, one ridge on shoulder of whorls slightly raised. Longitudinal brown streaks and dots on white background. Length 117 mm. (4.61 in.).
4. ***Pleuroploca trapezium* (Linnaeus)** Stout, thick shell; body whorl inflated, has moderately long siphon; strong tubercles on shoulder of whorls; surface marked by growth lines. Brown spiral double lines on white or pinkish background. Interior of aperture has red rays. Length 200 mm. (7.87 in.).

(See p. 158 for plate.)

1. ***Voluta lapponica* Linnaeus** Spire conical, body

whorl inflated, elongate; suture grooved; surface has fine longitudinal striae; columella has eight plaits which decrease in size from bottom to top. Chestnut brown longitudinal zigzag markings on ivory background. Length 77 mm. (3.03 in.).

2. *Voluta arausaica* Solander Spire conical, body whorl inflated, somewhat triangular; nodules on shoulder of whorls, most pronounced on body whorl; about six plaits on columella. Surface has orange spiral bands on white background. Length 67 mm. (2.64 in.).

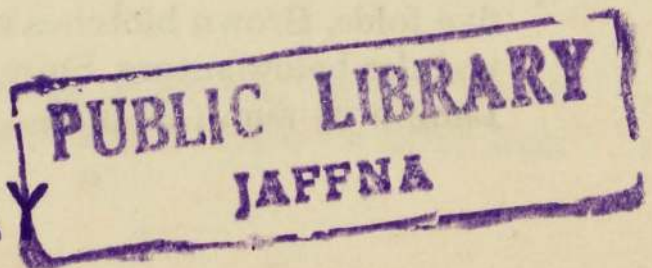
3. *Harpa amouretta* Röding Spire moderate, body whorl elongate oval, not inflated; parietal callus extends over ventral side of last whorl. Spiral bands of light brown and chocolate over surface. Length 43 mm. (1.69 in.).

4. *Cancellaria scalarina* Spire moderate, with somewhat stepped-up whorls; body whorl triangular; surface has distinct, obliquely longitudinal ridges. Whitish. Length 20 mm. (.79 in.).

5. *Trigonostoma trigonostoma* (Deshayes) Tall spire, stepped-up whorls; surface has longitudinal ridges which form spines on keeled shoulders; aperture trigonal. White. Length 22 mm. (.87 in.).

6. *Harpa harpa* (Linnaeus) Body whorl inflated, ridges on it separated by broad interspaces traversed by fine longitudinal striae. Surface glossy, having pattern of brownish festoons; ventral side of last whorl has two large chestnut blotches. Length 74 mm. (2.91 in.). (This form has long been known as *Harpa conoidalis* Lamarck.)

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SPECIAL COLLECTION



(See p. 159 for plate.)

1. ***Tiara isabella* (Swainson)** Surface of shell covered with spiral ribs and slender longitudinal striae; five plaits on columella. Light brown patterns of spiral or longitudinal bands on white background. Length 60 mm. (2.36 in.).
2. ***Mitra mitra* (Linnaeus)** Shell surface nearly smooth, polished; four plaits on columella. Bright red spots and blotches arranged in spiral rows on white background. Length 74 mm. (2.91 in.).
3. ***Tiara floccata* (Reeve)** Surface of shell has finely pitted spiral grooves, faint longitudinal striae, and, usually, growth lines towards anterior margin of body whorl; five plaits on columella; outer lip crenate anteriorly. White patches on brown background. Length 44 mm. (1.73 in.).
4. ***Chrysame ferruginea* (Lamarck)** Spire pointed; body whorl fat; spiral ridges on surface; outer margin of aperture crenate; three to four folds on columella. Longitudinally streaked with brown on white background. Length 41 mm. (1.61 in.).
5. ***Chrysame ambigua* (Swainson)** Spire tapering; surface has fine spiral grooves and faint longitudinal striae; columella has five folds. Orange with white spiral bands on whorls. Length 31 mm. (1.22 in.).
6. ***Chrysame eremitarum* (Röding)** Surface marked by pitted spiral grooves and growth lines; columella has five folds. Brown blotches on grey background. A few nodules below suture. Spire not as long as body whorl. Length 23 mm. (.90 in.).

7. *Mitropifex crebrilirata* (Reeve) Narrow, elongate shell; surface bears close-set longitudinal ridges and faint spiral striae; columella has four folds. Brown with white spiral band on whorls. Length 36 mm. (1.42 in.).
8. *Tiara morchi* (Adams) Slender, elongate shell; surface covered with spiral ribs; five folds on columella. White. Length 44 mm. (1.73 in.).
9. *Vexillum ornatum* (Reeve) Elongate shell, spire nearly as long as body whorl; suture canaliculate; whorls somewhat shouldered, especially penultimate and body whorls; surface has longitudinal folds and spiral striae; four folds on columella. Brown, with white spiral band around whorls anterior to shoulder. Length 53 mm. (2.09 in.).

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(See p. 160 for plate.)

1. *Babylonia spirata* (Linnaeus) Stubby shell, spire well developed, suture canaliculate; outer surface smooth, a fasciole surrounding base; umbilicus wide open. Brown flame patterns on light background. Length 52 mm. (2.05 in.).
2. *Babylonia zelandica* Bruguière Fusiform shell with well-developed spire; suture grooved; outer surface has faint, oblique striae; ridge at base; umbilicus wide open. Brown flame patterns on light background. Length 54 mm. (2.13 in.).
3. *Cantharus tranquebaricus* (Gmelin) Fairly thick shell with about 10 longitudinal ridges crossing fine,

spiral striae on outer surface; outer lip crenulate. Yellowish brown; inner lip red. Length 47 mm. (1.85 in.).

4. *Nassarius pallidulus* (Adams) Globosely ovate shell with conical spire of stepped whorls; outer surface has slightly oblique longitudinal ridges and faint spiral striae; shoulder angle of whorls of spire nodulous but shoulder of body whorl has row of stout tubercles; parietal callus wide; inside of outer margin of aperture striated. Light grey or brown; dark band over interspaces of shoulder tubercles of body whorl and white spiral band just anterior to these tubercles. Length 34 mm. (1.34 in.).
5. *Nassarius hepaticus* (Montagu) Spire well developed, just short of half total length; outer surface covered with transpiral ridges, those on body whorl rather flexuous; spiral groove below suture cuts across transpiral ridges forming row of nodules on whorls; a few spiral grooves also present on anterior part of body whorl; aperture broad, ridged on both margins; columellar callus extends but little onto body whorl. Light brown; white spiral band on middle of whorls of spire; on body whorl, two white spiral bands showing through interior of aperture. Length 28 mm. (1.10 in.).
6. *Alectrion suturalis* (Lamarck) Spire well developed, about half length of shell; outer surface traversed by fine spiral and longitudinal ridges forming square meshwork; spiral row of nodules below suture in each whorl. Whitish, diffused with pink. Length 35 mm. (1.38 in.).
7. *Zeuxis olivaceus* (Bruguière) Spire well developed, about half entire length of shell; outer surface partly smooth, more posterior whorls have oblique transpiral ridges, some of which extend onto inner lateral margin

of penultimate whorl and body whorl; lateral margin of outer lip ridged; inner and outer margin of aperture serrate. Olive with faint trace of light spiral band on each whorl; apex of spire dark. Length 42 mm. (1.65 in.).

8. *Zeuxis velatus* (Gould) Spire well developed; outer surface smooth but for faint longitudinal striae especially developed close to anterior margin of outer lip and some spiral striae at anterior end; row of minute granules below suture. Dark brown, almost black; some of granules whitish. Length 25 mm. (.98 in.).
9. *Peristernia nassatula* (Lamarck) Fusiform shell with well-developed spire; outer surface has strong, close-set longitudinal ridges crossed by spiral striae. White, with spiral bands of brownish pink; lips of aperture and siphonal canal purplish. Length 23 mm. (.91 in.).
10. *Pyrene flava* (Bruguière) Spire well developed, whorls look as if telescoped due to grooved suture; spiral striae on body whorl more prominent towards base and margin of outer lip. Yellowish brown, with spiral row of a few white spots below suture. Length 17 mm. (.67 in.).
11. *Pyrene flavida* (Lamarck) Narrow shell, body whorl tapering sharply towards outer end. Brown, with spiral rows of white on whorls. Length 15 mm. (.59 in.).
12. *Drupa margariticola* (Broderip) Solid shell with spiral striae and longitudinal ribs. Dominant colour black on spiral cords with a few white spiral bands and white spots on shoulder tubercles. Length 20 mm. (.79 in.). (See Plate 43, Fig. 13.)

13. *Marginella angustata* Sowerby Smooth, glossy shell; spire almost completely enveloped in body whorl which is ovoid and broader posteriorly; columella has four oblique folds of which fourth is small; aperture narrow, elongate, its outer lip thickened. Pinkish band on outer margin; surface has white and bluish spiral bands crossed by bluish longitudinal lines. Length 20 mm. (.79 in.).
14. *Latirolagena smaragdula* (Linnaeus) Solid, fat, spindle-shaped shell; outer surface covered with close-set, dark brown spiral bands on grey background. Columella has slight folds; outer margin of aperture striated on inner side. Length 43 mm. (1.69 in.).
15. *Euplica turturina* (Lamarck) Short, fat shell with small, pointed spire; surface of body whorl has spiral striae; inner lip margin has two rows of small teeth on posterior part; outer lip also has teeth. White. Length 14 mm. (.55 in.).
16. *Euplica versicolor* (Sowerby) Spire pointed; body whorl tapers towards anterior end; teeth on inside of both margins of aperture; outer surface has spiral striae. Pattern of brown spots on white background. Length 14 mm. (.55 in.).
17. *Engina melanozona* Tomlin Small, spindle-shaped shell; outer surface has longitudinal ridges. Black spiral bands on white background and row of about six oblique, short, black streaks at base. Aperture a narrow slit, both margins armed with denticles. Length 11 mm. (.43 in.).

(See p. 161 for plate.)

1. *Voluta magnifica* Gebauer Spire conical, rather blunt; aperture of body whorl wide, its edge thin; slight shoulder to body whorl. Four bands of wavy chestnut markings on creamy background. Four folds on columella. Length 178 mm. (7.01 in.).
2. *Melo melo* (Solander) Spire reduced, body whorl inflated forming large, thin shell; outer surface smooth but for fine close-set growth lines; aperture very wide, elongated; columella with four folds. Yellowish orange with large chestnut spots scattered on body whorl. Length 146 mm. (5.75 in.).
3. *Xancus pyrum rapa* (Lamarck) Thick, heavy shell; spire moderate, conical; body whorl inflated and anteriorly pointed; suture grooved, slightly wavy; outer margin of aperture has thin edge; columella has four folds and thin callus; surface of shell bears spiral and longitudinal striae. White with several spiral rows of brown spots. Length 127 mm. (5.00 in.).
4. *Xancus pyrum* (Linnaeus) Thick, heavy shell; spire conical; body whorl inflated and anteriorly elongated. Whorls shouldered by row of low tubercles; suture grooved; aperture drawn out into long anterior canal. Columella has four folds and fairly thick callus. Outer surface of shell finely striated spirally and longitudinally. White. Length 172 mm. (6.77 in.).

(See p. 162 for plate.)

1. ***Oliva textilina* Lamarck** Elongate shell with short conical spire; suture somewhat grooved; outer lip of aperture thick; body whorl has prominent beak-like callosity posteriorly and callus extending over anterior plications on fasciole. Intercrossing brown lines and two brown spiral bands on cream-coloured background. Length 80 mm. (3.15 in.).
2. ***Oliva miniacea* (Röding)** Spire pointed; body whorl narrows anteriorly; suture grooved; parietal callus extends over fasciole. Brown reticulate patterns on yellowish surface of body whorl and three brown spiral bands. Length 64 mm. (2.52 in.).
3. ***Oliva erythrostroma* (Meuschen)** Spire pointed, suture grooved; callus on columella extends over fasciole. Outer surface has purplish reticulations on white background, inside of aperture orange. Length 50 mm. (1.97 in.).
4. ***Oliva sericea* (Röding)** Spire shortened, body stout; callosity on edge of columella extends over fasciole. Body surface white, covered by close, dark brown network and two dark spiral bands, one posteriorly, other at about middle. Inside of aperture pink. Several colour variations of species. Length 58 mm. (2.29 in.).
5. ***Oliva ornata* Marrat** Spire short; cylindrical shell has grooved suture; callus extends over fasciole. Brown reticulations and three spiral rows of usually disconnected dark spots against grey background of body whorl. Length 27 mm. (1.06 in.).
6. ***Oliva oliva* Linnaeus** Spire small, acute, last whorl

flattened and base of spire concave on right side; projecting callosity on posterior of columella and parietal callus on fasciole. Longitudinal dark brown wavy markings and two dark brown spiral bands on yellowish background; inside of aperture grey. Length 47 mm. (1.85 in.).

7. *Oliva sericea* ssp. Same proportions as *O. sericea* figured above. Characteristic feature is uniform creamish yellow of outer surface. Length 56 mm. (2.20 in.). (See Plate 54, Fig. 13.)
8. *Oliva annulata* Gmelin Spire pointed, comparatively tall; sutural groove distinct. Body whorl widest about region of annulus and tapers anteriorly. Brown dots and larger purplish spots scattered irregularly on white outer surface; row of purplish spots present more or less regularly in front of suture; short, dark brown lines on fasciole; inside of aperture orange. Length 38 mm. (1.50 in.).
- 9–12. *Oliva ispidula* Linnaeus Spire short, pointed; body whorl almost barrel-shaped. Callus on posterior end of columella extends onto lower whorl of spire; parietal callus extends over anterior plications of fasciole. Colour of outer surface variable—white, yellow, brown, or almost black—with dark mottling or zigzag patterns or spiral bands on body whorl; sometimes colour uniform. Length 45 mm. (1.77 in.). The four specimens pictured show only a few of the many variations this species is known to display.
13. *Olivancillaria steeriae* Reeve. Spire conical; callus on columella extends over whorls of spire but does not cover them along posterior margin. Body whorl slender. Row of dark spots along anterior and posterior margins of body whorl and shorter row of dark spots on fasciole; rest of surface of body whorl covered with

dark reticulations on creamish background. Length 42 mm. (1.65 in.).

14. *Olivancillaria hiatula* Spire tall, body whorl slender; callus on columella extends over whorls of spire. Body whorl grey except for cream band along anterior margin. Length 22 mm. (.87 in.).
15. *Olivancillaria gibbosa* (Born) Stout, heavy shell; spire short; body whorl inflated, especially posteriorly; thick callus on columella extends over whorls of spire. Surface of body whorl covered with dense brown reticulations on white background; row of brown markings along anterior margin of body whorl and similar but shorter row on fasciole. Length 44 mm. (1.73 in.).
16. *Agaronia cinnamomea* (Lamarck) Spire short, conical, suture filled in with callus. Body whorl rather barrel-shaped, marked by two close-set grooves anteriorly. Aperture of shell wide, outer lip bears minute tooth on margin, posteriorly; columellar border of aperture strongly twisted. Suture between apex and body whorl chestnut in colour with whitish band below. Body whorl cinnamon brown. Length 22 mm. (.87 in.).

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(See p. 163 for plate.)

1. *Subula maculata* (Linnaeus) Stout, thick shell; spire tapering markedly to apex. Surface flesh-coloured with spiral rows of rectangular dark spots or smaller dots. Length 92 mm. (3.62 in.).
2. *Duplicaria duplicata* (Linnaeus) Each whorl of shell divided by spiral groove slightly above middle

of whorl; surface has flattened longitudinal ribs. Purplish with white spiral band above suture. Length 86 mm. (3.39 in.).

3. *Subula crenulata* (Linnaeus) Shell turreted at suture with row of nodules on anterior side of the suture. Flesh-coloured, with spiral rows of brown dots. Length 76 mm. (2.99 in.).
4. *Subula dimidiata* (Linnaeus) Spiral groove at about a third of height of each whorl from suture; surface mainly smooth but for longitudinal ribs towards apex. Orange, with streaks and bands of white. Length 91 mm. (3.58 in.).
5. *Impagus confusa* (Smith) Surface of body whorls marked by many weak longitudinal striae. Purplish brown, with spiral rows of spots forming dark band below suture. Length 52 mm. (2.05 in.).
6. *Triplostephanus lima* (Deshayes) Surface of shell has longitudinal ridges and grooves constricted below suture. Greyish brown. Length 52 mm. (2.05 in.).
7. *Cinguloterebra serotina* (Adams and Reeve) Surface of shell has about 20 whorls, each whorl encircled by four granular ridges, largest most posterior. Cream-coloured. Length 42 mm. (1.65 in.).
8. *Abretiella cerithina* (Lamarck) Short shell; sides of whorls convex, each whorl grooved at about middle; surface of basal whorls nearly smooth but apical whorls longitudinally ridged. Flesh-coloured, with brownish longitudinal streaks. Length 34 mm. (1.34 in.).
9. *Terebra subulata* (Linnaeus) Whorls slightly inflated subsuturally; surface shiny, with very faint spi-

ral and longitudinal striae and bearing large, brown, rectangular spots arranged spirally on white background. Length 106 mm. (4.17 in.).

10. *Terebra guttata* (Röding) Whorls somewhat inflated subsuturally; spiral row of granules below suture in apical whorls. Orange brown, with two spiral rows of white spots on body whorl and single row on other whorls. Length 84 mm. (3.31 in.).
11. *Terebra commaculata* (Gmelin) Sides of whorls straight; subsutural zone slightly raised; surface has spiral and faint longitudinal striae. Yellow background with elongated brown clouding. Length 74 mm. (2.91 in.).
12. *Myurella pretiosa* (Reeve) Subsutural zone raised; whorls marked by faint spiral striae and curved longitudinal folds. Dirty white. Length 56 mm. (2.20 in.).

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(See p. 164 for plate.)

1. *Lambis lambis* (Linnaeus) Body of shell spindle-shaped; shoulder has nodule; surface has close-set spiral ridges; wing-like outer lip of aperture prolonged into seven finger-like channelled processes. Outer surface brownish on whitish background; interior of aperture pinkish and flesh-coloured. Length 204 mm. (8.03 in.).
2. *Lambis chiragra* (Linnaeus) Heavy shell; row of large nodules on shoulder and shallower ones on lower part of body; six spines arising from outer lip and projecting on all sides of shell; margin of outer lip thick-

ened. Surface of shell has brown streaks on white background; aperture dark purple; inside of aperture has purple and white streaks. Length 233 mm. (9.17 in.).

3. ***Lambis scorio* (Linnaeus)** Body short; nodules on whorls; surface has raised spiral striae; outer lip of aperture produced into seven processes, of which terminals longer than curved laterals which bear nodules. Outer surface has brownish markings on white background; interior of aperture ridged, these ridges white on purple background. Length 174 mm. (6.85 in.).
4. ***Lambis crocata* (Linklater)** Body short with spiral rows of nodules on outer surface and spiral striae; nodules on shoulder larger; outer lip has seven processes, some curled backwards. Interior of aperture deep orange. Length 108 mm. (4.25 in.).

## 52

(See p. 165 for plate.)

1. ***Terebellum terebellum* (Linnaeus)** Shell elongate spindle; inner lip of aperture longer than outer. Light and dark brown spots on white background, dark brown spots lying in spiral rows. Length 40 mm. (1.57 in.).
2. ***Janthina janthina* (Linnaeus)** Spire low; somewhat angular shoulder to body whorl. Violet. Diameter 24 mm. (.94 in.).
3. ***Tudicla spirillus* Linnaeus** Spire low, bearing terminal knob; shoulder of whorls has sharp ridge; body whorl bulbous, with long anterior canal; surface has fine spiral striae; columella stands out as thin longi-

tudinal flap; inside of outer lip has striae. White. Length 63 mm. (2.48 in.).

4. *Xenophora helvacea* Peripheral keel thin, irregularly lobate; suture irregular; surface carries no foreign particles. Yellowish brown. Diameter 52 mm. (2.05 in.).
5. *Xenophora tenuis* Fulton Dental tubercles on peripheral keel; base somewhat concave, bearing spiral striae and growth lines; small shell fragments and gravel cemented along suture and on basal margin. Shell surface whitish. Diameter 35 mm. (1.38 in.).
6. *Xenophora pallidula* Reeve Oblique folds on shell surface; base bears spiral striae and growth lines; comparatively large shells of bivalves and gastropods and pieces of rock cemented on surface. White. Diameter 72 mm. (2.83 in.).

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## 53

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(See p. 166 for plate.)

1. *Notohaliotis sieboldi* (Reeve) Nearly oval; spiral ribs fairly stout, slightly wavy; outer lip expanded. Four perforations. Mainly reddish brown, lighter at margin. Length 90 mm. (3.60 in.), width 71 mm. (2.80 in.).
2. *Naticarius rufilabris* (Reeve) Tube of body whorl expanded at shoulder; funicular pad of moderate size. Mainly brown due to about four brown spiral bands against lighter background on body whorl; darker at apex. Length 18 mm. (.71 in.), width 16 mm. (.63 in.).
3. *Mammilla kurodai* Taki Oblong shell consisting

mainly of body whorl; spire small. Background white with four spiral rows of fairly large, irregular brown spots on body whorl; dark brown callus on inner lip. Length 24 mm. (.94 in.), width 15 mm. (.59 in.).

4. ***Cheilea tectumsinense* (Lamarck)** Shell with circular aperture and apex slightly eccentric, posterior; dorsal surface bears fine, radiating lines and a few concentric ridges. Internal appendage semi-circular in cross section. White. Diameter of base 12 mm. (.47 in.).
5. ***Crucibulum violaceum* Carpenter** Conical shell with pointed apex and nearly circular base; outer surface not regularly even. Internal appendage somewhat compressed. Violet externally as well as internally. Diameter of base 24 mm. (.94 in.).
6. ***Ritena costata* (Gmelin)** Viewed dorsally, shell oval; about 16 stout black spiral ribs; grooves between ribs much lighter. Crescent aperture guarded by strong teeth. Length 34 mm. (1.34 in.), width 27 mm. (1.06 in.).
7. ***Bullia vitata* Linnaeus** Shell with tower-like spire; surface of whorls traversed by numerous fine longitudinal and spiral grooves; two spiral rows of ridges immediately anterior to each suture, these ridges made up of rectangular areas. Parietal wall of columella plicate. White. Length 36 mm. (1.42 in.).
8. ***Chrysame chrysalis* (Reeve)** Somewhat inflated, spindle-shaped shell; surface of whorls covered with spiral cords. Four columellar plaits. Reddish brown with white spiral zone covering middle of body whorl. Length 20 mm. (.79 in.), width 10 mm. (.39 in.).
9. ***Latirus polygonus* (Gmelin)** Shell spindle-shaped; whorls bear tuberculated, longitudinal ridges, eight

of them per whorl; also spiral ribs. Outer surface flesh-coloured but spiral ribs brown where they cross over longitudinal ridges. Length 62 mm. (2.44 in.).

10. ***Latirus aplustre* Gmelin** More solid, heavier shell than the above. Longitudinal ridges smoothly arched. Flesh-coloured background of outer surface traversed by brown spiral double lines; also, highest areas of longitudinal ridges in each whorl brown. Length 80 mm. (3.15 in.).
11. ***Tibia delicatula* (Nevill)** Spindle-shaped shell whose spire is as long as its body whorl. Outer surface has fine longitudinal threads crossed by spiral lines. Anterior canal short and turned slightly outwards; posterior canal very short and comparatively wide. Outer lip margin bears four short spines and, sometimes, rudiment of fifth spine more anteriorly. Olivaceous with fine, light blue spiral lines running onto spines on their dorsal side. Length 100 mm. (3.94 in.).

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## 54

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(See p. 167 for plate.)

1. ***Ranularia pyrum* (Linnaeus)** Spire short, large body whorl; nodulated shell surface bears transverse cords and longitudinal varices. Aperture ovate, anterior canal fairly long. Generally brown with dark brown areas between transverse cords on varices. Length 87 mm. (3.43 in.).
2. ***Distorsio reticulata* Röding** Distortion of body whorl onto spire slight although body whorl swollen. Shell surface covered by reticulation formed of crossings of longitudinal and spiral ridges. No lower lip

callus expanding over ventral body whorl. Anterior siphon comparatively long. Horn-coloured. Length 30 mm. (1.18 in.).

3. *Cymatium kleineri* Sowerby Shell small; spire pointed and anterior canal moderately long; surface has spiral ribs crossed by finer radial lines with granules at points of crossing. Aperture oval, outer lip rugose. Brown; darker brown areas on varices. Length 28 mm. (1.10 in.).
4. *Clypeomorus humilis* (Dunker) Shell short, stout; body whorl inflated. Three spiral rows of granules on each whorl except body whorl, which bears six rows. Granular rows have smooth lines between them. Faint varix may run on each side. Reddish brown or black. Length 21 mm. (.83 in.).
5. *Staphylaea staphylaea* (Linnaeus) Oval shell, dorsal surface has minute granules. Nearly median dorsal groove faintly noticeable. Teeth extend across ventral surface and separated from each other by fine red lines. Dorsal surface brown, with scattered fine white spots; extremities have brown blotches. Length 16 mm. (.63 in.). (See Plate 42, Fig. 11, where shell is larger and dorsal longitudinal groove more distinct.)
6. *Staphylaea nucleus* (Linnaeus) Oval shell with many nodules and midline crease on dorsal surface. Ventral surface traversed by extensions of teeth. Grey dorsally, lighter ventrally. Length 23 mm. (.91 in.). (See Plate 41, Fig. 13.)
7. *Erosaria nebrites ceylonensis* Schilder and Schilder Semi-pyriform shell. Dorsally, background light brown with numerous white spots of varying size. Dark brown band across middle of back carries blotch of darker brown on each side. Reddish brown striae cross lateral

ridges; striae and spots of same colour over ventral side. Length 27 mm. (1.06 in.).

8. *Ovatipsa coloba gregori* Ford Somewhat depressed oval shell with heavy callus on each side. Aperture wide, teeth extending onto both sides but becoming fainter marginally. Three violaceous transverse bands on light grey dorsum; brown spots on callosities. Ventral surface white. Length 30 mm. (1.18 in.).
9. *Derstolida stolid*a (Linnaeus) Fairly inflated, cylindrical shell. Dorsal surface has light blue background over middle of which there is quadrilateral brown patch; corners of this connected to four brown areas at sides; small brown dots scattered along the margins. Teeth extend over white ventral surface. Length 31 mm. (1.22 in.).
10. *Erosaria boivinii* (Kiener) Semi-pyriform shell; callosity along right side more pronounced. Background white; brown spots on dorsum, deeper brown spots on sides. Length 31 mm. (1.22 in.).
11. *Angaria ampla* (Gmelin) Elongate shell, spire pointed. Sutures inlaid with callus. Columella slightly twisted; aperture fairly narrow. White except near brown spire. Length 27 mm. (1.06 in.).
12. *Dauciconus planorbis* (Born) Small cone with moderate spire. Fine encircling lines on body whorl. Background white; small brown spots on spire and two light brown-to-yellow bands on body whorl connected to each other by longitudinal extensions. Length 31 mm. (1.22 in.).
13. *Oliva sericea* (Röding) One of many forms of this variable shell. Shiny brown except for tip of spire and inside of aperture, which are nearly white. Length 52 mm. (2.05 in.). (See Plate 49, Fig. 7.)

14. *Cylinder abbas* (Bruguière) Compact shell with moderate spire. Chestnut brown reticulations on white background of surface; some smaller reticulations apparently crowded together into definite areas. Wavy, rather thick, longitudinal dark brown streaks. Length 38 mm. (1.50 in.).
15. *Rhizoconus vexillum* (Gmelin) Rather heavy shell with broad base and low spire. Alternating brown and white areas on spire; brown surface of body whorl interrupted by a circle of white blotches on shoulder and another about the middle. Length 74 mm. (2.91 in.).

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 55
 

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(See p. 168 for plate.)

1. *Regiconus aulicus* (Linnaeus) Fairly large shell with tall, pointed spire; body whorl has rounded shoulder. Surface has large, reddish brown patches connected by network of same colour enclosing triangular colourless areas. Length 102 mm. (4.02 in.).
2. *Cylinder textile* (Linnaeus) Low but sharp spire; shoulder rounded; body whorl somewhat bulbous. Surface has brown tent markings, patches of brown in bands, and wavy, longitudinal dark streaks. Length 106 mm. (4.17 in.). (See Plate 57, Fig. 9.)
3. *Darioconus pennaceus* (Born) Tip on spire; shoulder rounded. Surface has white tent markings bounded by network of brown connected to small and larger brown patches. Length 93 mm. (3.66 in.).
4. *Lithoconus litteratus* (Linnaeus) Flat spire; angled shoulder. Surface of body whorl has nearly square

black spots arranged more or less regularly on white polished background. Length 77 mm. (3.03 in.).

5. *Cleobula betulina* (Linnaeus) Spire raised at pointed apex; body whorl inflated, shoulder rounded. Surface of spire has brown stripes, body whorl encircled by rows of dark brown spots of varying shape and size; background reddish yellow. Length 78 mm. (3.07 in.).
6. *Lithoconus leopardus* (Röding) Spire low; shoulder slightly rounded; body whorl surface not polished. Irregular rows of spots on white background. Length 91 mm. (3.58 in.).

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## 56

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(See p. 169 for plate.)

1. *Strioconus striatus* (Linnaeus) Spire moderate, spire whorls channelled; surface of body whorl has fine spiral and longitudinal striae, purplish brown blotches and connecting fasciae on pale pink background. Length 76 mm. (2.99 in.).
2. *Virgiconus distans* (Hwass) Spire low, tuberculated above suture. Body whorl slender cone, brown, with light-coloured band around middle and darker at anterior end; brown fasciae on spire between tubercles. Length 74 mm. (2.91 in.).
3. *Cleobula loroisii* (Kiener) Spire low; shoulder faintly channelled below suture. Body whorl short, heavy cone; surface has longitudinal and spiral striae, latter more pronounced anteriorly. Greyish. Length 70 mm. (2.76 in.).

4. *Gastroidium geographus* (Linnaeus) Spire moderate, tuberculated on shoulder. Surface of body whorl has faint longitudinal and spiral striae, brown clouds and network on whitish background. Length 71 mm. (2.80 in.).
5. *Hermes terebra* (Born) Gently curving spire. Body whorl long, with spiral striae. White, with two wide, light purple spiral bands. Length 75 mm. (2.95 in.).
6. *Rhombus zonatus* (Hwass) Coronated spire. Body whorl has grey bandings and orange spiral lines on white background. Length 68 mm. (2.68 in.).
7. *Leptoconus monile* (Bruguière) Sharp, pointed spire; shoulder of whorls canaliculate. Surface of body whorl polished, bearing brown dots arranged in spiral bands; some of dots run together forming longitudinal streaks. Background white. Length 63 mm. (2.48 in.).
8. *Rhizoconus miles* (Linnaeus) Spire moderate, shoulder of whorls canaliculate. Body whorl has raised spiral threads anteriorly and bears two dark brown spiral bands connected by dense, fine, wavy, longitudinal brown lines on whitish background. Length 57 mm. (2.24 in.).
9. *Virgiconus virgo* (Linnaeus) Spire low, shoulder of whorls shallowly canaliculate; body whorl faintly marked by spiral striae. Flesh-coloured with violet patch at anterior end. Length 57 mm. (2.24 in.).

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## 57

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(See p. 170 for plate.)

1. *Cleobula figulina* (Linnaeus) Spire low, pointed;

shoulder rounded. Dark brown with darker brown spiral lines on body whorl. Length 52 mm. (2.05 in.).

2. ***Virroconus piperatus* (Dillwyn)** Spire low, pointed; shoulder faintly nodular. Body whorl pinkish with circular striae having darker dashes of pink so that there are longitudinal rows of these darker pink dashes; white band on shoulder and another just below middle of body; dark streaks on shoulder between nodules. Length 54 mm. (2.13 in.).
3. ***Leptoconus amadis* (Gmelin)** Spire sharp, pointed; shoulder channelled; body whorl has straight sides. Discontinuous bands of brown, and brown reticulations on white background. Length 52 mm. (2.05 in.).
4. ***Lithoconus eburneus* (Hwass)** Spire flat but with sharp point; shoulder of body whorl rounded; surface of body whorl smooth except for some spiral striae at base. White, circled irregularly by rectangular black spots. Length 47 mm. (1.85 in.).
5. ***Lithoconus tessulatus* (Born)** Spire low, pointed. White background has checkered pattern of orange spots, some of which lie close together, forming two bands around body; anterior end of body whorl has slight tinge of violet. Length 49 mm. (1.93 in.).
6. ***Virroconus lividus* (Bruguière)** Spire moderate, coronated; posterior half of body whorl nearly smooth or with fine spiral striae, anterior half has distinct spiral striae, generally granular. White ring on shoulder of body whorl and white spiral band lower down; rest of surface olive and dark brown at tip. Length 52 mm. (2.05 in.).
7. ***Conus nicobaricus* Bruguière** Spire pointed, coronated with widely spaced nodules; shell covered with tent markings and network of pinkish reticula-

tions on white background; considerable smudging of tent markings by chestnut blotching below shoulder; narrow chestnut band around middle of body, broader chestnut band lower down. Length 44 mm. (1.73 in.).

8. *Leptoconus generalis* (Linnaeus) Spire pointed; shoulder feebly channelled; body whorl slim, almost smooth but for a few spiral striae at anterior end. Two broad brown bands encircle white surface of body whorl and brown zigzag lines run lengthwise from these bands; anterior end purplish brown. Length 51 mm. (2.01 in.).
9. *Cylinder textile* (Linnaeus) Spire conical; body whorl somewhat inflated. Surface covered with network of brown tent-like markings which are small and dense in some areas; dark chestnut streaks wavy, longitudinal. Background white. Length 43 mm. (1.69 in.). (See Plate 55, Fig. 2.)

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## 58

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(See p. 171 for plate.)

1. *Puncticulis arenatus* (Bruguière) Spire pointed, coronated. Body whorl chubby, with smooth white surface covered with brown dots more numerous at anterior end. Length 39 mm. (1.54 in.).
2. *Chelyconus achatinus* (Gmelin) Spire elevated; body whorl has encircling striae. Wavy markings of dark chestnut on upper and basal parts of body whorl with irregular blotches and spots in between. Background white. Length 51 mm. (2.01 in.).
3. *Textilia nimbosus* (Bruguière) Spire low, pointed;

body whorl has fine circular striae mottled with reddish spots which sometimes run together to form wavy bands. Length 41 mm. (1.61 in.).

4. *Dauciconus augur* (Solander) Spire moderate, pointed; angled shoulder to body whorl. White surface of body whorl has circular rows of fine red dots and two red bands. Length 40 mm. (1.57 in.).
5. *Puncticulis pulicarius* (Hwass) Spire pointed, moderate; tubercles on shoulder of whorls. Coarse black dots irregularly scattered on white background. Length 37 mm. (1.46 in.).
6. *Virroconus ebraeus* (Linnaeus) Spire low, weakly tuberculate. Rows of quadrilateral, large black spots on white background of body and spire; anterior end dark. Length 29 mm. (1.14 in.).
7. *Cylinder natalis* (Sowerby) Spire moderate; body whorl slender, flesh-coloured, with a few dark brown patches connected by longitudinal, brown zigzag streaks. Length 34 mm. (1.34 in.).
8. *Chelyconus catus* (Bruguière) Spire moderate; faint spiral striae on upper part of body whorl gradually becoming more pronounced; granule-bearing ridges on lower part. Brownish clouded pattern on bluish-to-white background. Length 39 mm. (1.54 in.).
9. *Stephaniconus varius* (Linnaeus) Spire elevated, tuberculate; surface of body whorl has spiral striae which become markedly granular more anteriorly. Small black dots on striae and darker patches on body which tend to form two bands. Background white. Length 38 mm. (1.50 in.).
10. *Darioconus episcopus* (Bruguière) Spire moderate,

acuminate; body whorl cylindrical. Dark brown patch on spire and a few similar patches on body whorl connected by brown tent marks on white background. Length 41 mm. (1.61 in.).

11. *Hermes nussatella* (Linnaeus) Spire moderate, acuminate; shell slender; body whorl encircled by fine granular striae and rows of brown dots. Background yellowish; irregular blotches of brown also present. Length 32 mm. (1.26 in.).
12. *Virroconus coronatus* (Gmelin) Spire moderate, nodulated; body whorl of purplish white ground with interrupted, circular brown lines and longitudinal rows of chestnut streaks in two bands. Length 27 mm. (1.06 in.).
13. *Gastridium obscurus* (Sowerby) Spire low, pointed; body whorl narrow, finely striate. Dark brown areas on purplish background. Length 24 mm. (.94 in.).
14. *Pionoconus pertusus* (Bruguière) Spire moderate; surface of body whorl faintly striate. Rosy red with white area at shoulder, at middle of body, and also terminally. Length 24 mm. (.94 in.).
15. *Rhizoconus rattus* (Bruguière) Spire low; body whorl smooth towards shoulder, with fine spiral striae towards base. Olive brown with white band about middle and another on shoulder, extending onto spire. Length 28 mm. (1.10 in.).
16. *Virroconus chaldaeus* (Röding) Spire moderate, shoulder tuberculate. Black spots on spire; wavy, longitudinal black lines on body in two broad spiral zones; background white. Length 29 mm. (1.14 in.).

(See p. 172 for plate.)

1. ***Trochus sacellum* Philippi** Conoid shell; whorls have rather flat sides encircled by three rows of papillary grains, lower margin of whorls nodulated; base circularly grain-ridged. Pink. Height 24 mm. (.94 in.).
2. ***Vittina turrita* (Gmelin)** Oval shell with tallish spire; row of small teeth on inner lip. Surface of shell polished and covered with many narrow longitudinal stripes of black alternating with those of brownish yellow. Length 28 mm. (1.10 in.).
3. ***Phos senticosus* (Linnaeus)** Well-developed, turreted spire with pointed apex; surface of shell has longitudinal ridges crossed by numerous spiral striae bearing small spines; anterior canal short; inside of aperture striated. Greyish, with darker spiral band on about middle of body whorl. Length 40 mm. (1.57 in.).
4. ***Engina zonata* (Reeve)** Spindle-shaped shell with close-set spiral striae traversing entire surface; outer lip with fine teeth; anterior canal short. Whitish yellow, encircled by a few dark spiral bands. Length 24 mm. (.94 in.).
5. ***Latirus craticulatus* (Linnaeus)** Fusiform shell having well-developed spire with pointed apex; body traversed by spiral striae and also bearing slightly oblique, longitudinal ridges; plaits on columella distinct. Mainly brown. Length 64 mm. (2.52 in.).
6. ***Latirus turritus* (Gmelin)** Fusiform shell with well-developed spire though apex somewhat blunt; surface traversed by prominent spiral ribs; longitudinal ridges not so distinct; four columellar plaits small. Gen-

erally light brown; spiral ribs darker brown; inside of aperture orange to yellow. Length 42 mm. (1.65 in.).

7. ***Engina pulchra* (Reeve)** Fusiform shell with tall spire; surface traversed by spiral ribs and bearing longitudinal ridges; blunt teeth on margin of outer lip. Orange yellow; inside of aperture pink. Length 23 mm. (.91 in.).
8. ***Dauciconus litoglyphus* (Bruguière)** Low spire; shoulder of body wall rounded. Polished surface of brown with white spots on spire, row of larger spots around base of body whorl and interrupted white band more anteriorly on body; anterior end dark. Length 24 mm. (.94 in.).
9. ***Casmaria ponderosa* (Gmelin)** Low spire, its whorls somewhat inflated; body whorl comparatively large, inflated, with row of nodules on shoulder; columella has heavy callosity; outer margin of aperture thickened and toothed and has row of brown, squarish blotches along dorsal surface. Length 32 mm. (1.26 in.).
10. ***Gibberulus tridentatus* (Gmelin)** Narrow shell; spiral whorls slightly inflated, suture grooved; body whorl longer than spire. Shell surface polished, bearing faint longitudinal striae and brown streaks and spots on creamy white background. Length 39 mm. (1.54 in.).
11. ***Rhizoconus mustelinus* (Hwass)** Low spire with grooved suture; shoulder of body whorl bluntly rounded. Spire mainly white with brown blotches radiating out from apex to just below shoulder of body whorl. Surface of body wall orange or pinkish with characteristic white spiral band bordered by dark spots around middle of whorl. Length 34 mm. (1.34 in.).

12. *Conusprella sowerbyi* (Reeve) Biconical shell, its spire only a little less than half entire length; spiral whorls have concave surfaces and are granulated above suture; body whorl carries flat spiral ribs with smaller spiral striae between. Mostly brown with darker brown longitudinal streaks. Length 36 mm. (1.42 in.).

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(See p. 173 for plate.)

1. *Charonia tritonis* (Linnaeus) Large shell with tall spire tapering to a point; thick spiral ridges on surface of whorls, also several varices; inner margin of aperture reflexed, has many plaits; outer margin wavy, toothed. Shell surface has fine polish and scalloped pattern of white, light brown, and dark brown; inside of aperture orange. Length 120 mm. (4.72 in.).
2. *Ranularia* sp. Shell has rather low spire; body whorl well inflated with moderate siphon; outer surface has spiral rows of nodules and longitudinal ridges; outer lip of aperture has crenulate inner margin. Alternate white and brown bands on shell surface. Length 29 mm. (1.14 in.).
3. *Gelagna clandestina* (Lamarck) Thin shell with low spire but well-inflated whorls; outer surface has spiral ridges close together. Generally brown but spiral ridges black. Length 38 mm. (1.50 in.).
4. *Colubraria castanea* Kuroda and Habe Elongate, turreted shell with pointed spire; body whorl not as long as spire; surface of shell covered with network of spiral and longitudinal rows of granules; several short varices on whorls; aperture narrow, outer lip crenu-

late. Brown, with scattered darker patches. Length 56 mm. (2.20 in.).

5. *Colubraria strepta* (Crossman) Elongate, turreted shell with pointed apex; whorls of spire slightly swollen; outer surface has spiral rows of granules and some short varices; left margin of shell somewhat convex and right margin shows slight concavity between last spiral whorl and body whorl. Brown, with scattered darker patches. Length 50 mm. (1.97 in.).
6. *Vasum ceramicum* (Linnaeus) Biconical shell; body whorl forms larger cone than spire; each spiral whorl has spiral row of spines and several spiral striae; body whorl also has spiral rows of spines, one of anterior rows carrying distinctly longer spines; surface longitudinally ridged; columella has three plaits. Brown, with darker blotches. Length 51 mm. (2.01 in.).
7. *Vasum turbinellum* (Linnaeus) Solid, conical shell; spire short; body whorl tapers anteriorly; rows of horn-like spines on whorls; two spiral rows of larger spines on shoulder separated by two spiral rows of low tubercles from two spiral rows of larger spines more anteriorly; narrow longitudinal folds on body whorl; aperture elongate, four main plaits on columella. Dark spiral bands on grey background. Length 63 mm. (2.48 in.).



PART

III

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SHELLS OF  
CEPHALOPODA

(See p. 176 for plate.)

1. ***Nautilus pompilius* Linnaeus** Pearly shell of many chambers closely coiled in same plane. Surface creamy white, with streaks of brown. Diameter 158 mm. (6.22 in.).
2. ***Spirula spirula* Lamarck** Many-chambered tapering shell loosely coiled in same plane, like a ram's horn. White. Length 23 mm. (.91 in.).
3. ***Argonauta argo* Linnaeus** Shell of "paper nautilus" is of parchment-like substance and is egg-case of female. Single chamber, flattened laterally and having keel tuberculated at margins; surface has wavy ridges, some bifurcate. White; brownish on keel. Length 78 mm. (3.07 in.).

## THE PLATES

*Publisher's note:* Plates designated by the author as containing shells which collectors would most want to see in natural hues have been reproduced here in colour. Features of the production process made it impossible to group all plates in accordance with conchological classifications while using colour for the selected plates. Where a choice was necessary, the benefits of colour reproduction were chosen over those of strict adherence to scientific order.

PART

I

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SHELLS OF  
PELECYPODA  
or Bivalve Molluscs

(Plates 1-23)

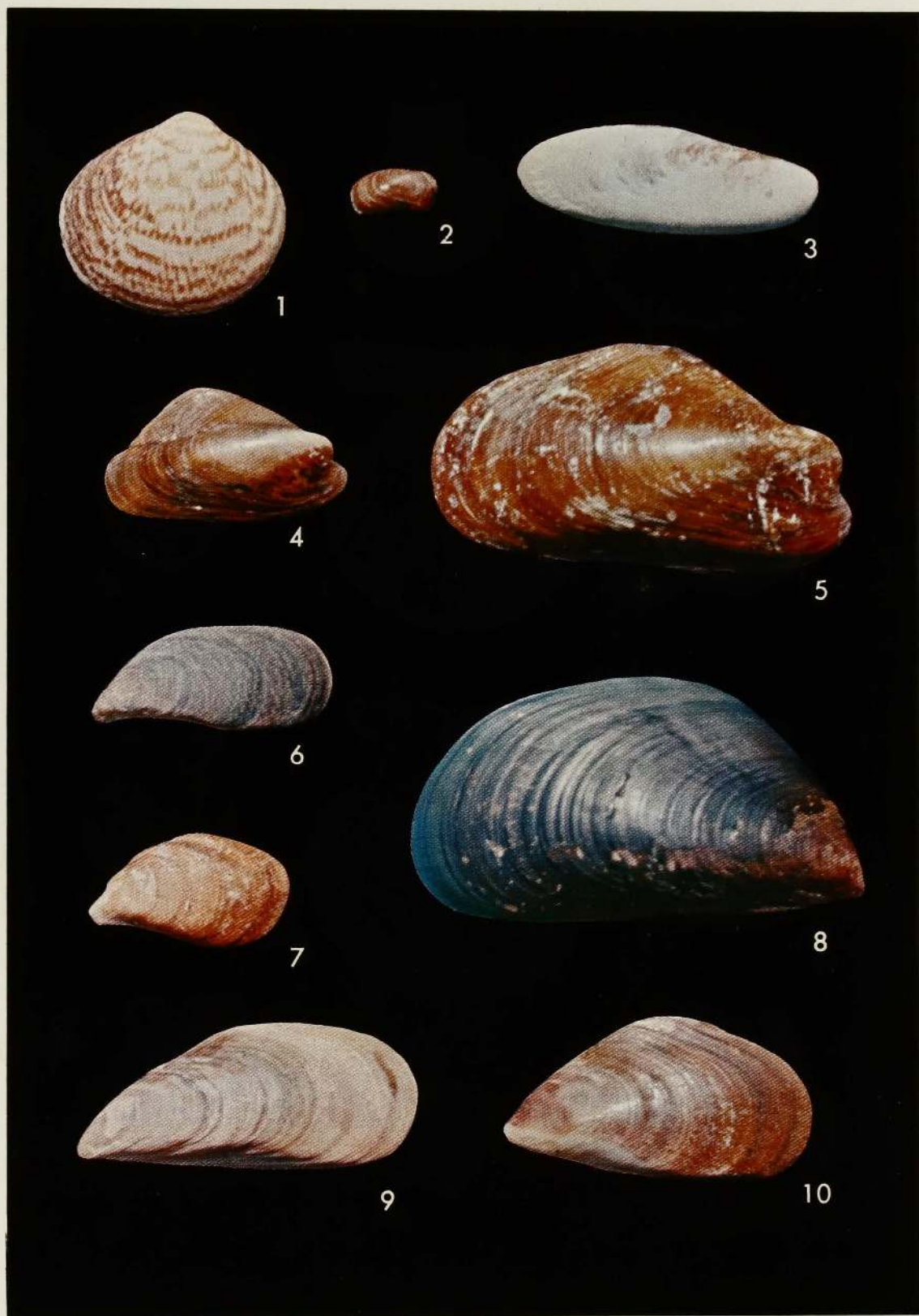


PLATE 1

(Text on pp. 14-15)

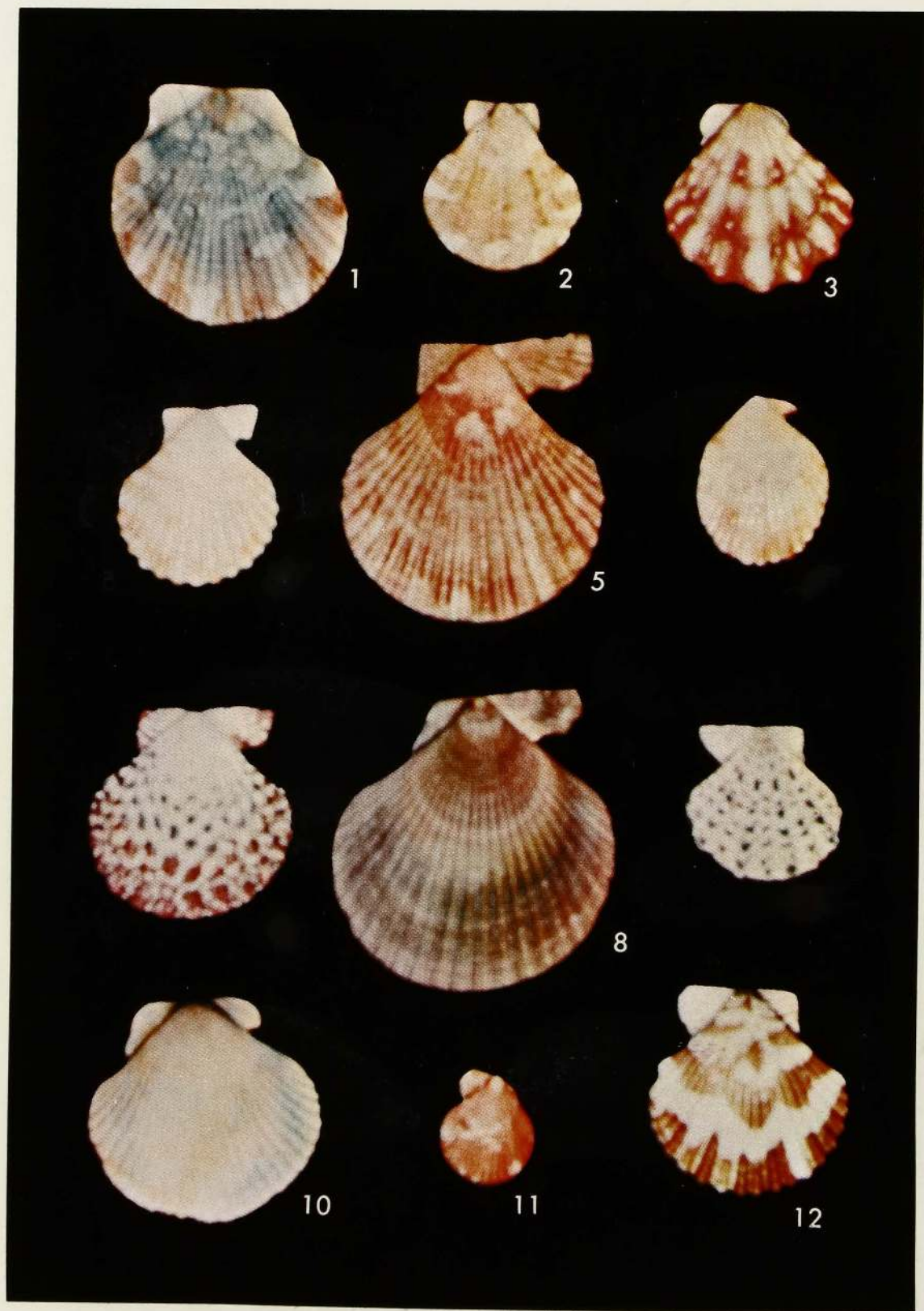


PLATE 2

(Text on pp. 15-17)

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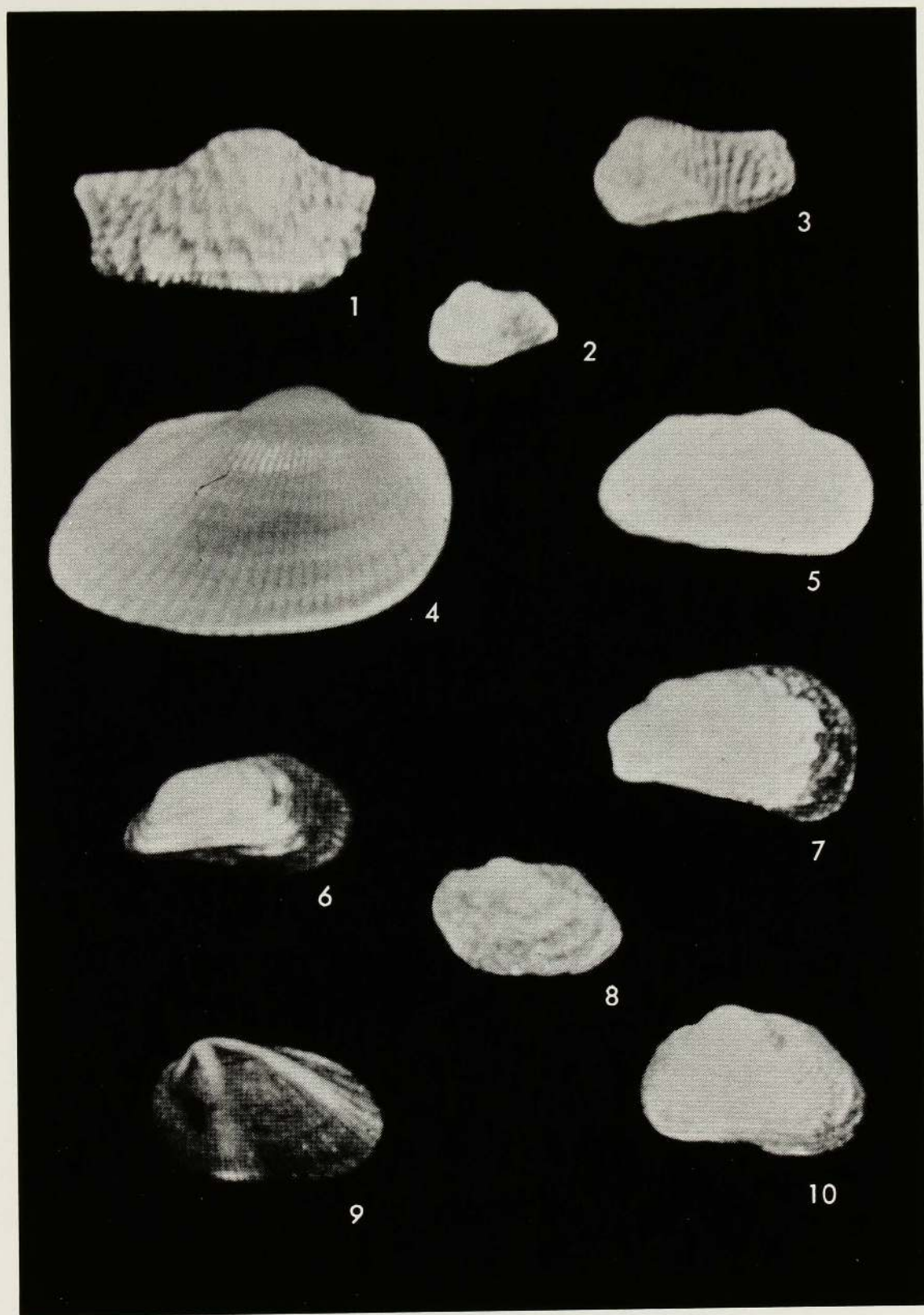


PLATE 3

(Text on pp. 17-18)

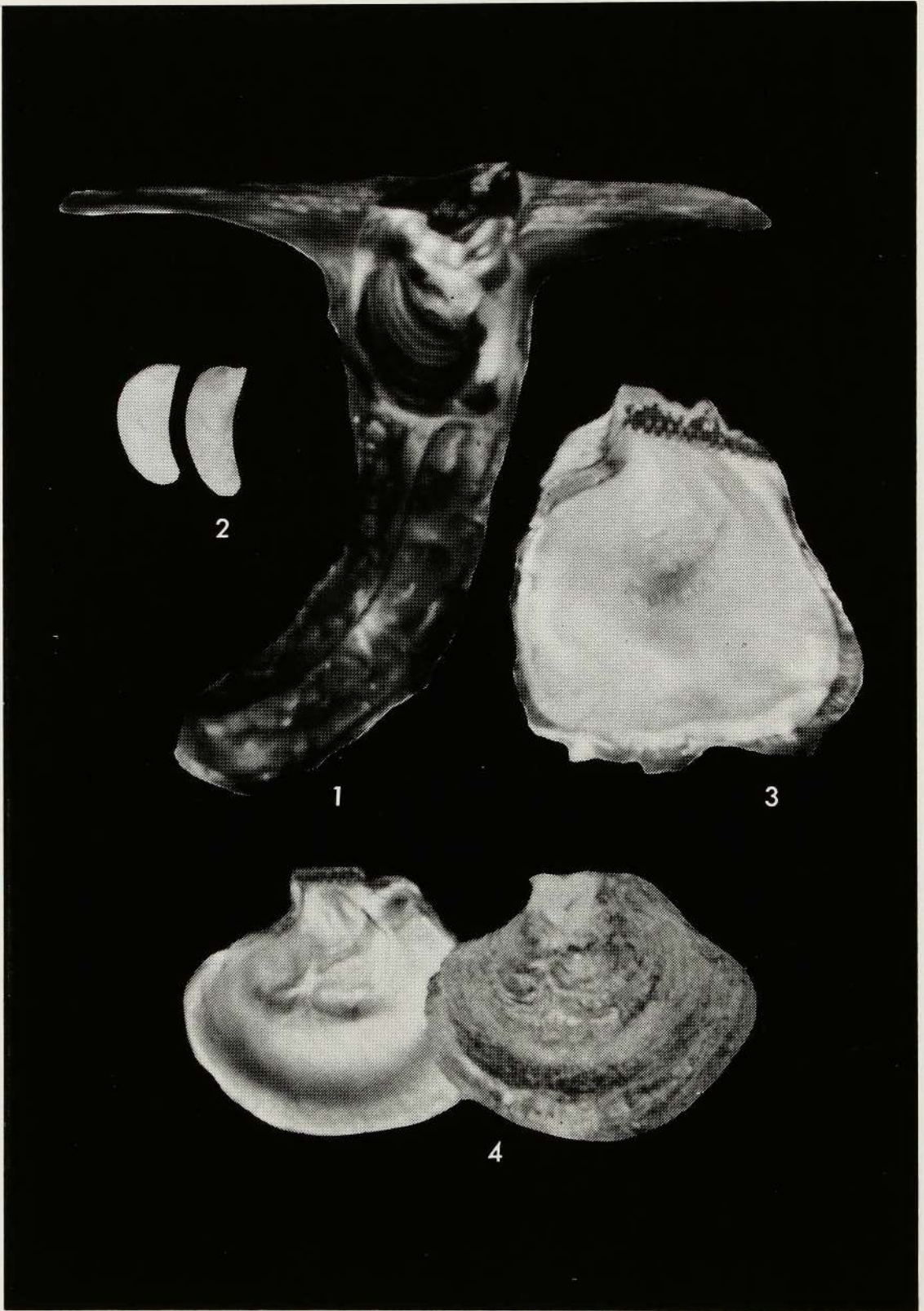


PLATE 4

(Text on p. 19)

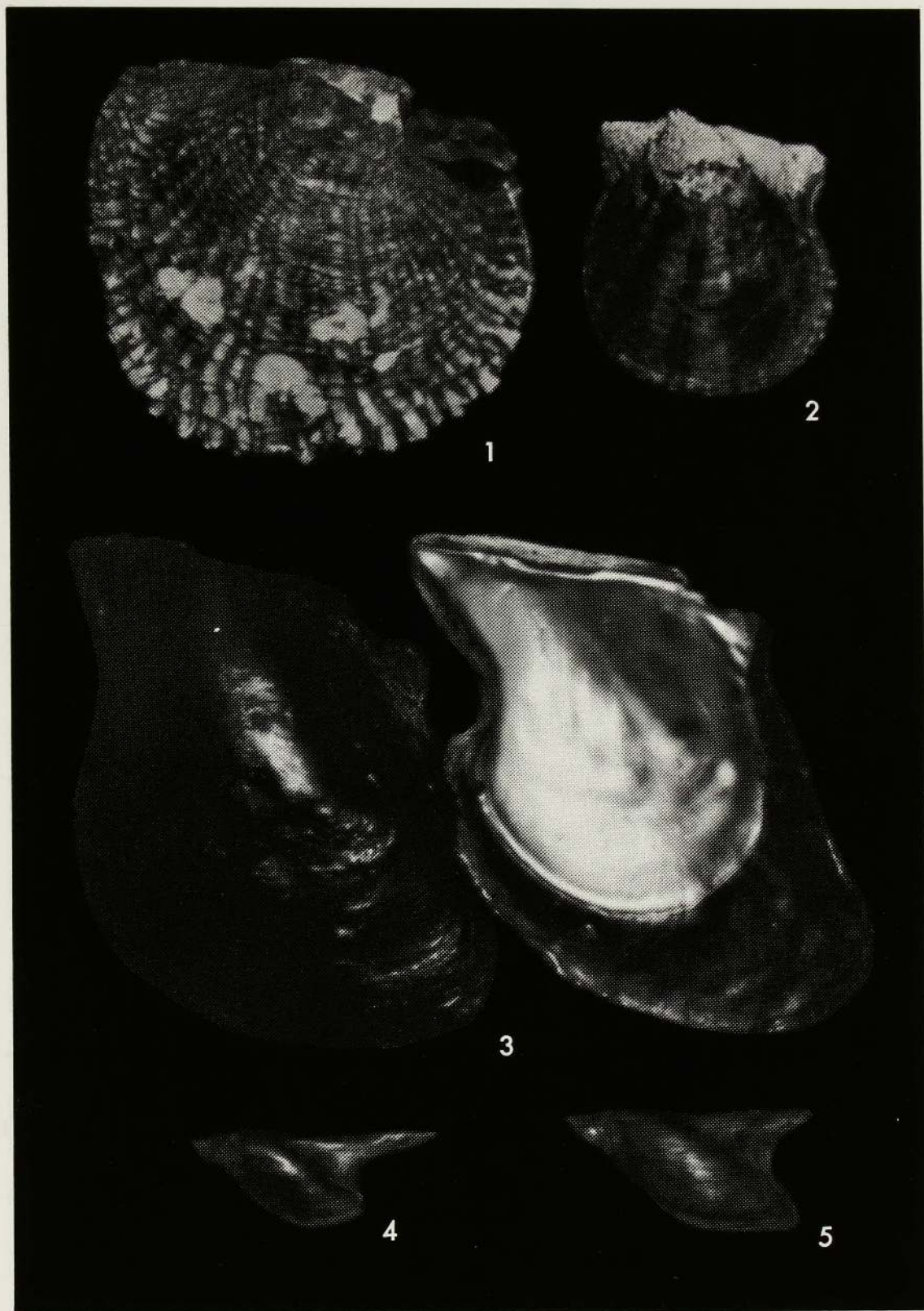


PLATE 5

(Text on pp. 19-20)

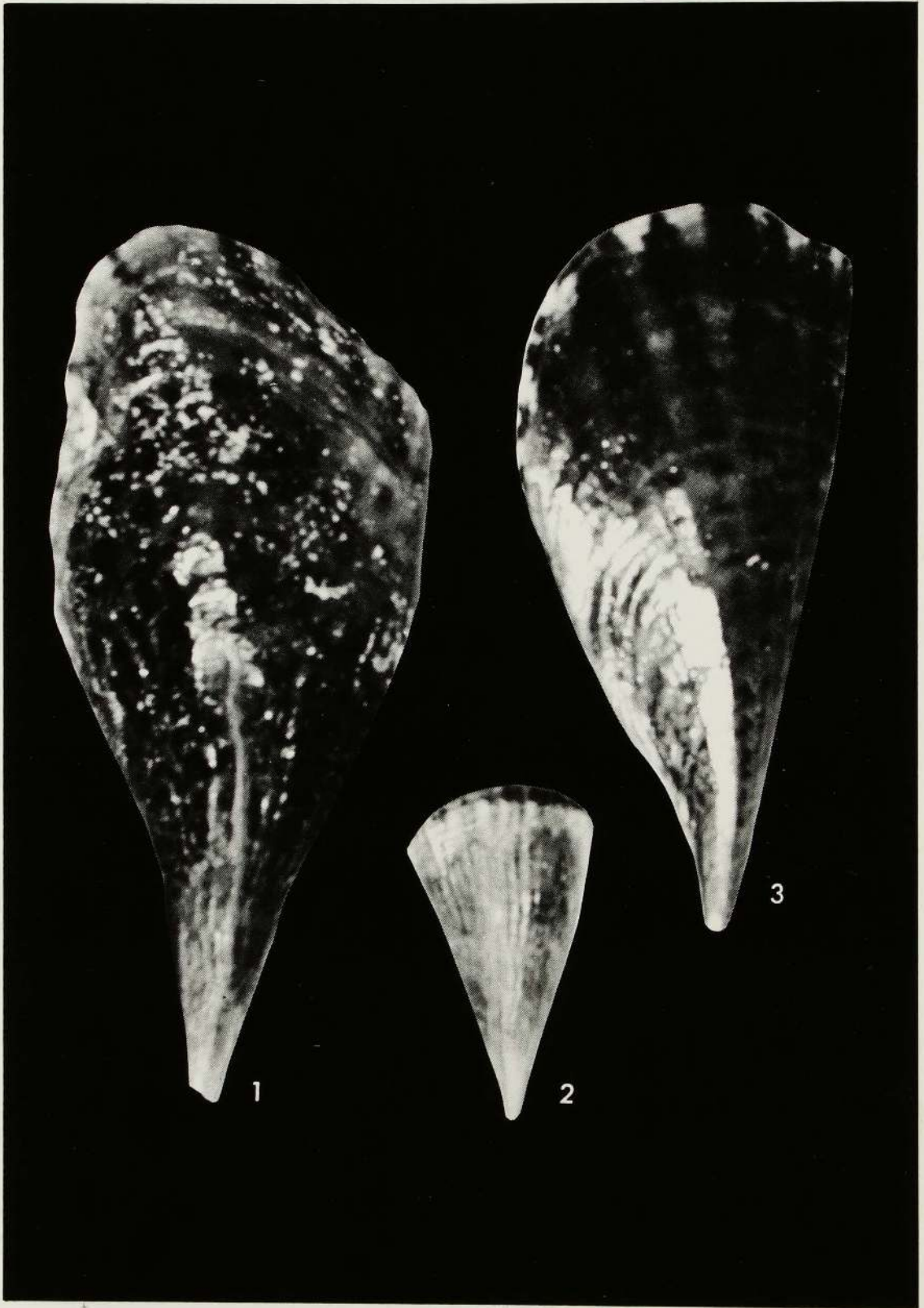


PLATE 6

*(Text on pp. 20-21)*



PLATE 7

(Text on pp. 21-22)

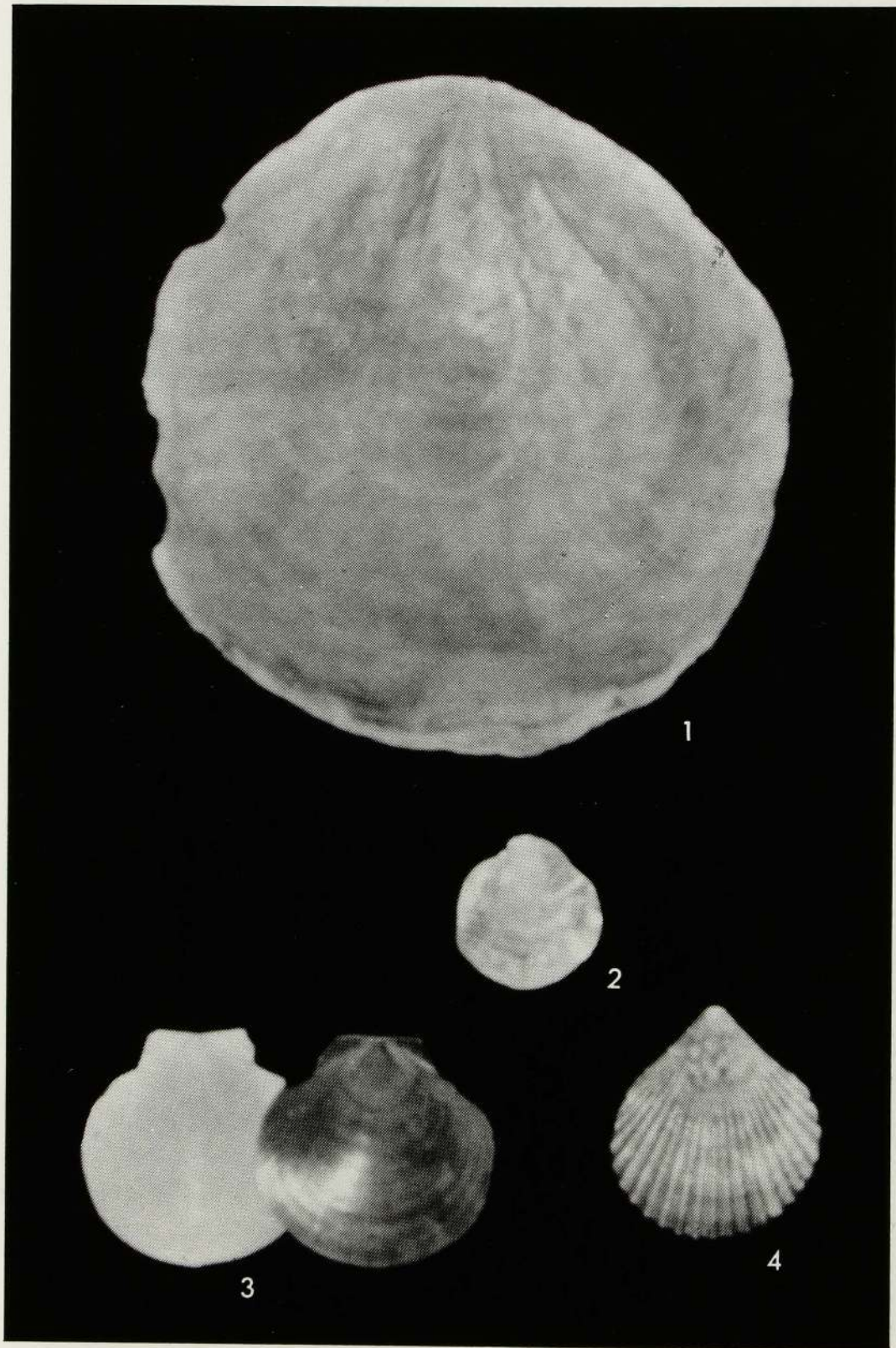


PLATE 8

*(Text on p. 22)*

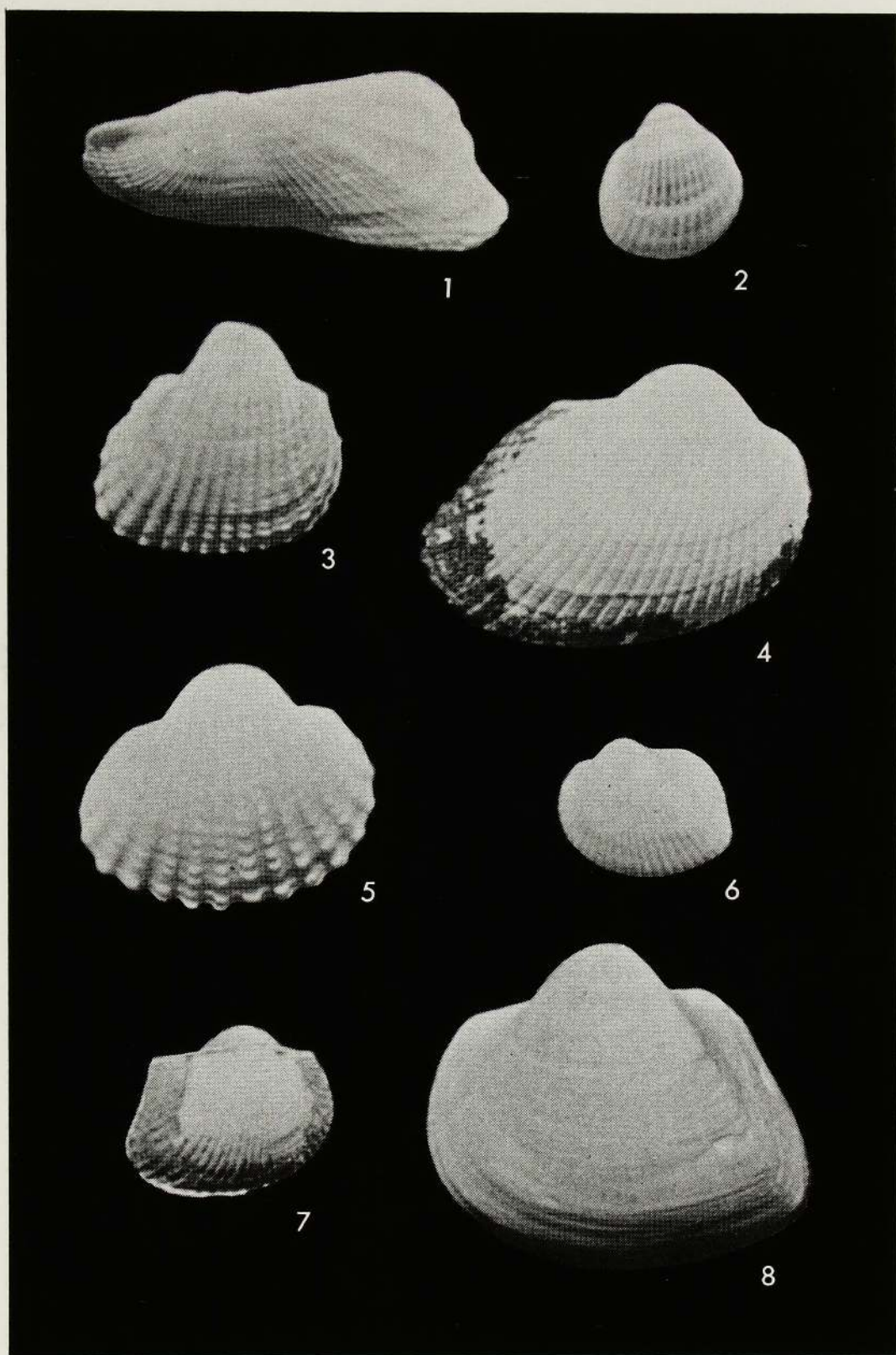


PLATE 9

(Text on pp. 22-24)

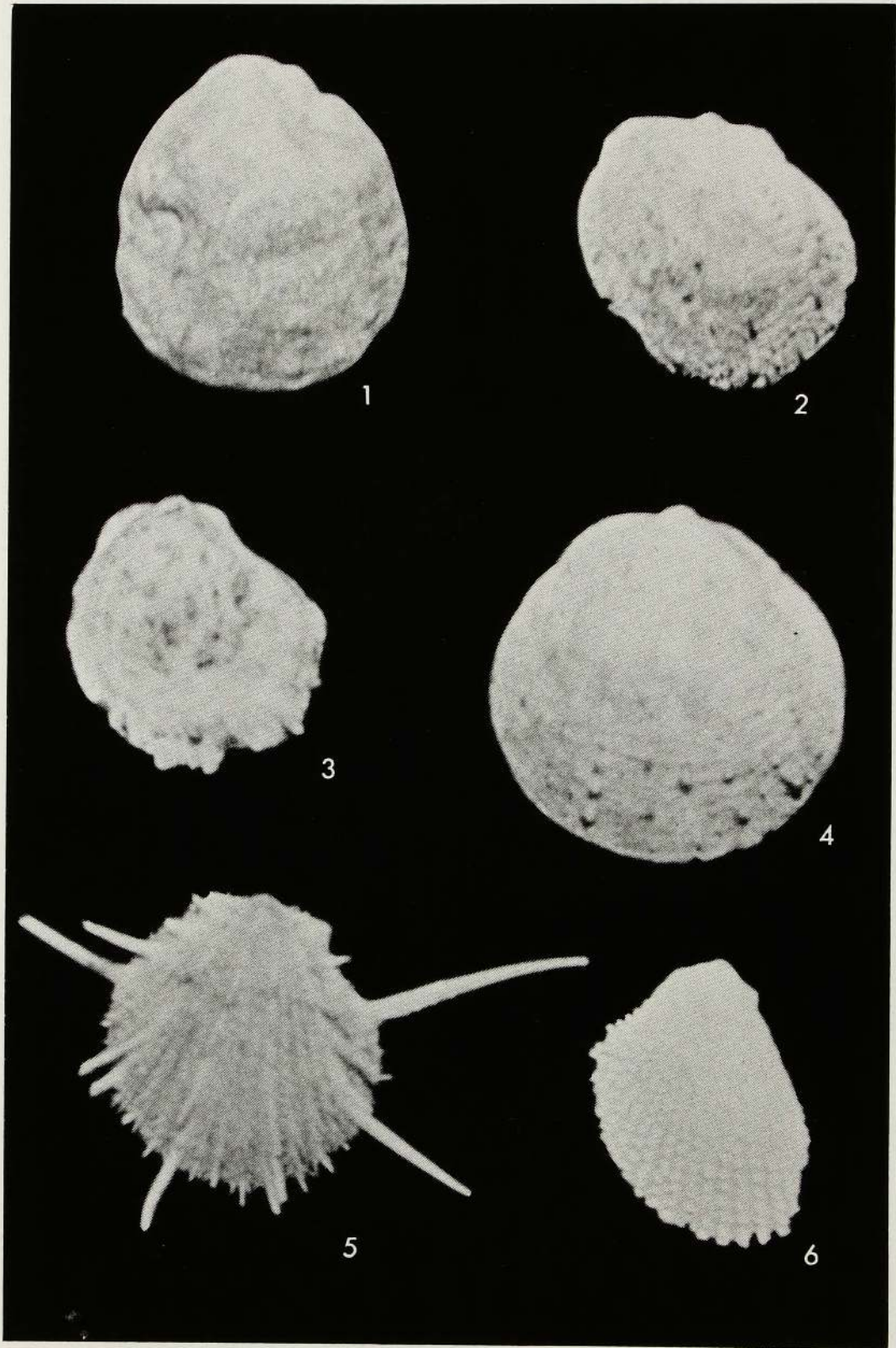


PLATE 10

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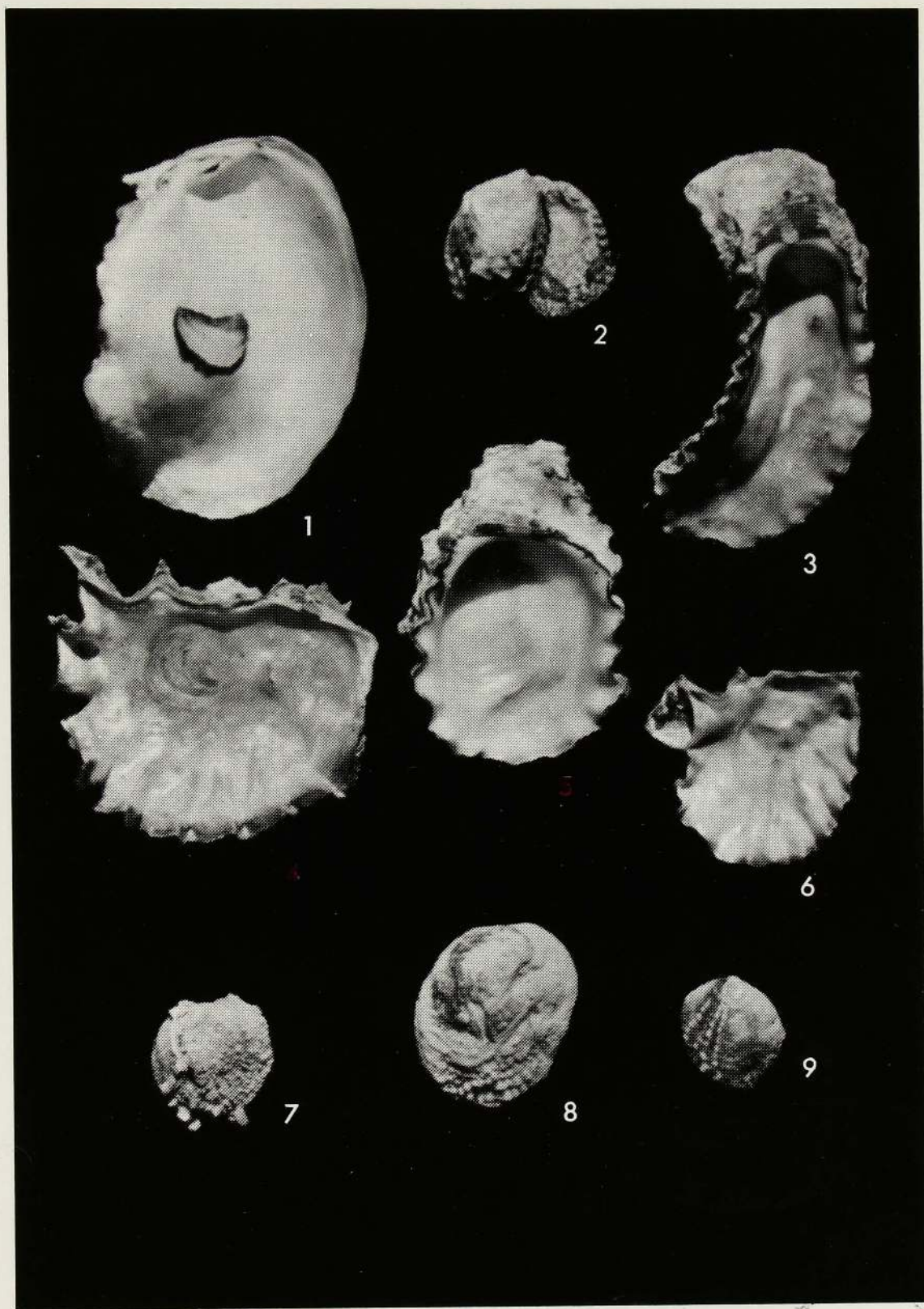


PLATE 11

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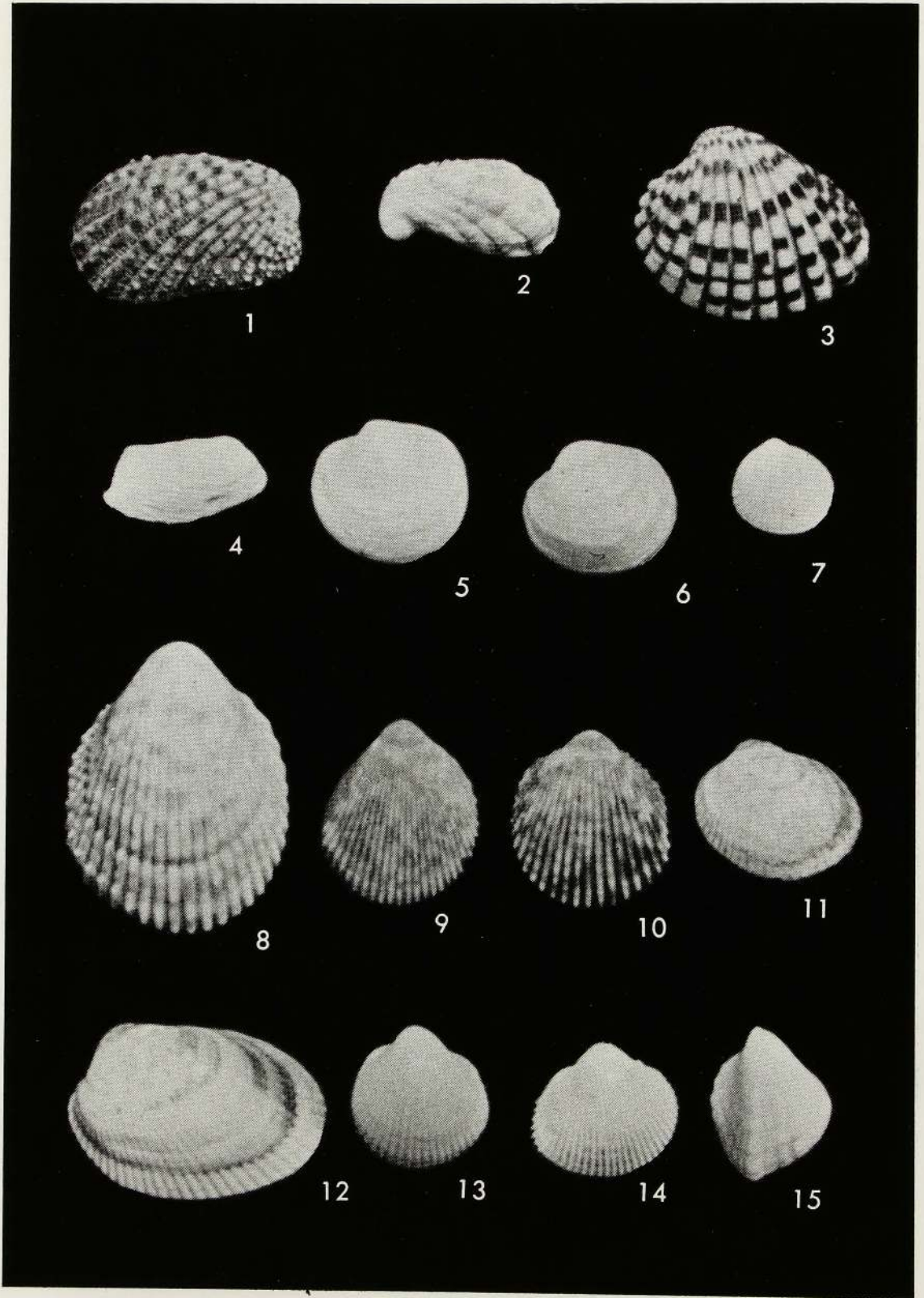


PLATE 12

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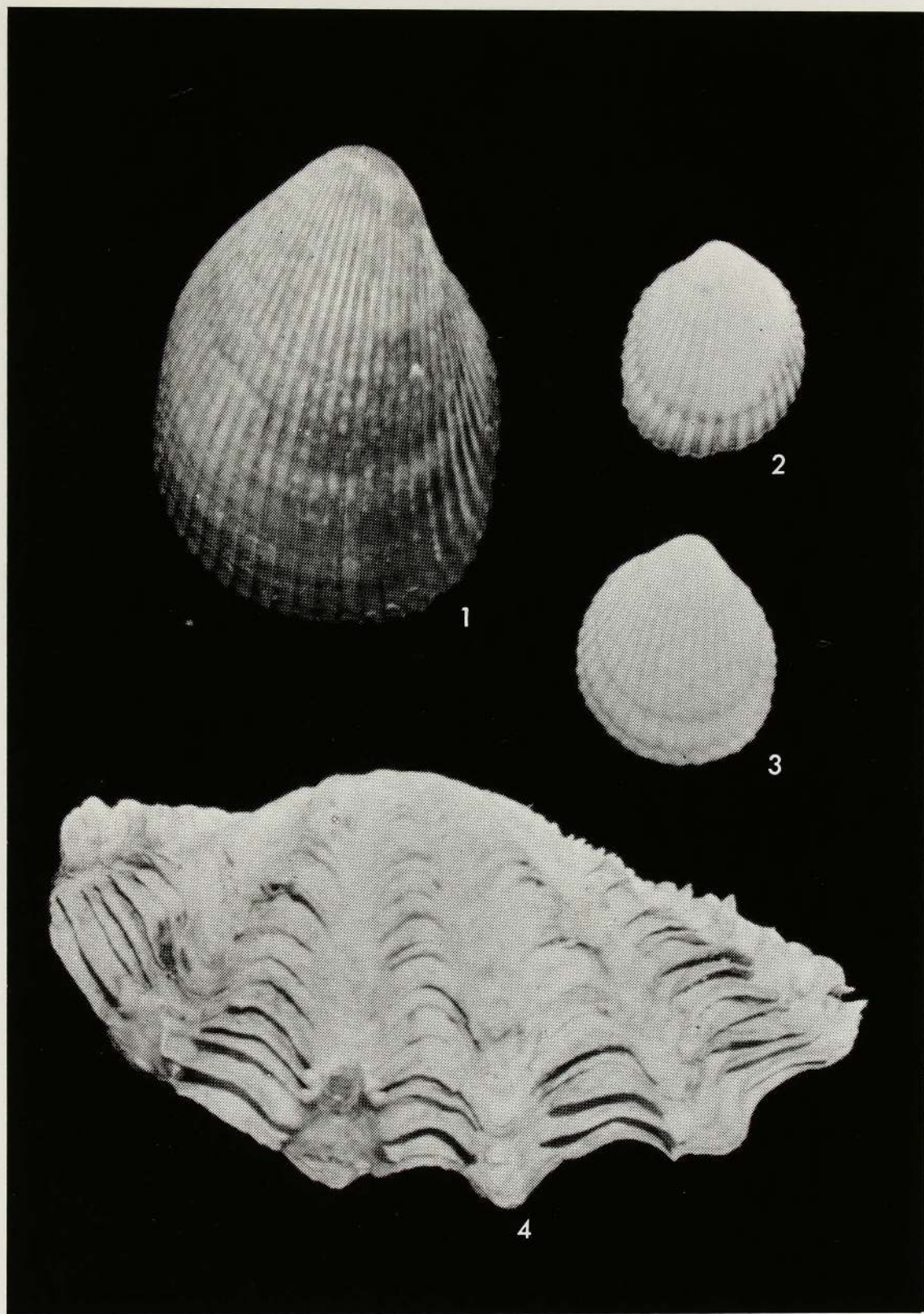


PLATE 13

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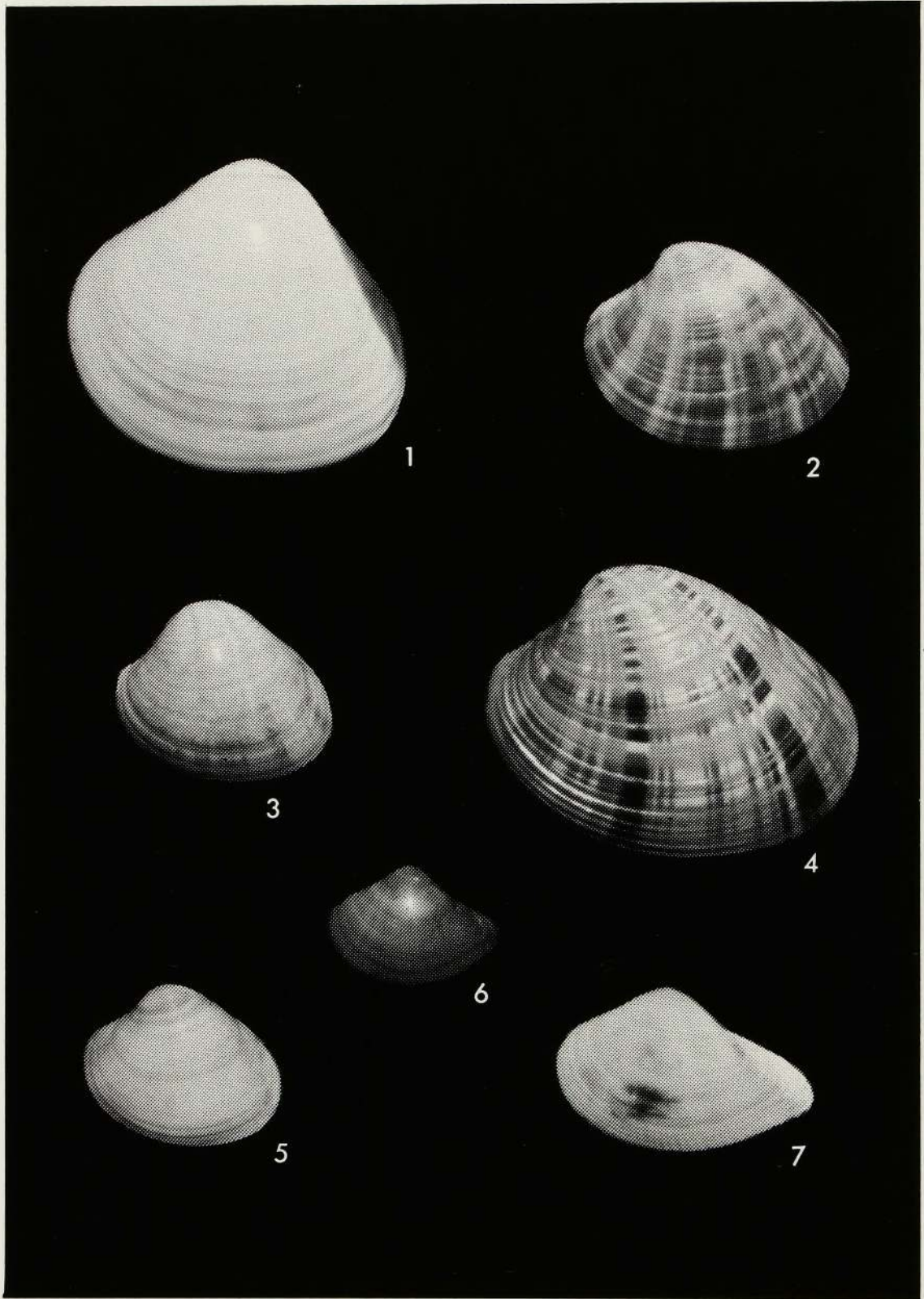


PLATE 14

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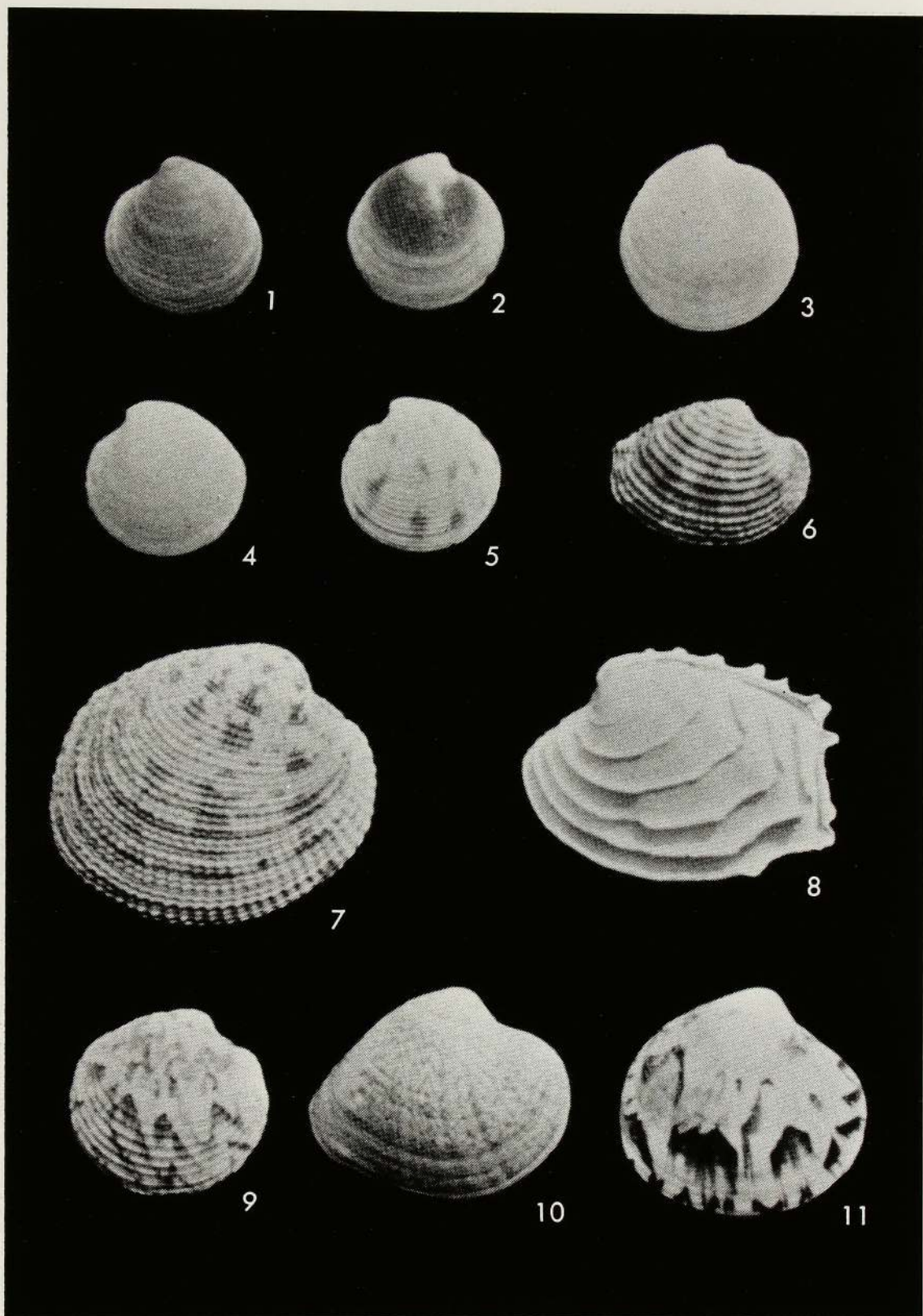


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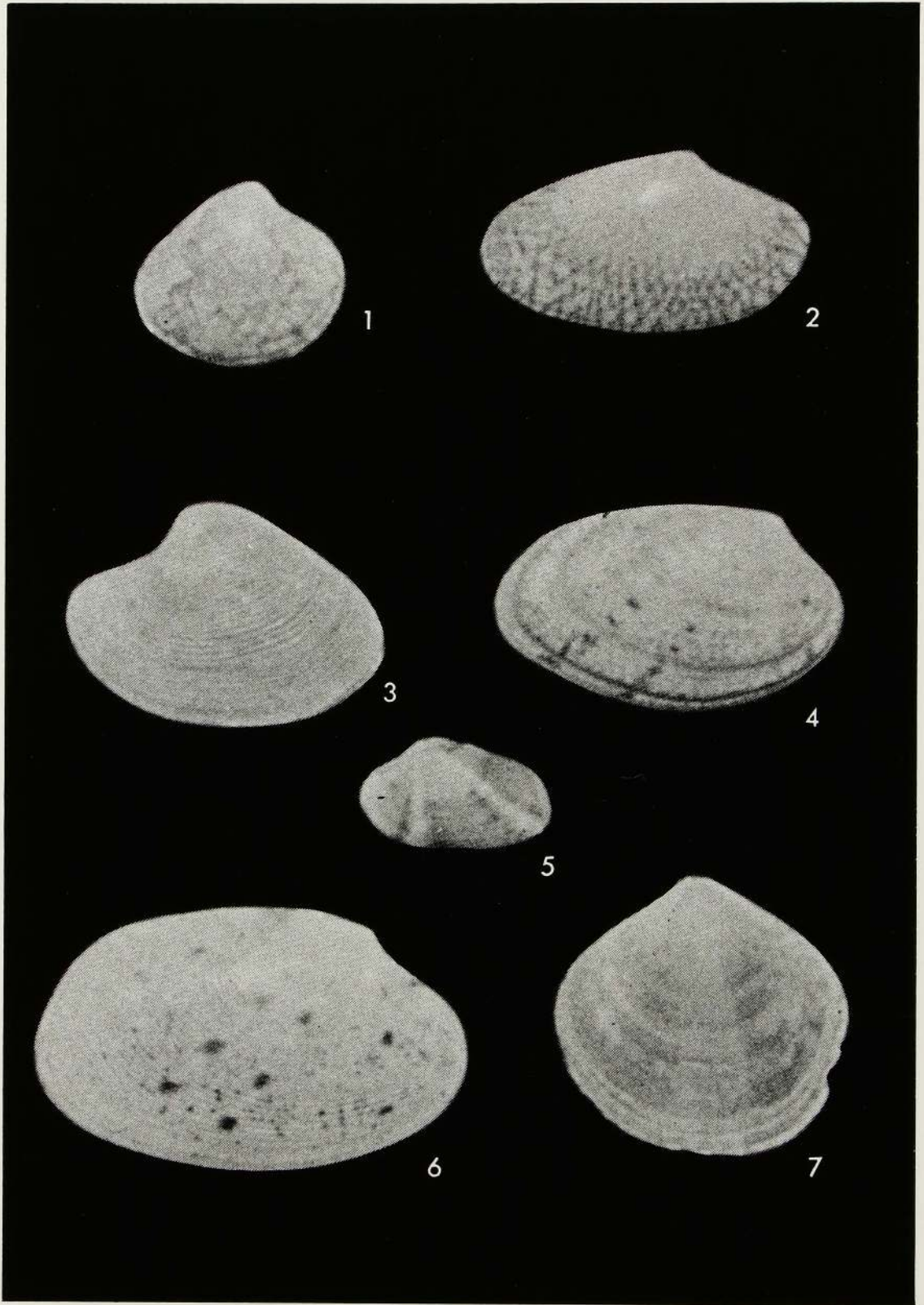


PLATE 16

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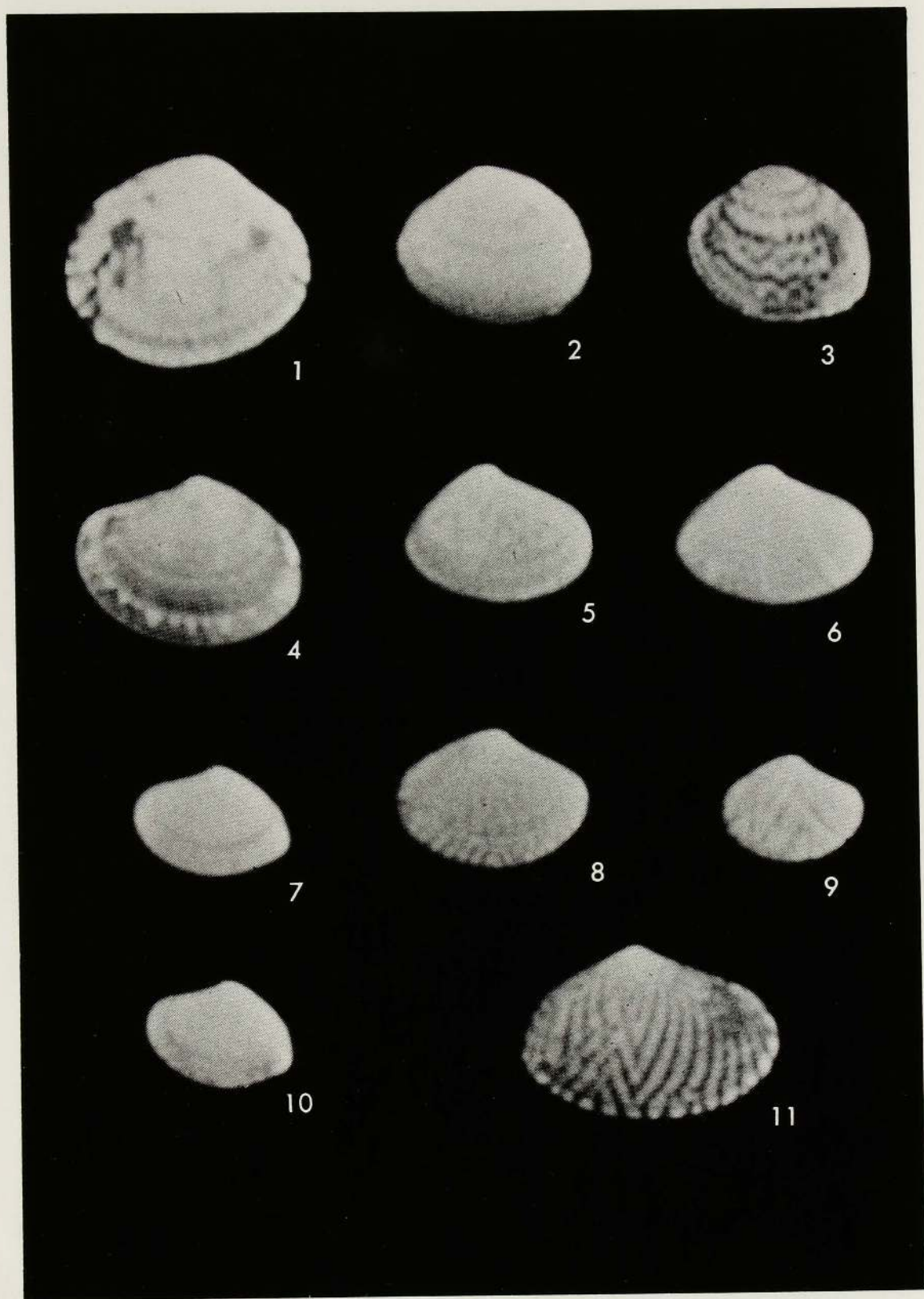


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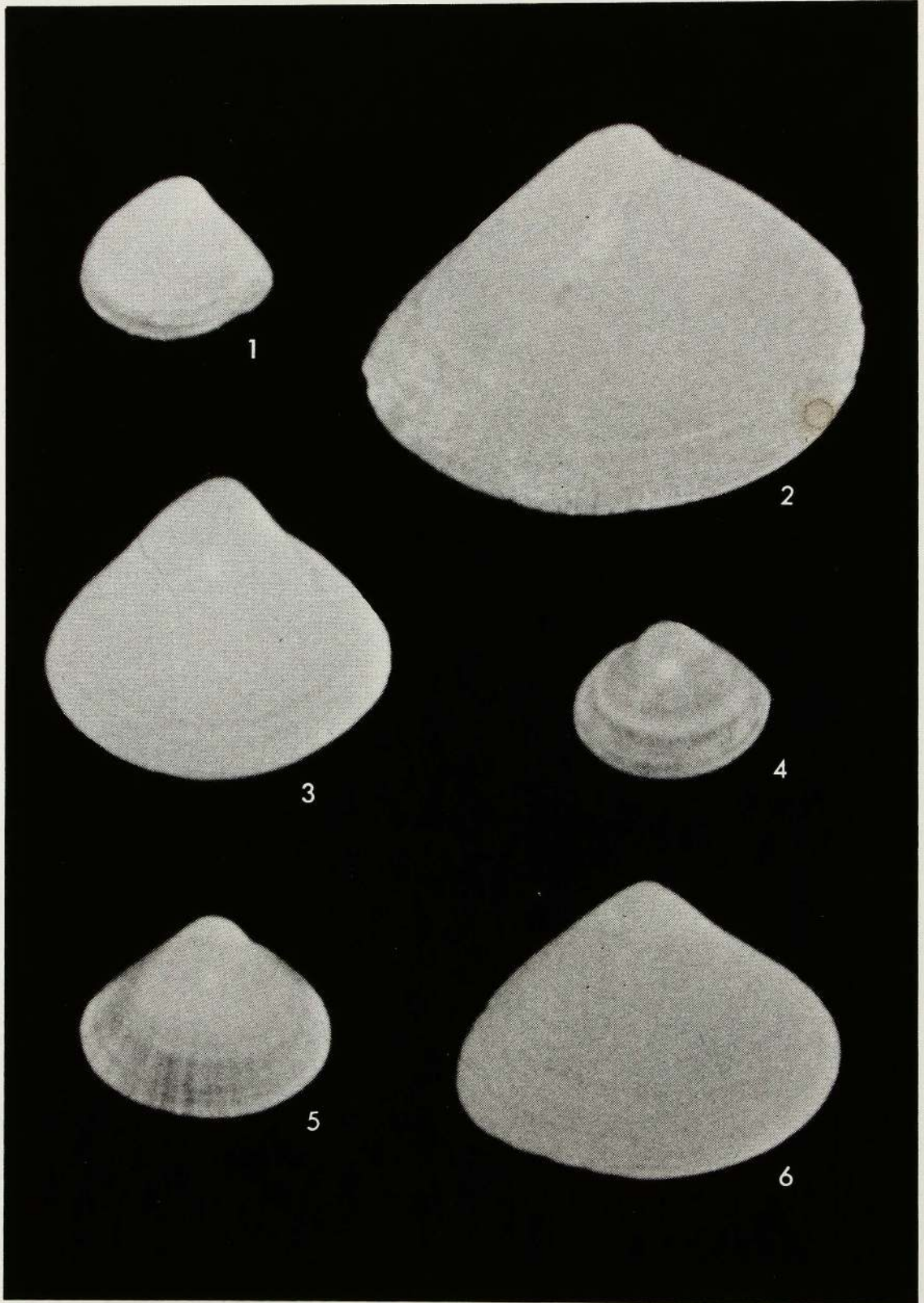


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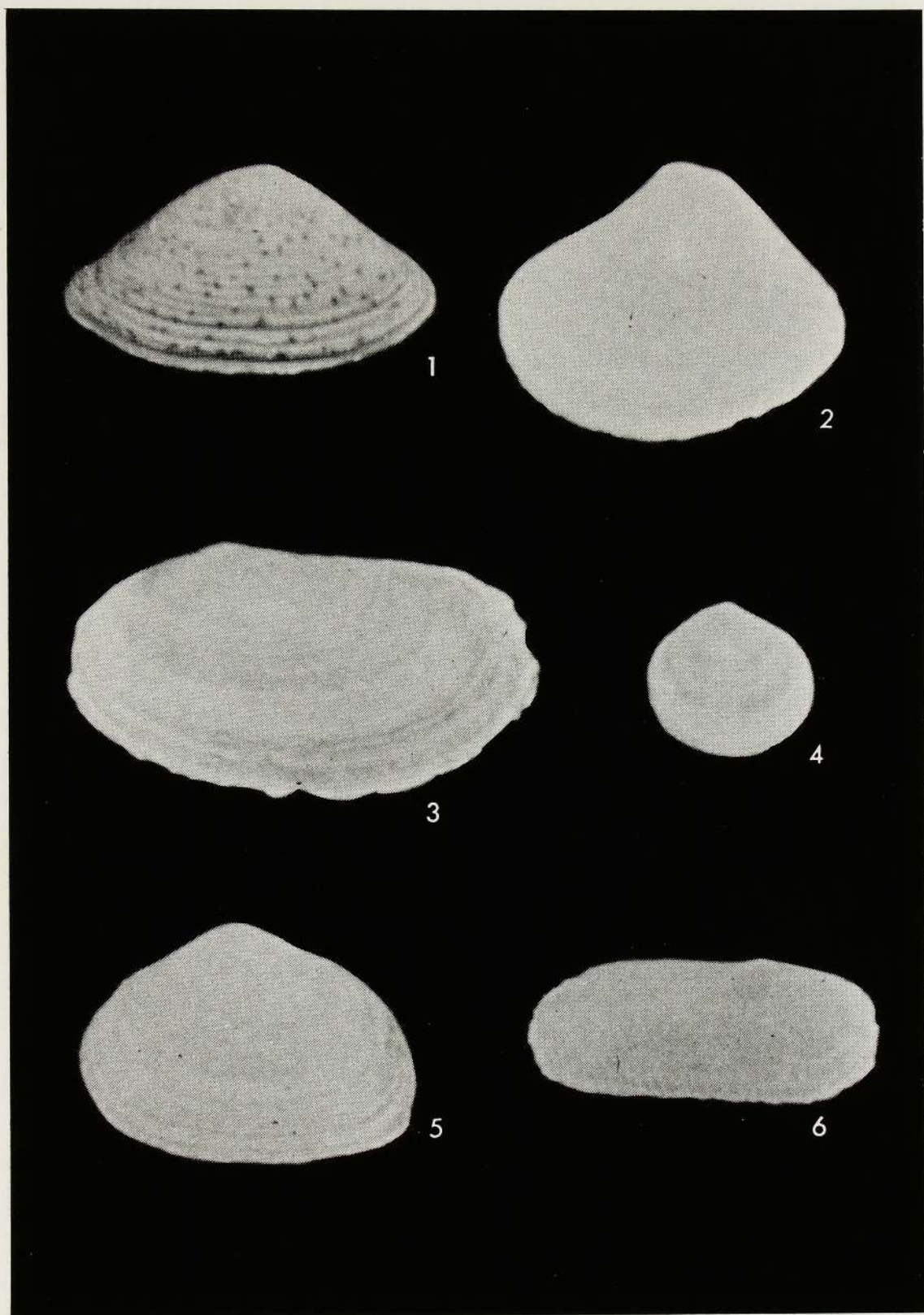


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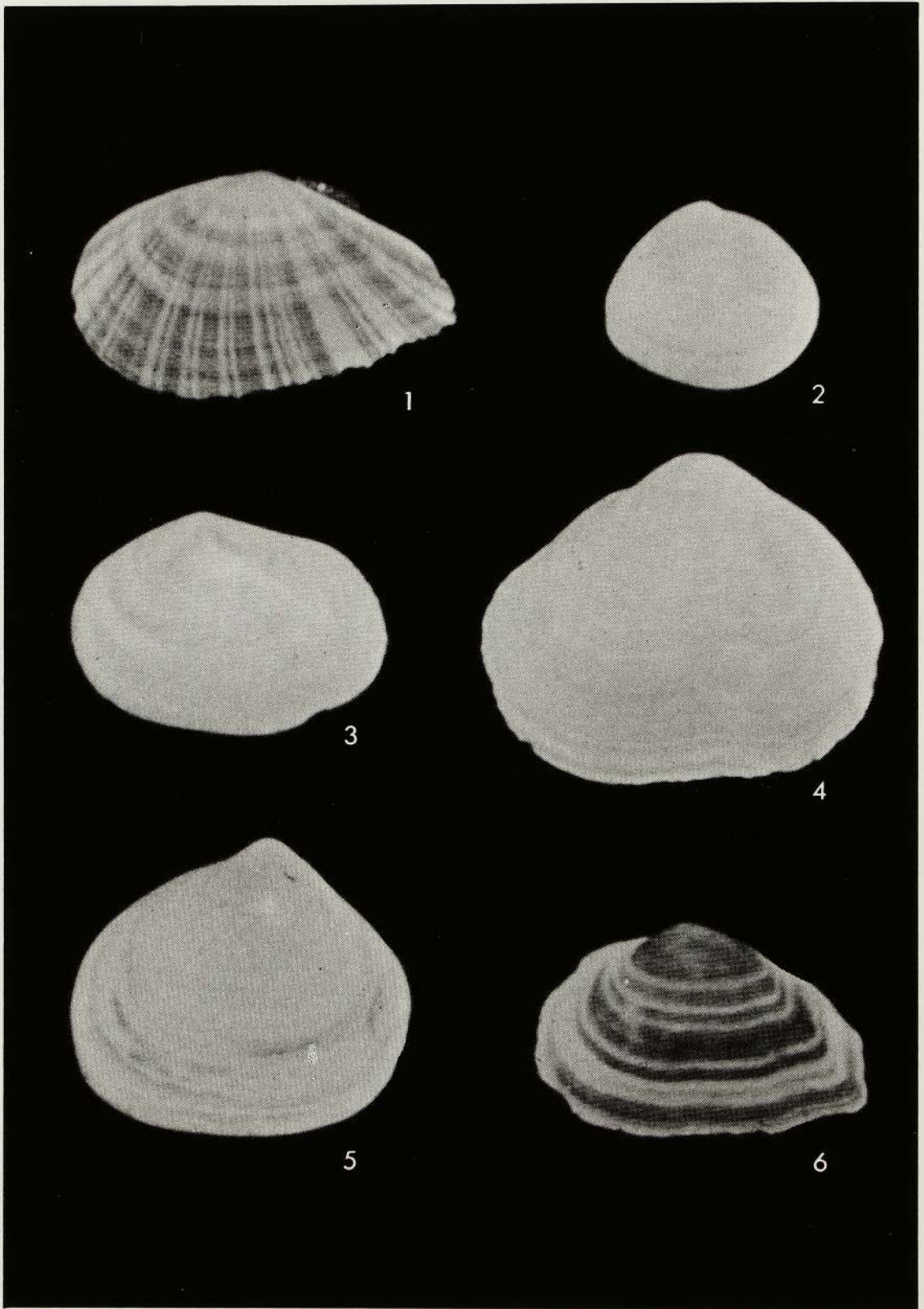


PLATE 20

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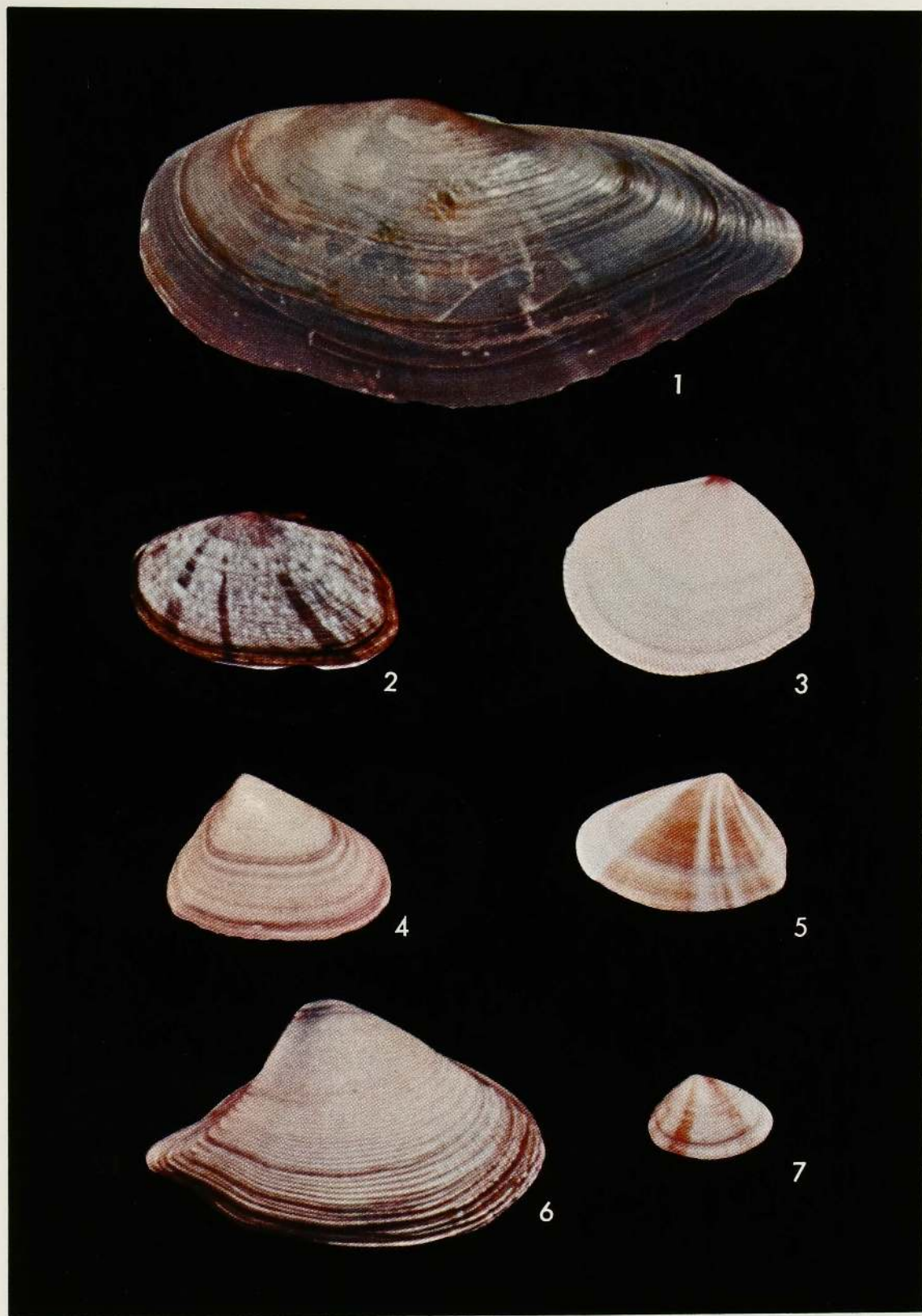


PLATE 21

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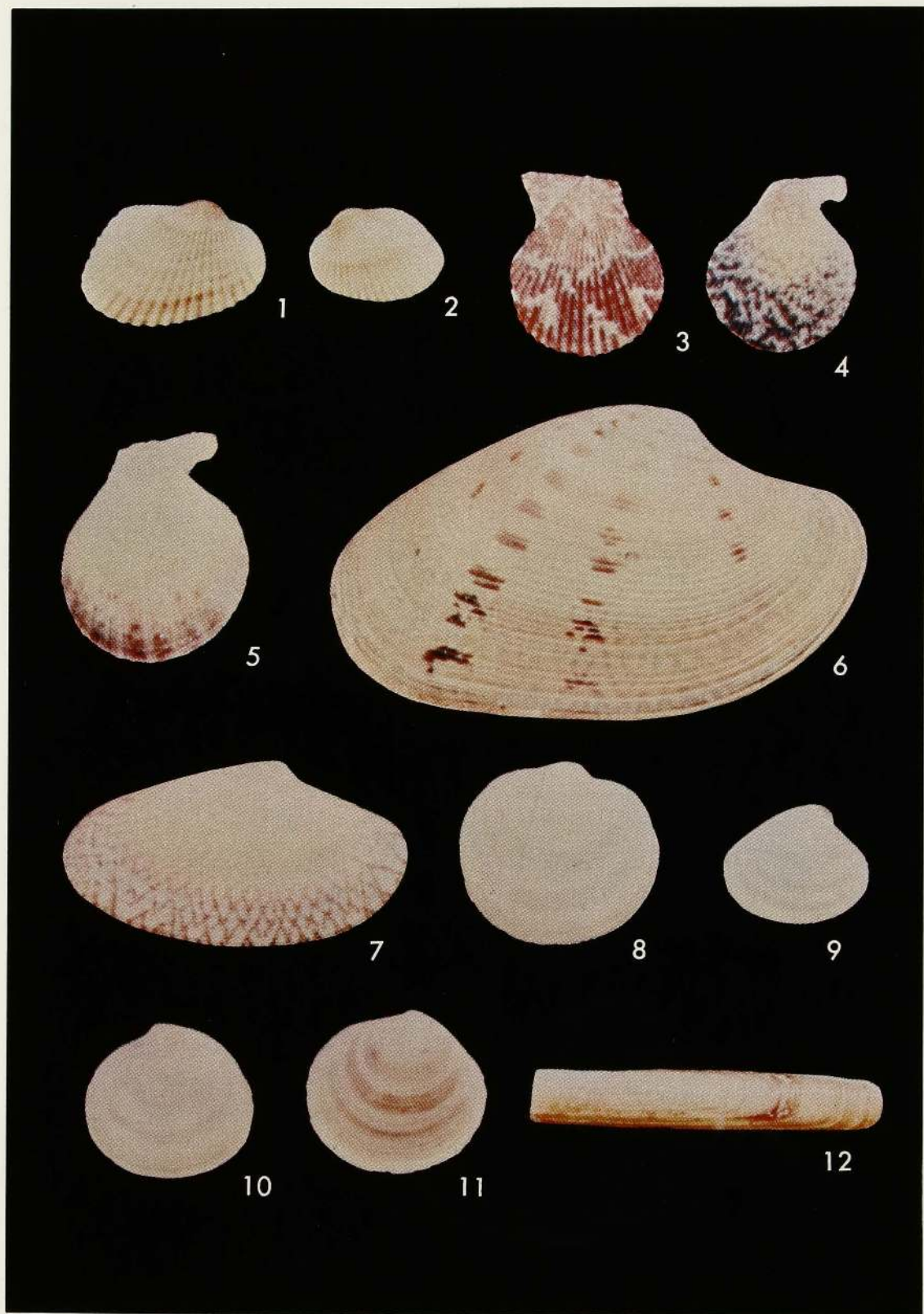


PLATE 22

(Text on pp. 42-43)

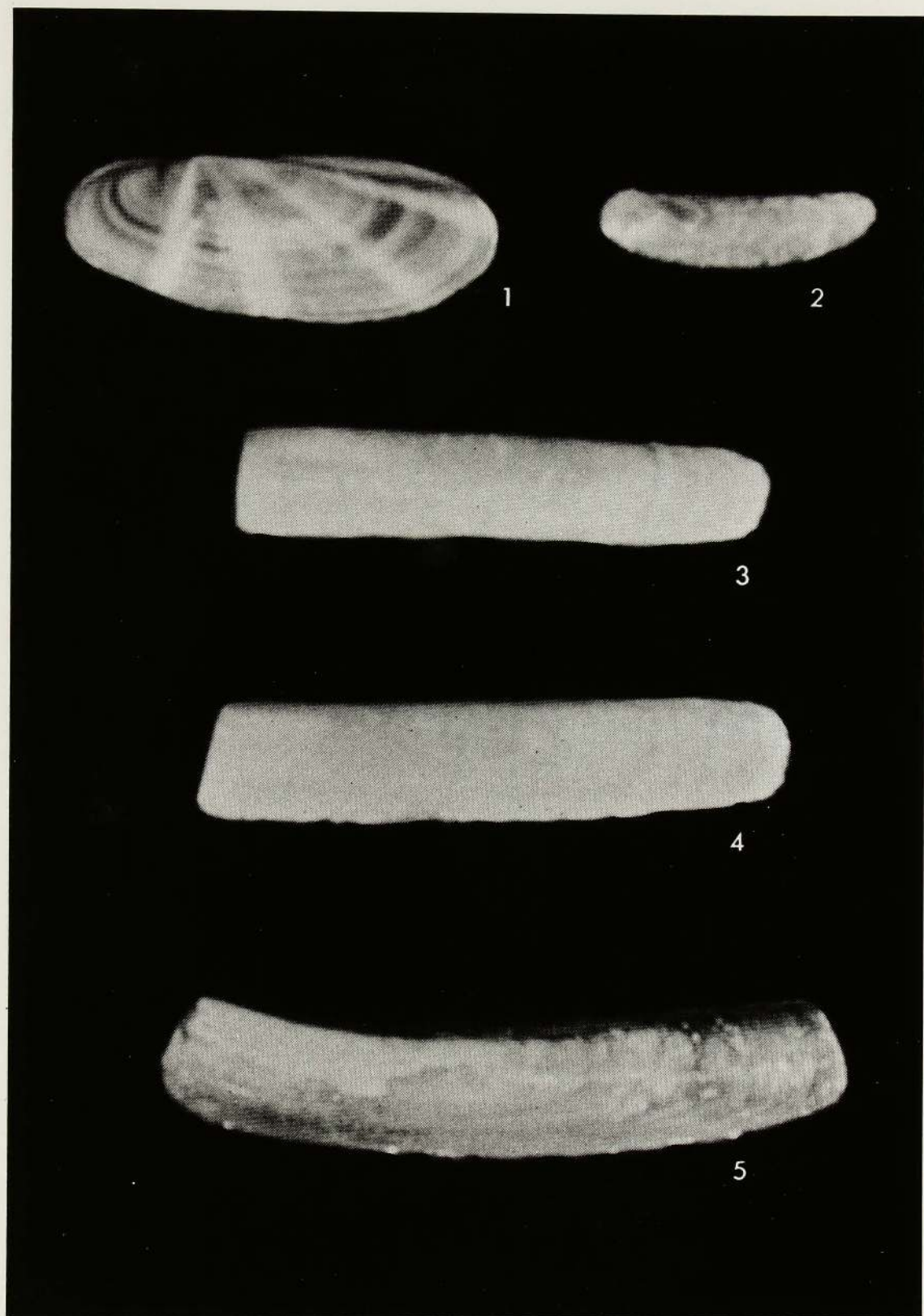


PLATE 23

(Text on p. 44)

PART

II

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SHELLS OF  
GASTROPODA  
or Snail-like Molluscs

(Plates 24-60)



PLATE 24

(Text on pp. 46-47)

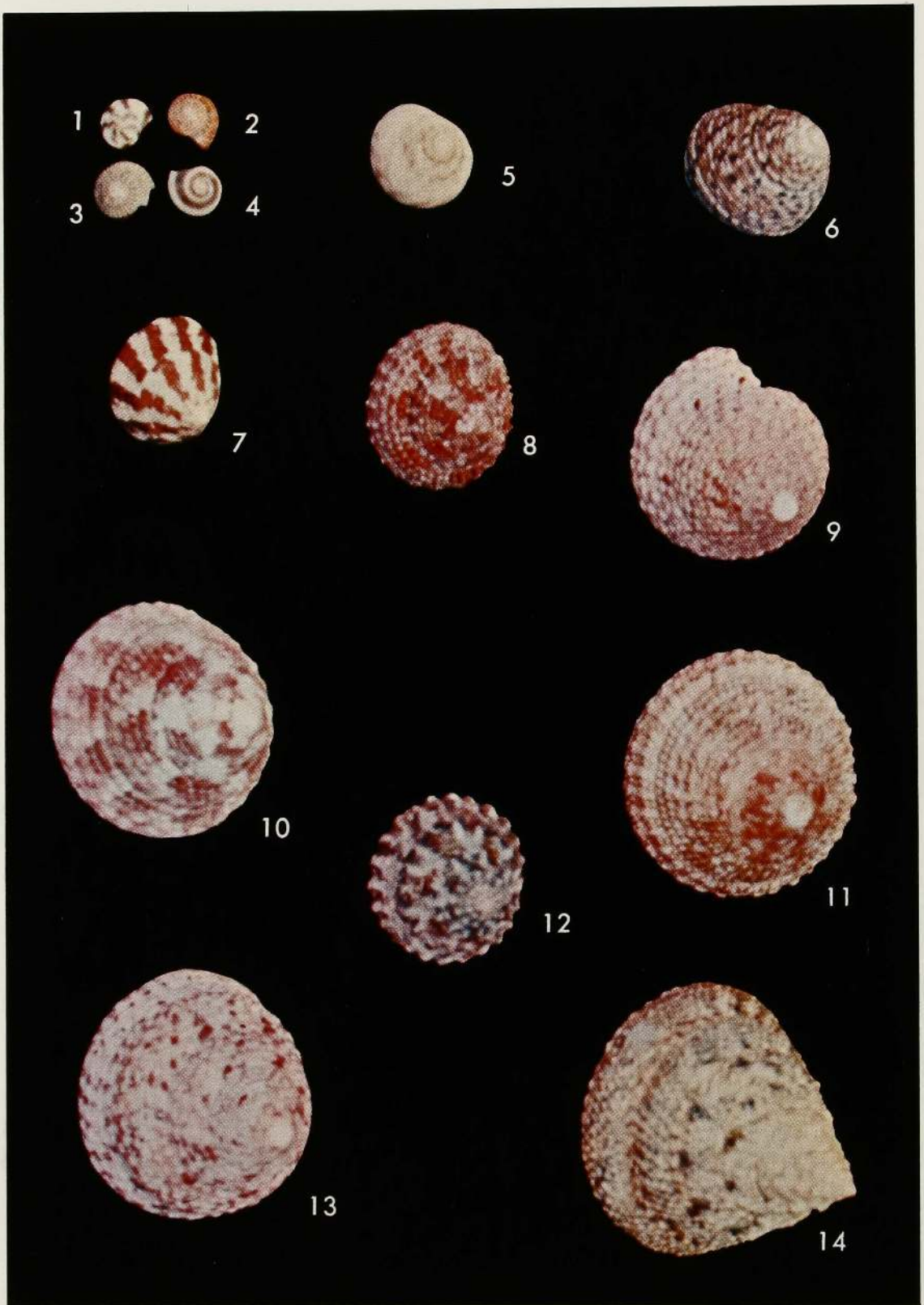


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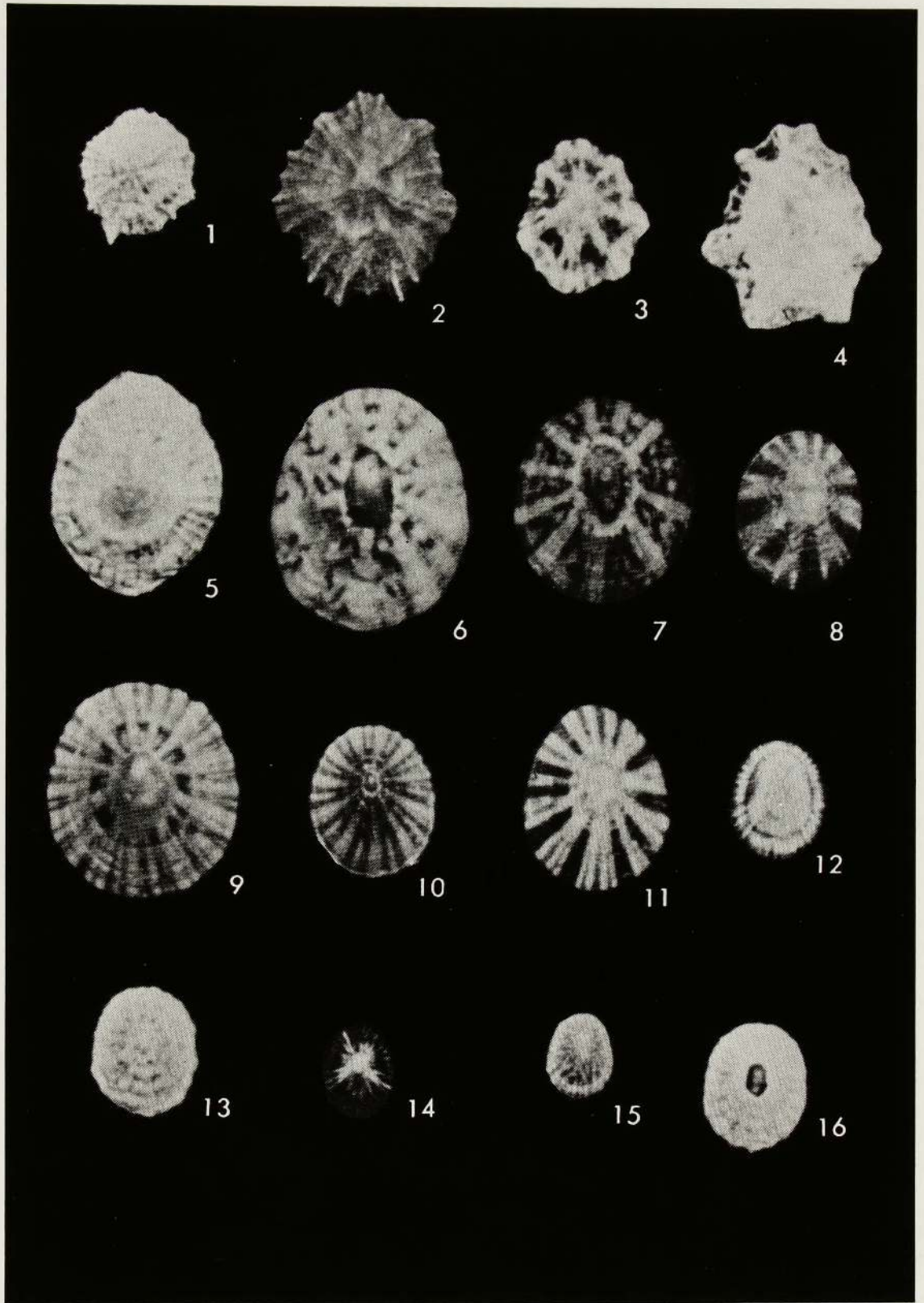


PLATE 26

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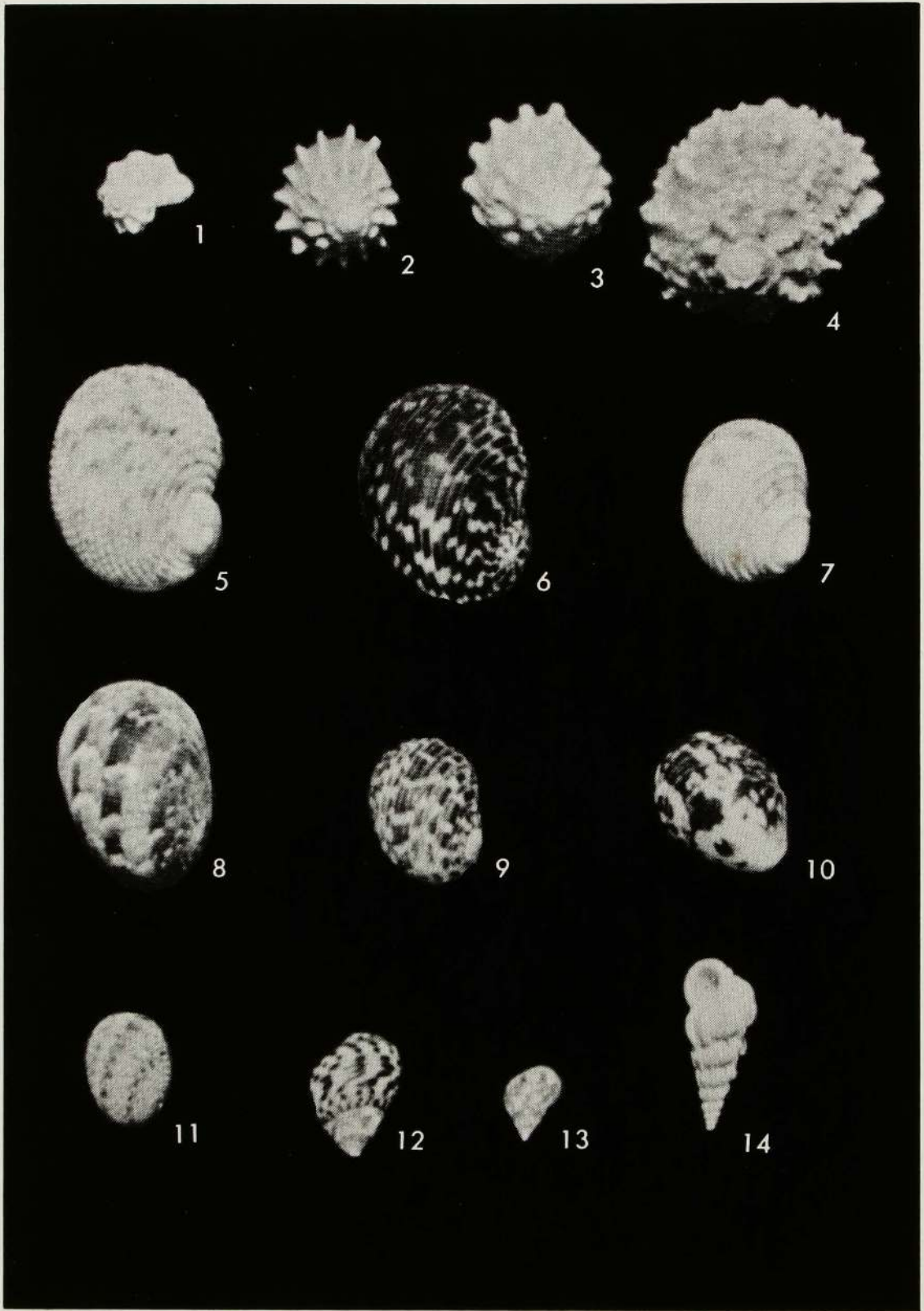


PLATE 27

(Text on pp. 51-53)



PLATE 28

(Text on pp. 53-54)

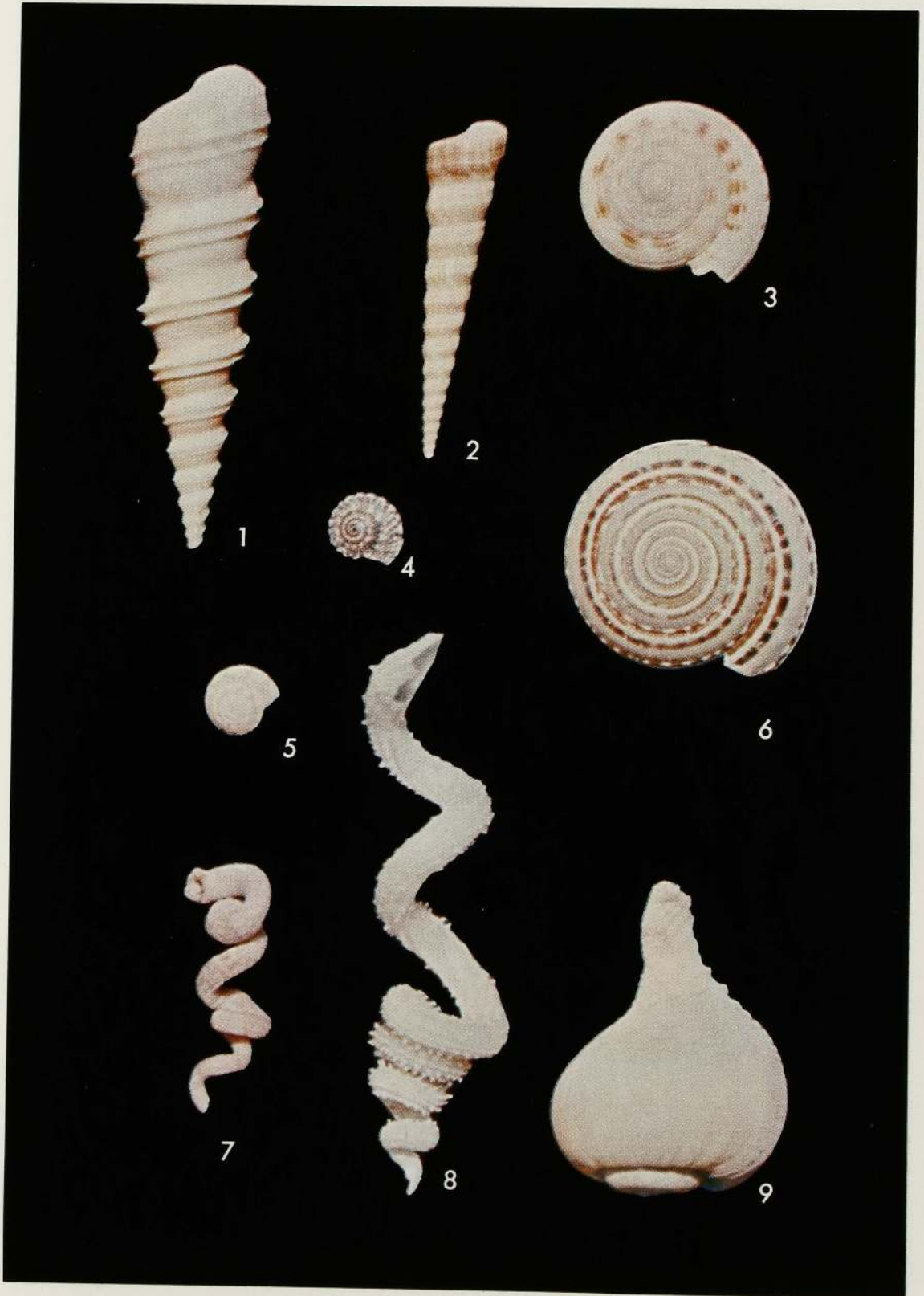


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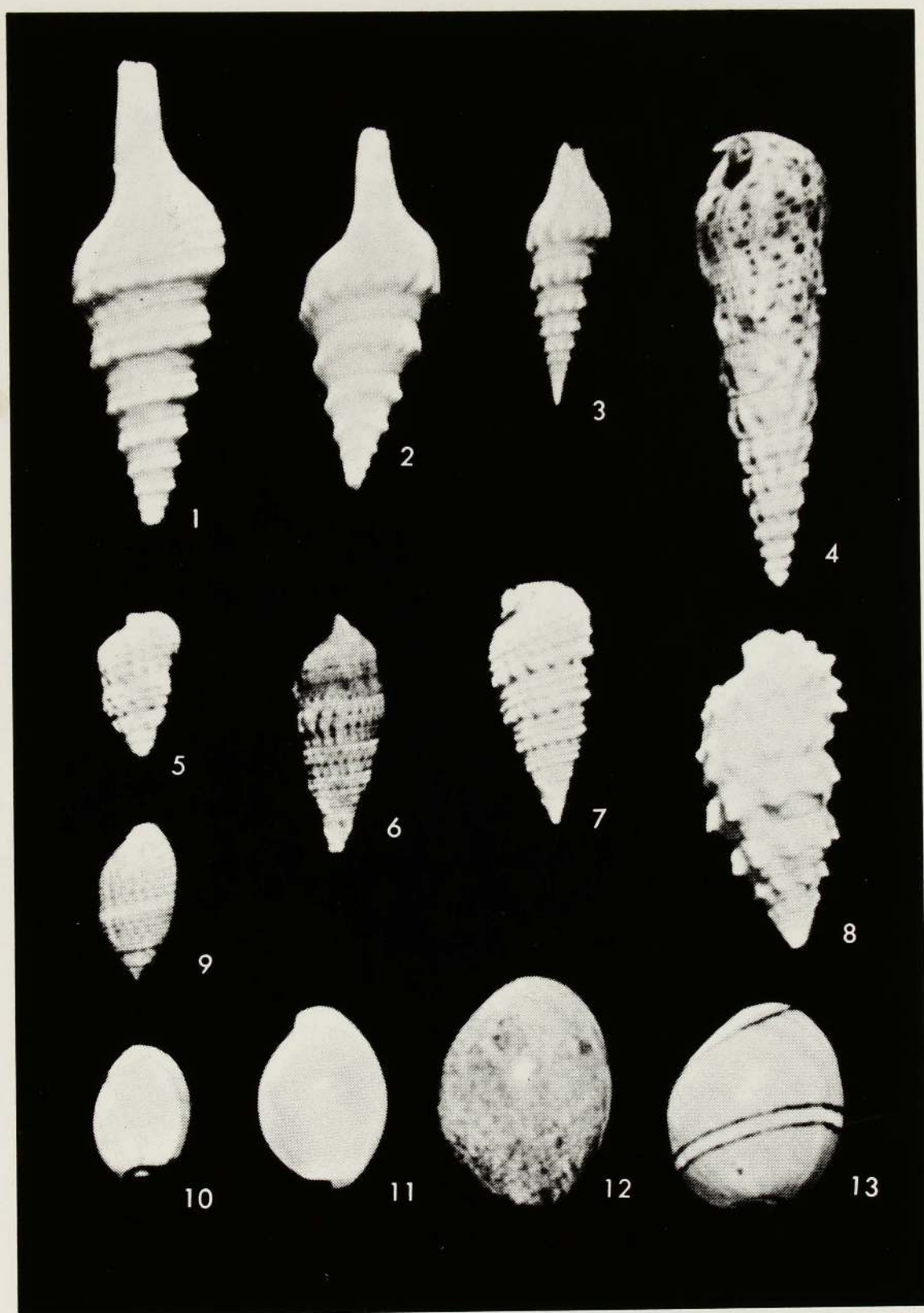


PLATE 30

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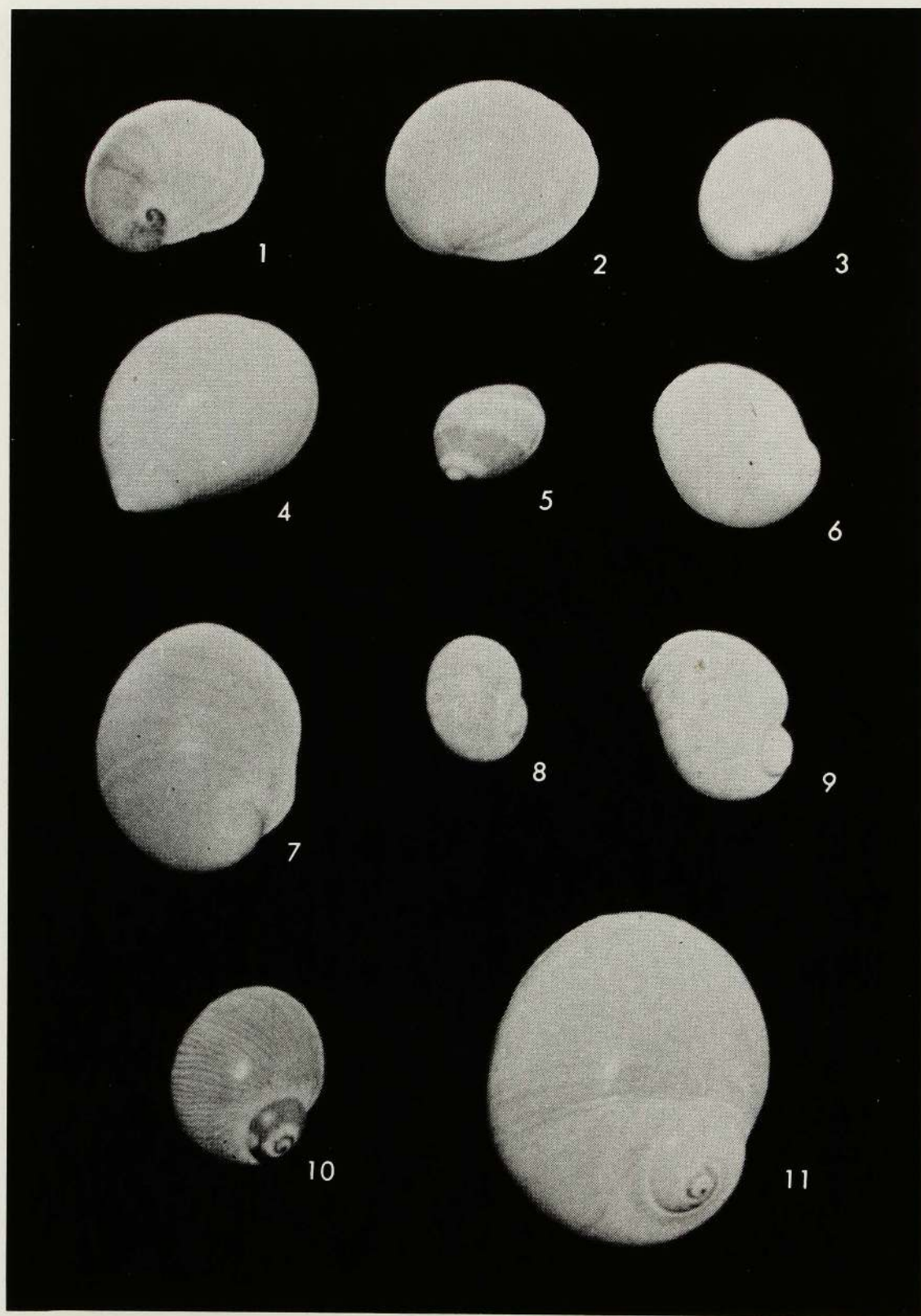


PLATE 31

(Text on pp. 58-59)



PLATE 32

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PLATE 33

(Text on pp. 61-62)

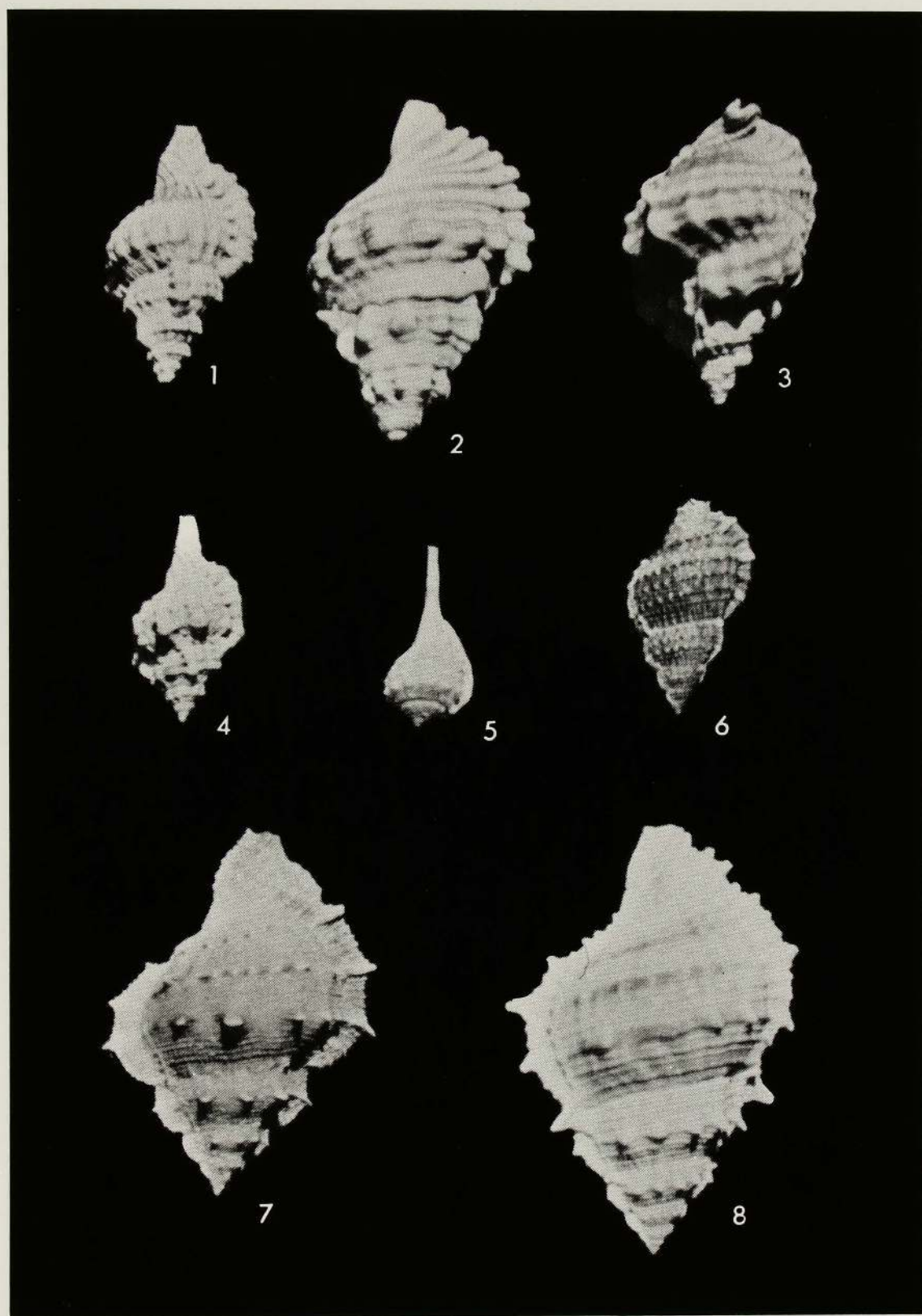


PLATE 34

*(Text on pp. 63-64)*



PLATE 35

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PLATE 36

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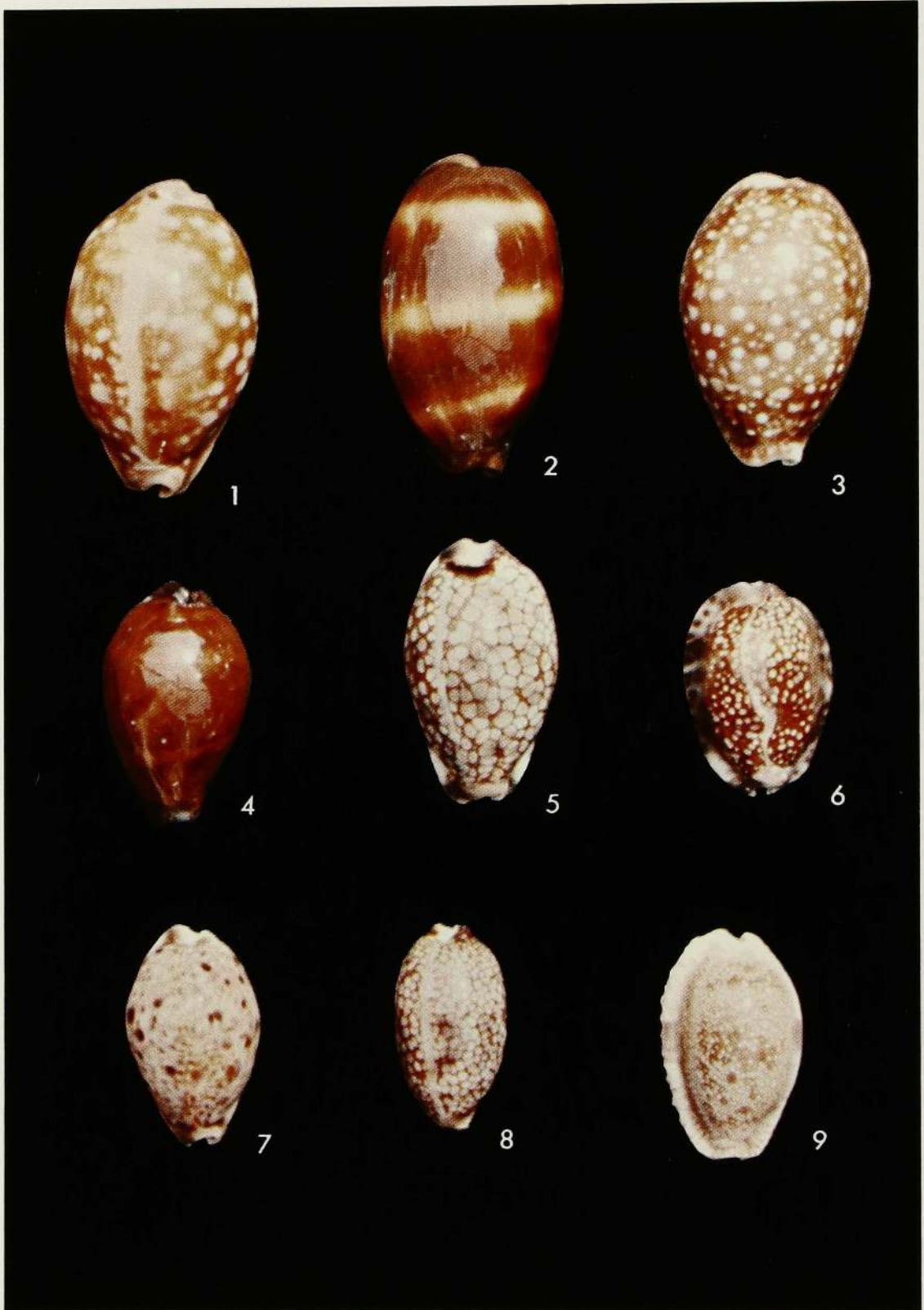


PLATE 37

(Text on pp. 66-67)



PLATE 38

*(Text on p. 67)*

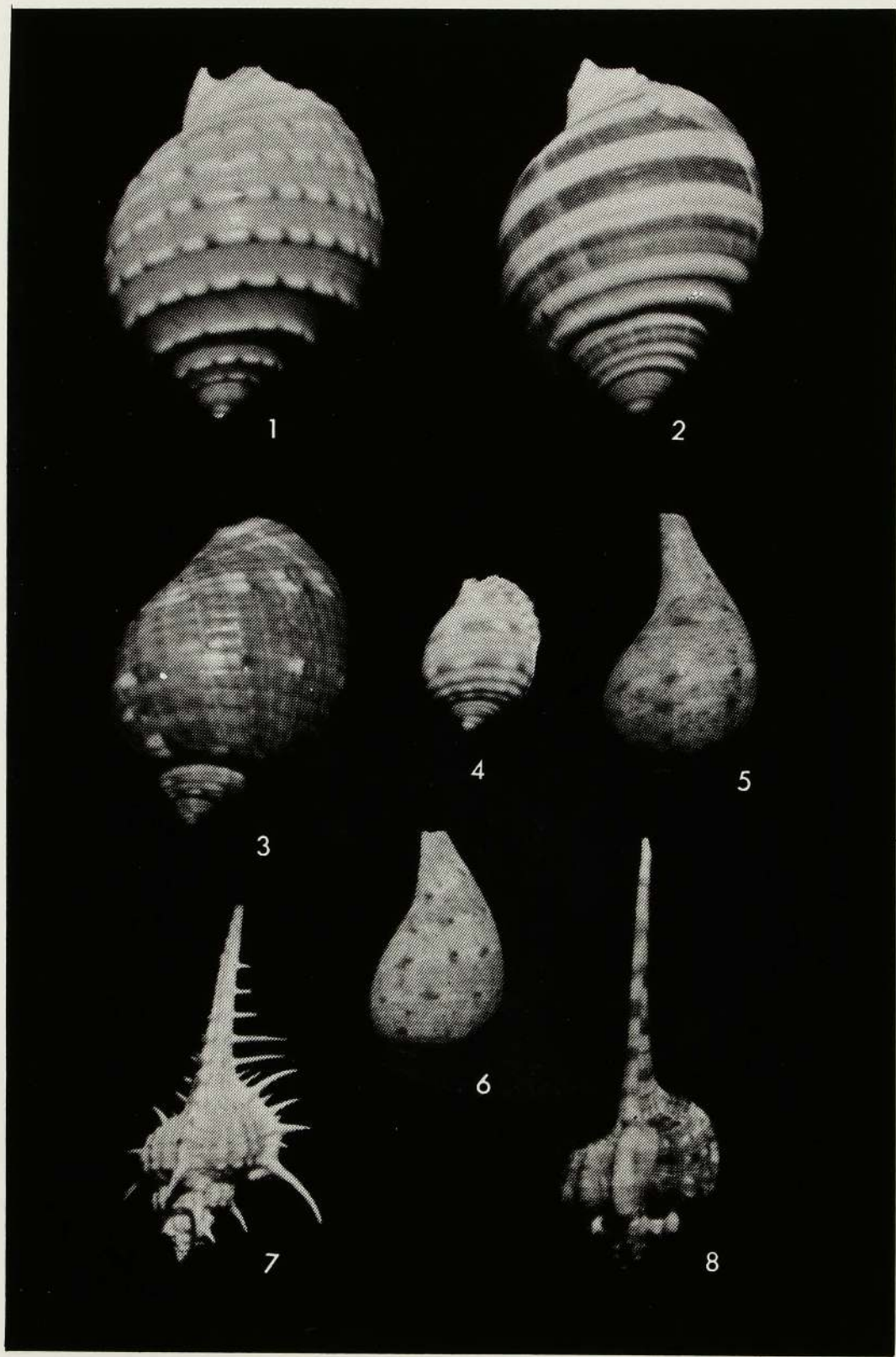


PLATE 39

(Text on pp. 68-69)

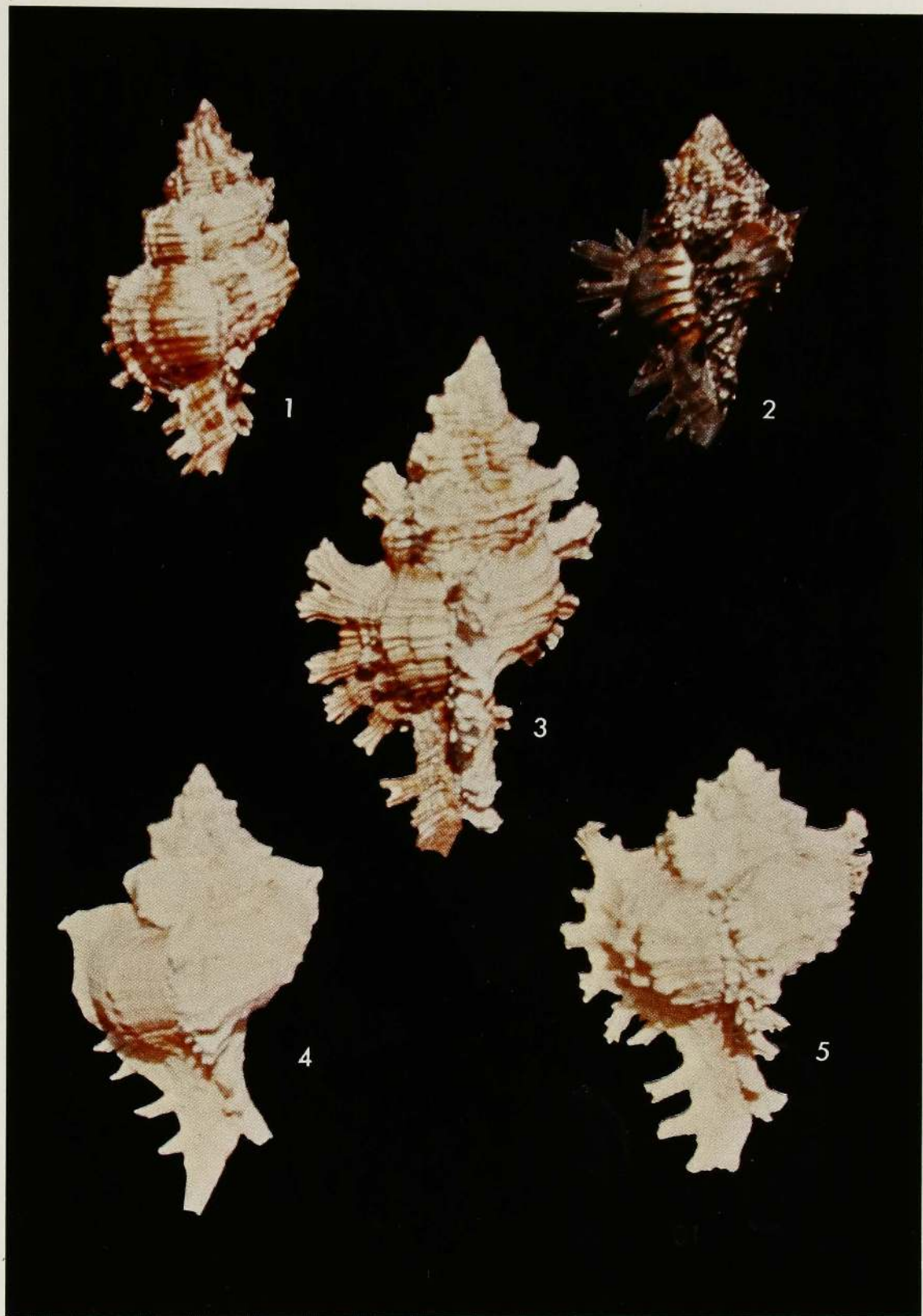


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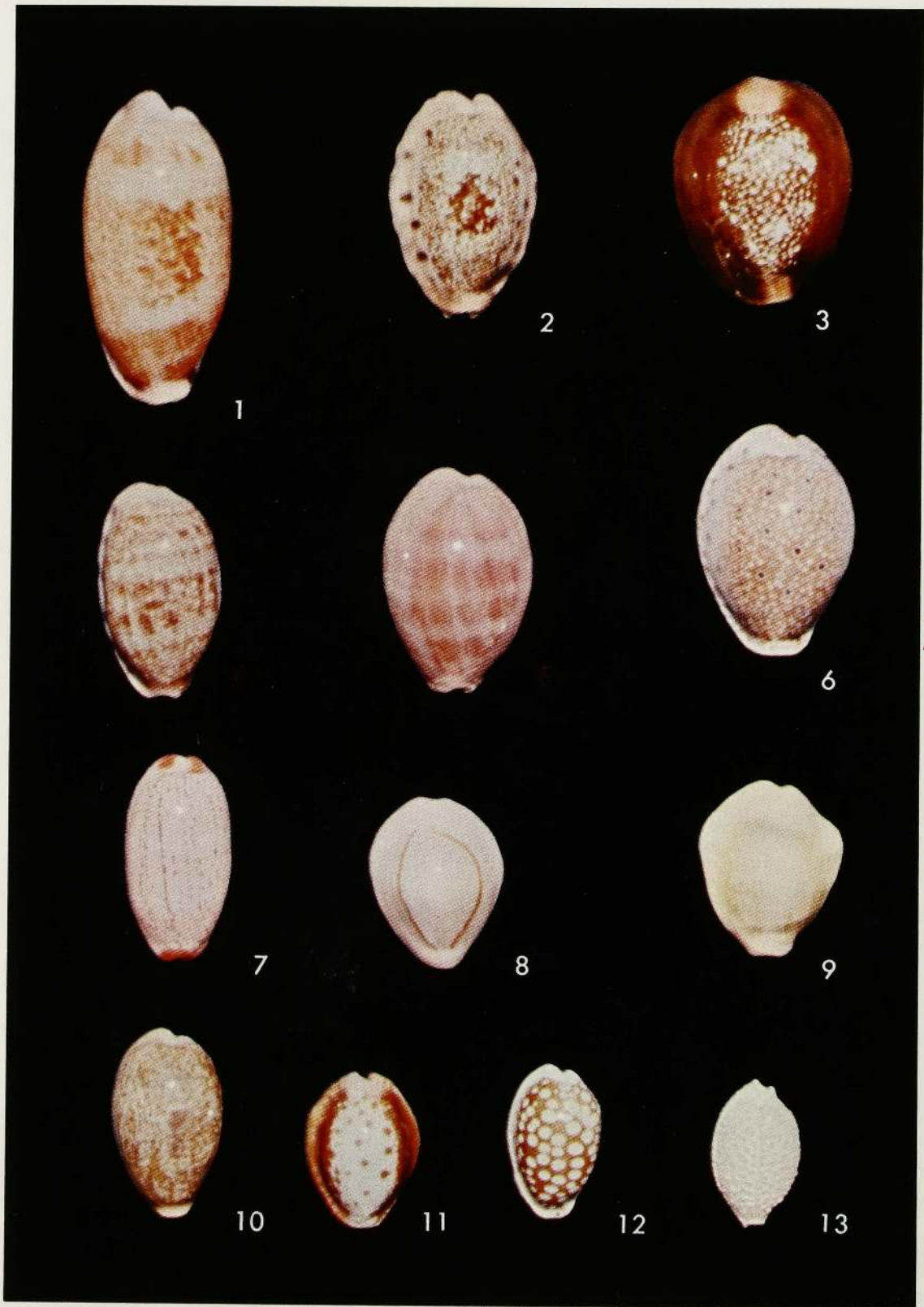


PLATE 41

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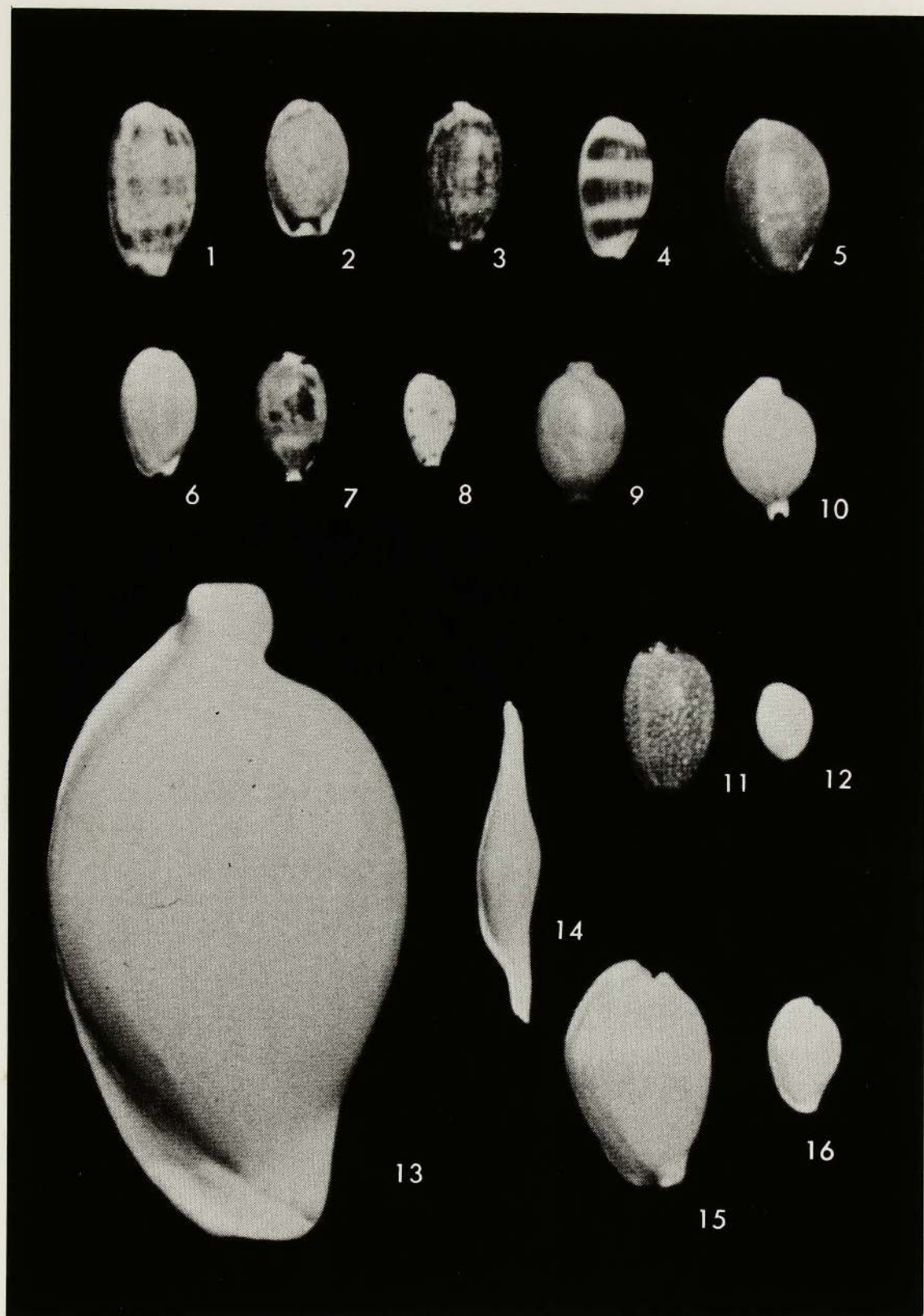


PLATE 42

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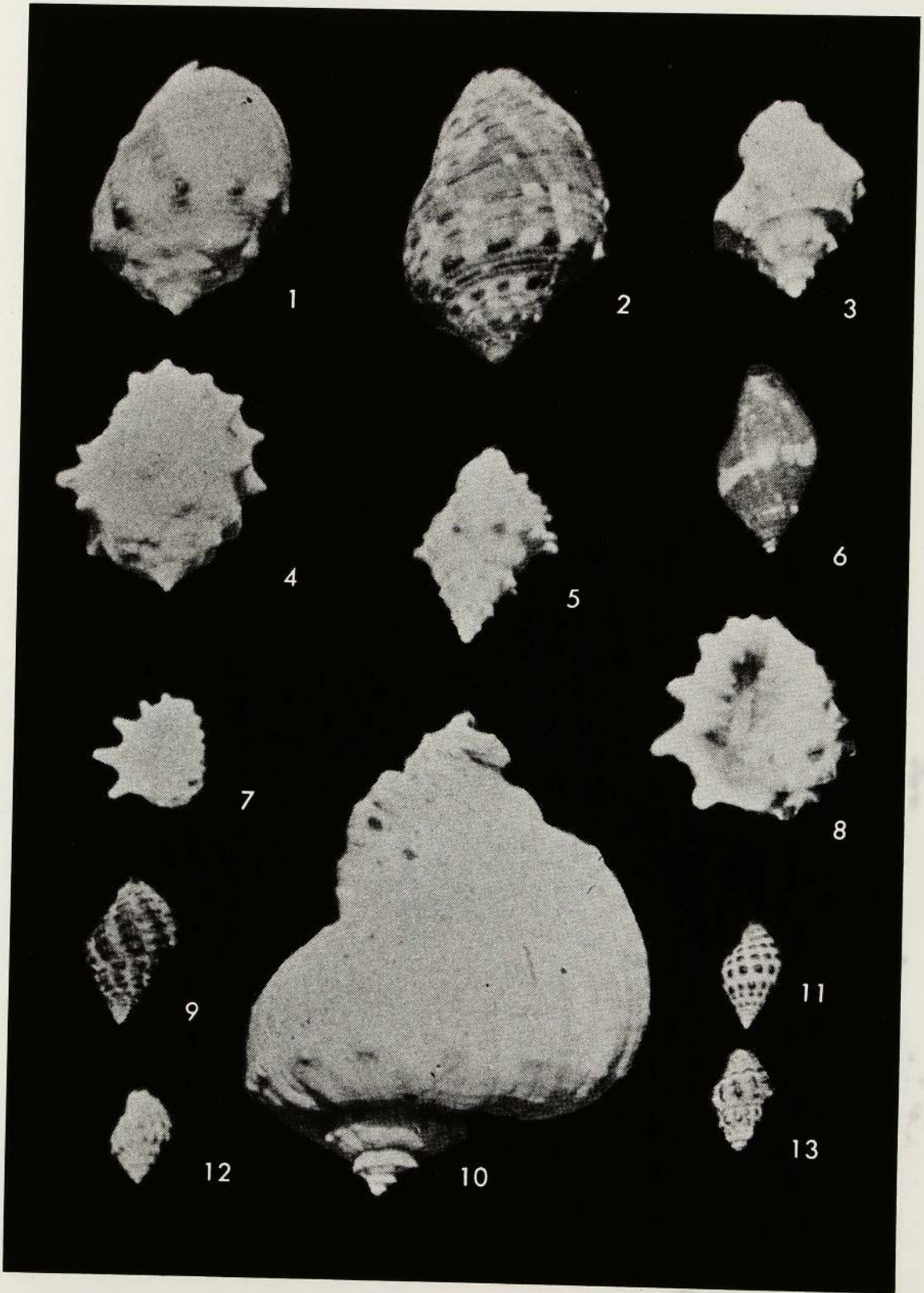
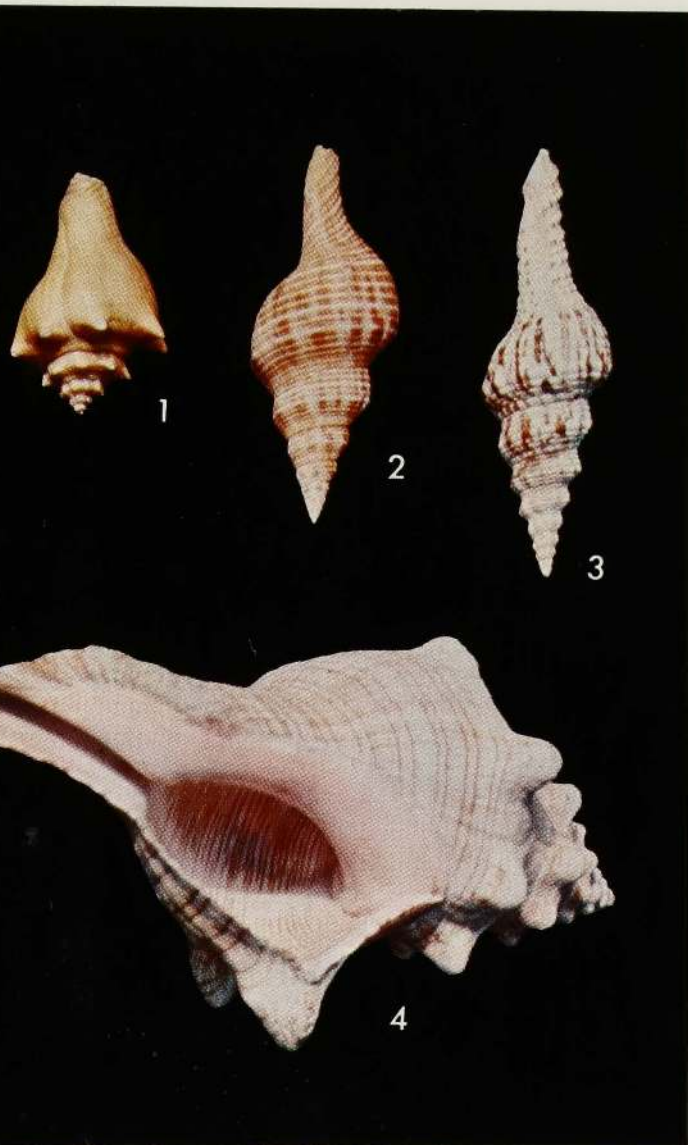


PLATE 43

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PLATES 44, 45  
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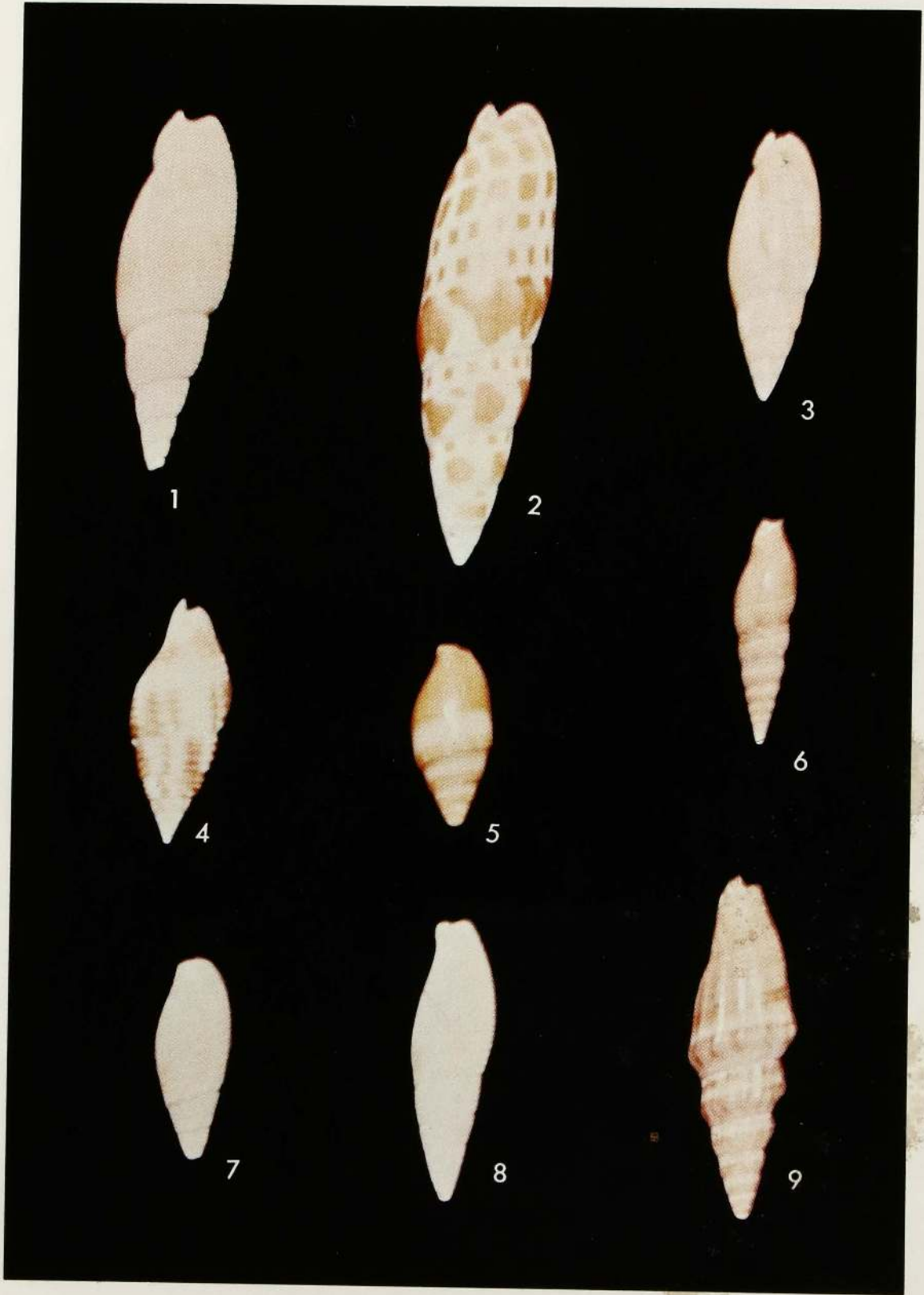


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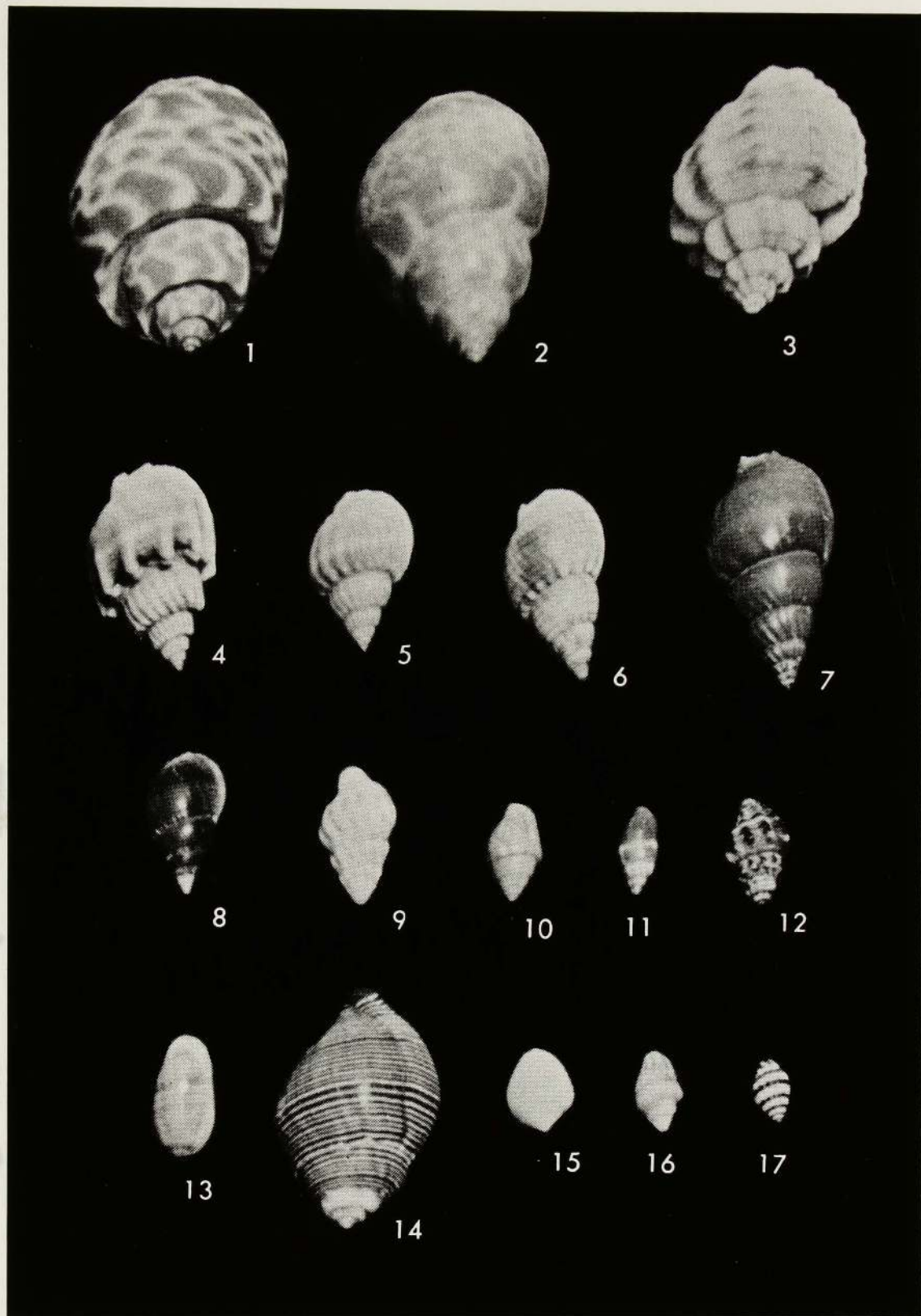


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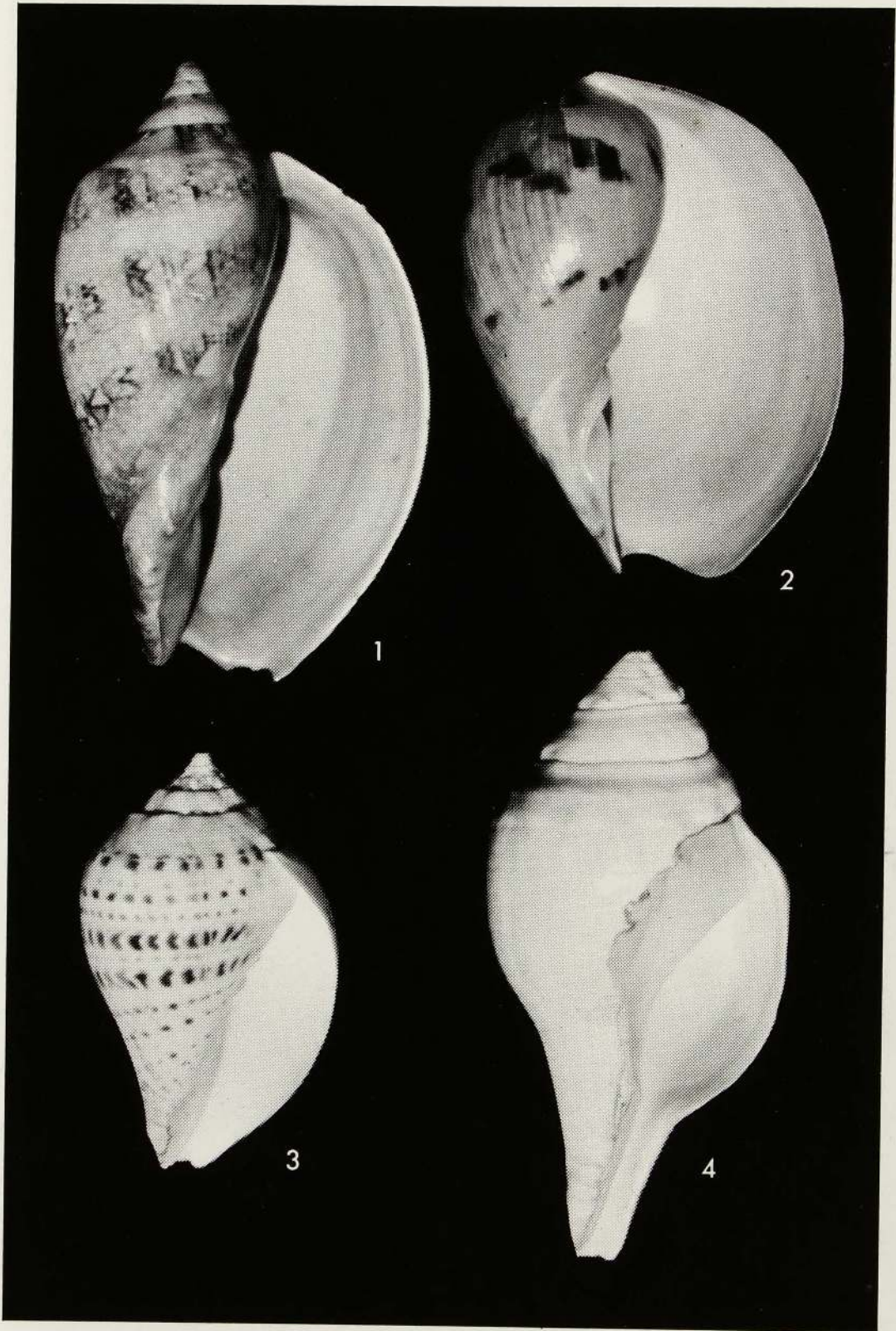


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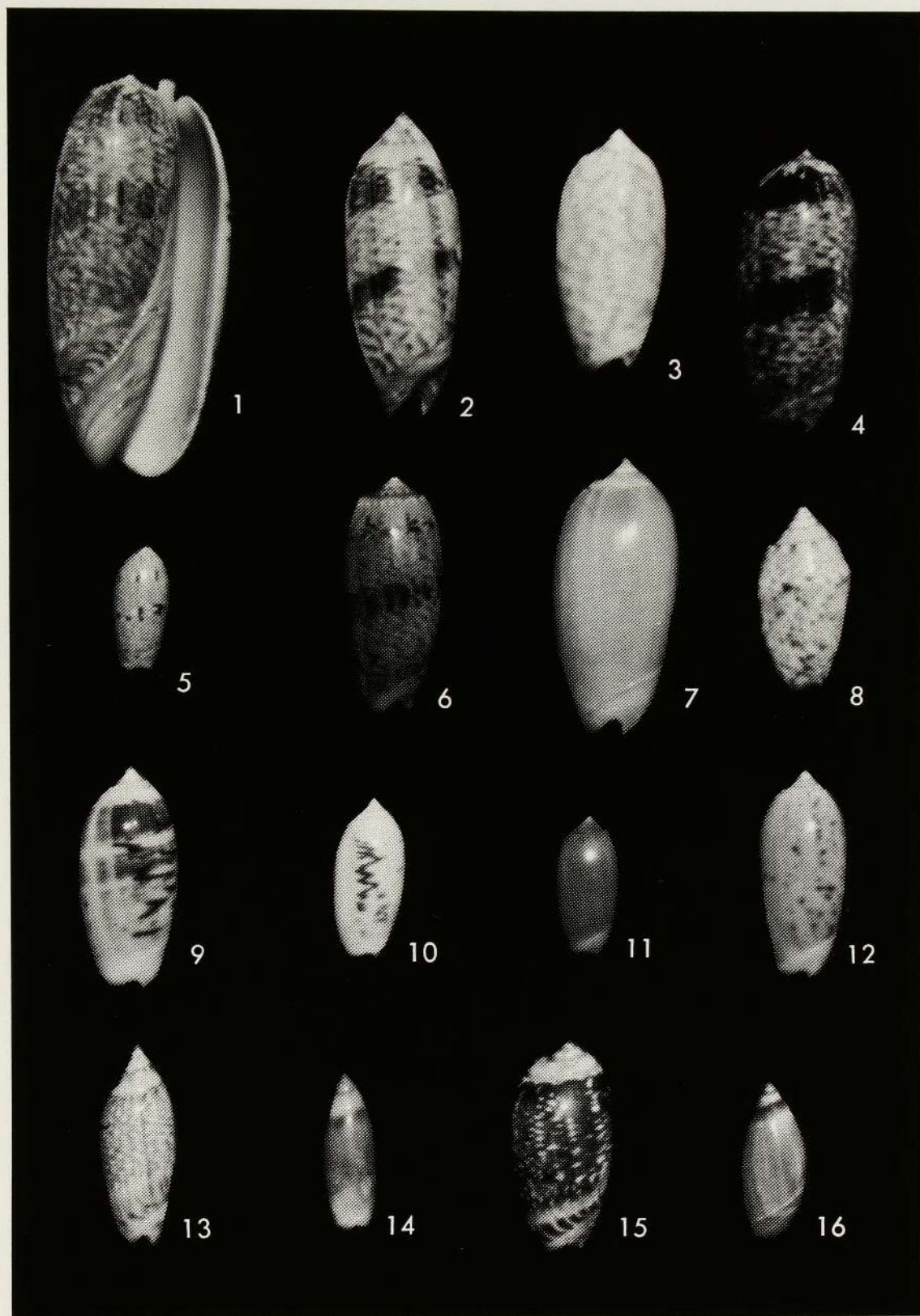


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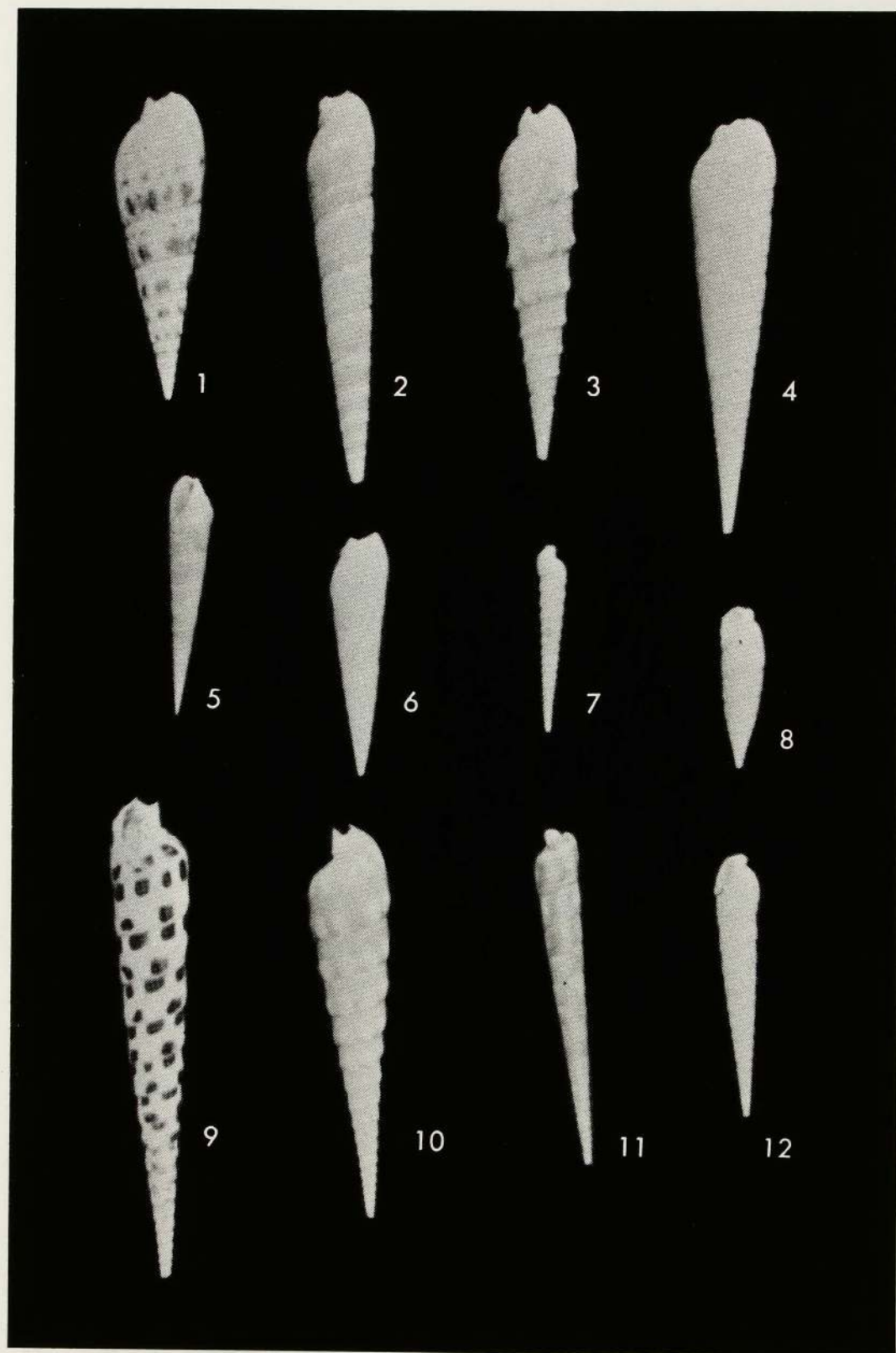


PLATE 50

(Text on pp. 88-90)

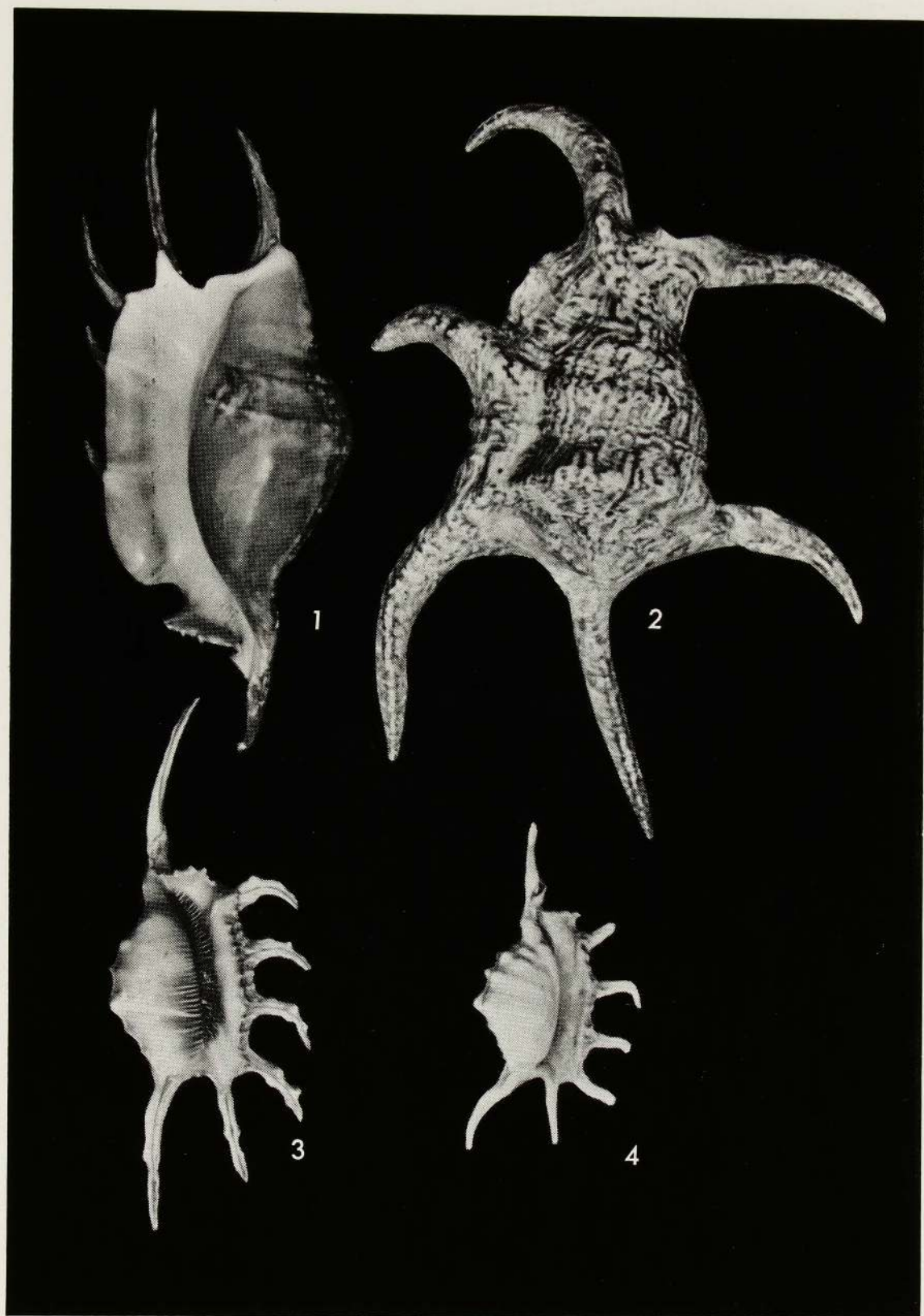


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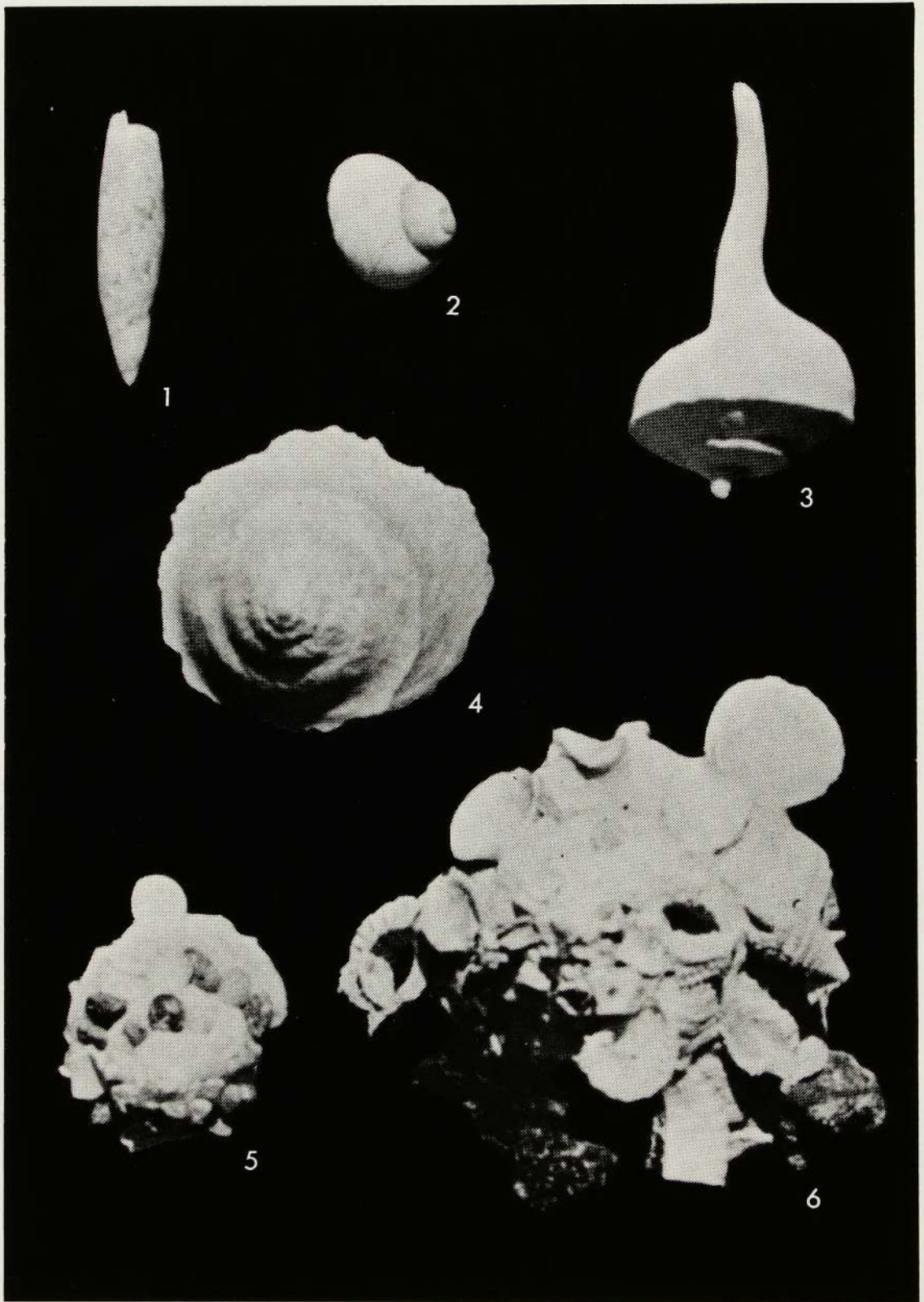


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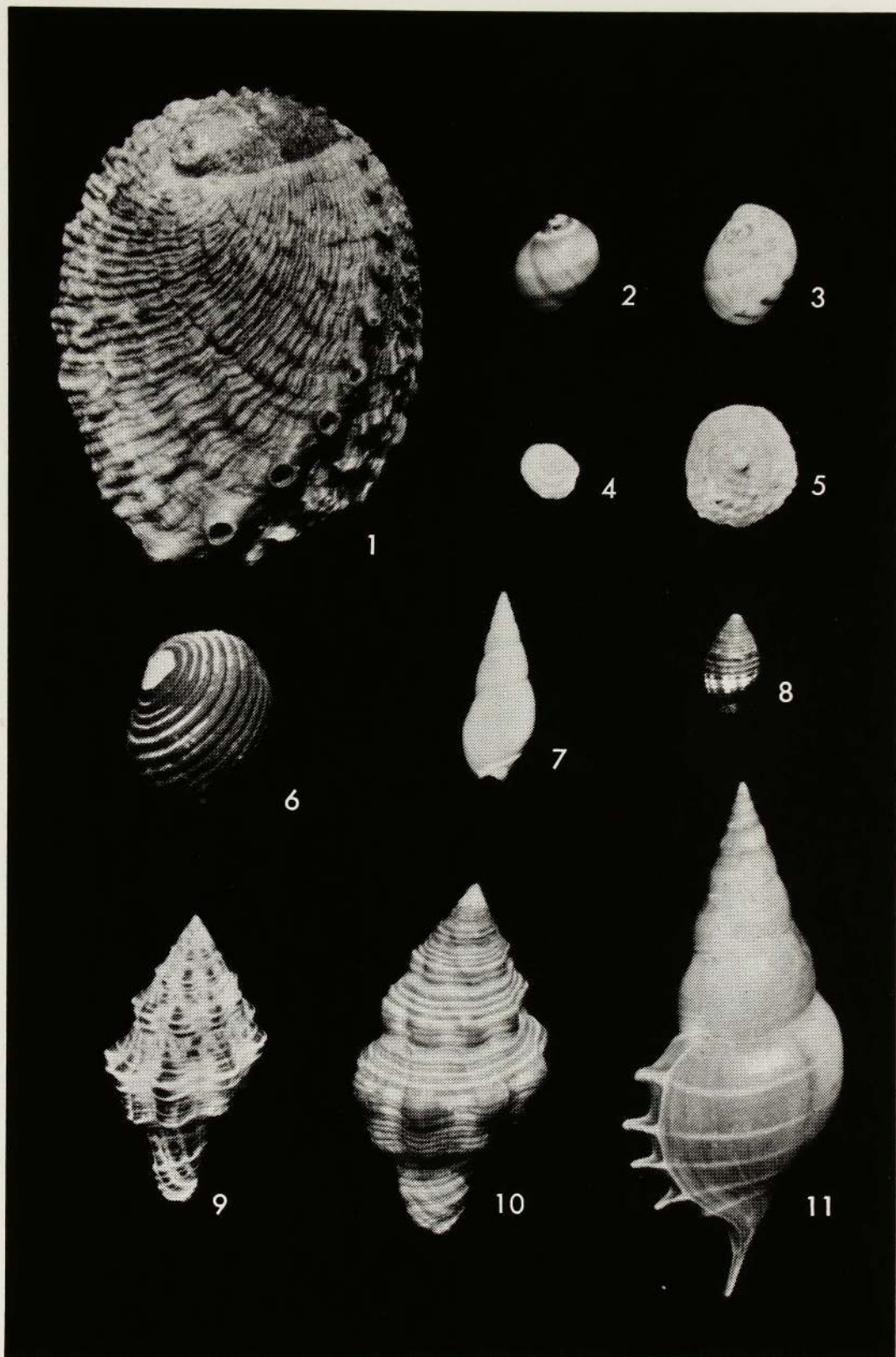


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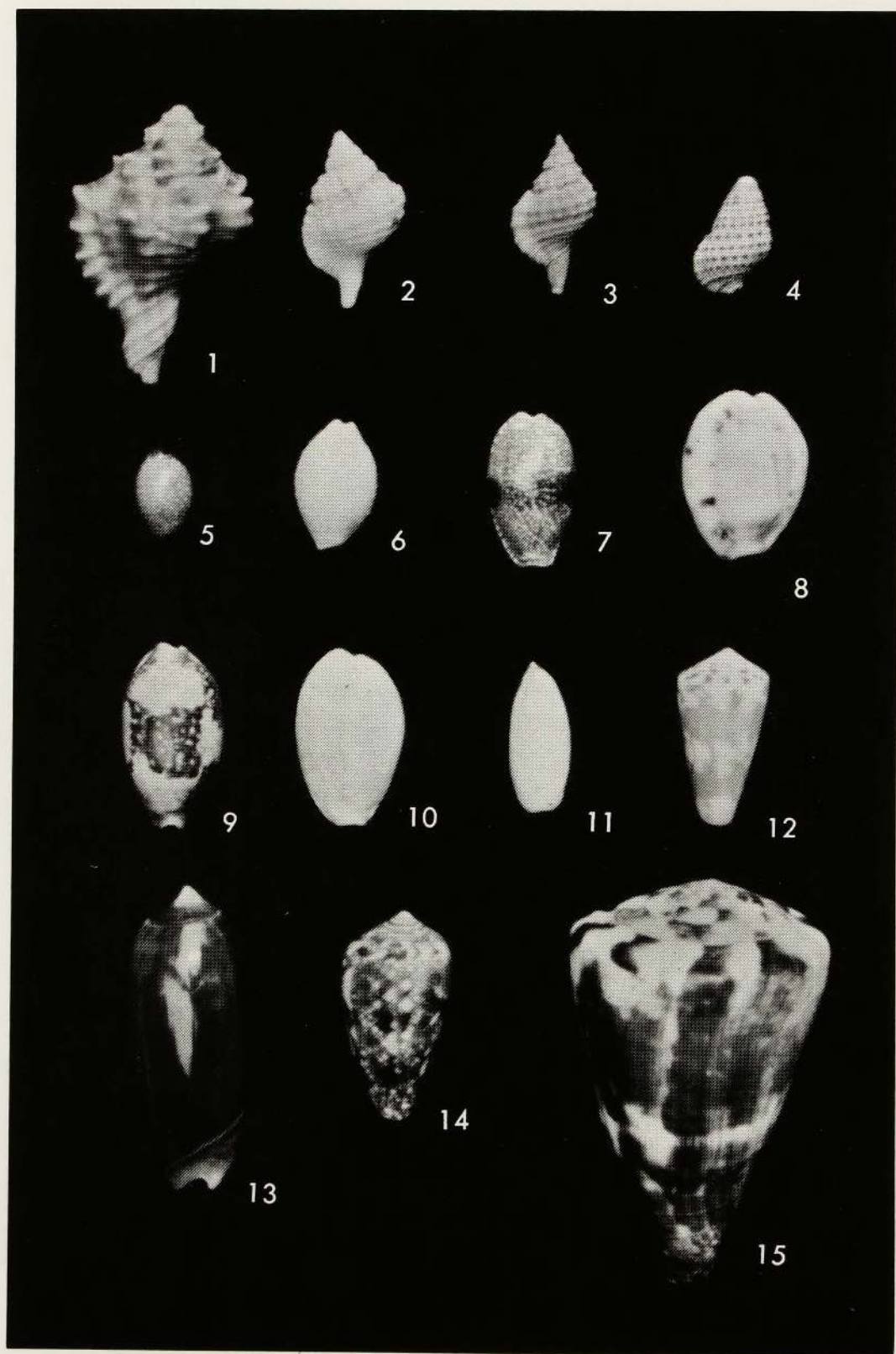


PLATE 54

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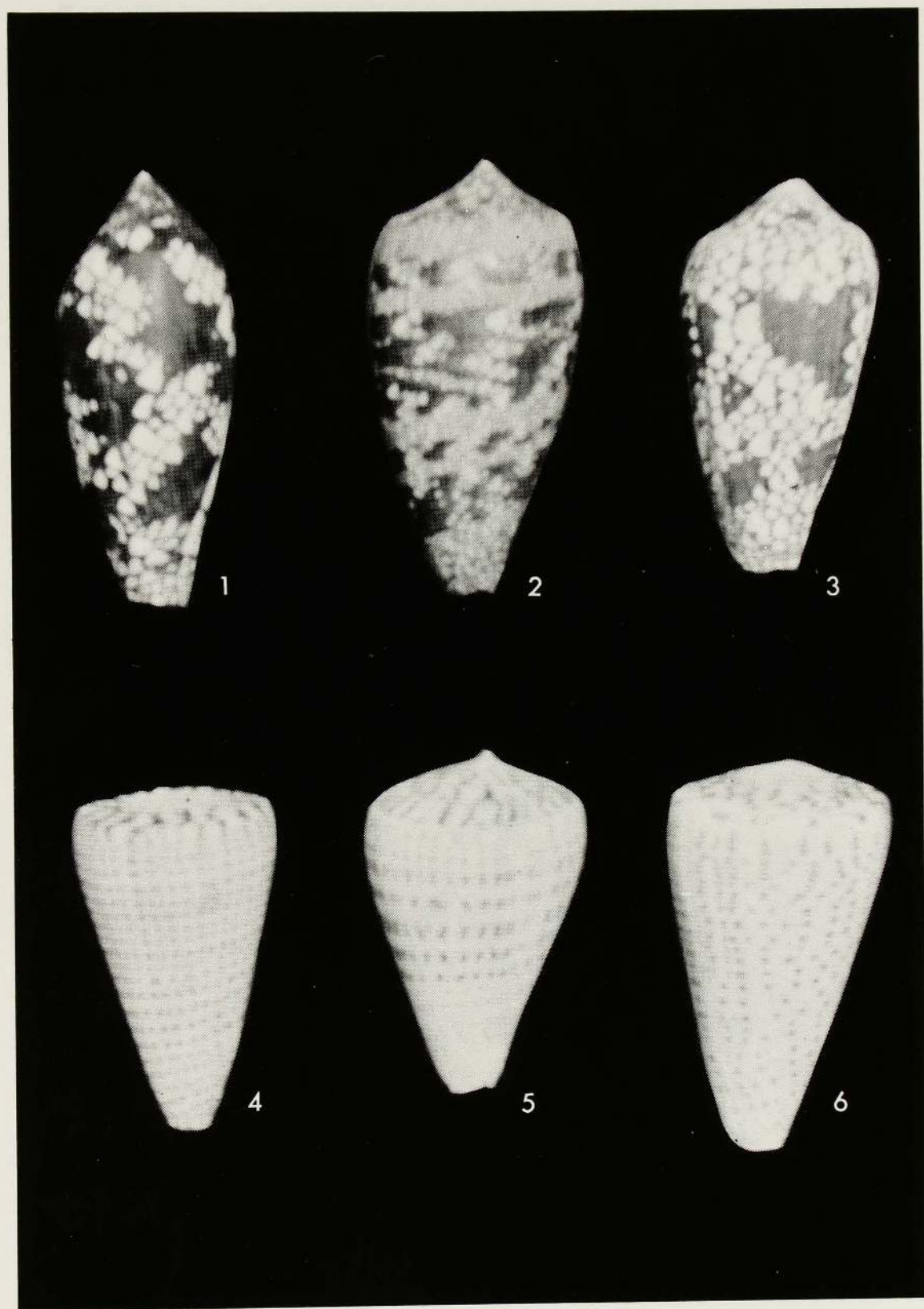


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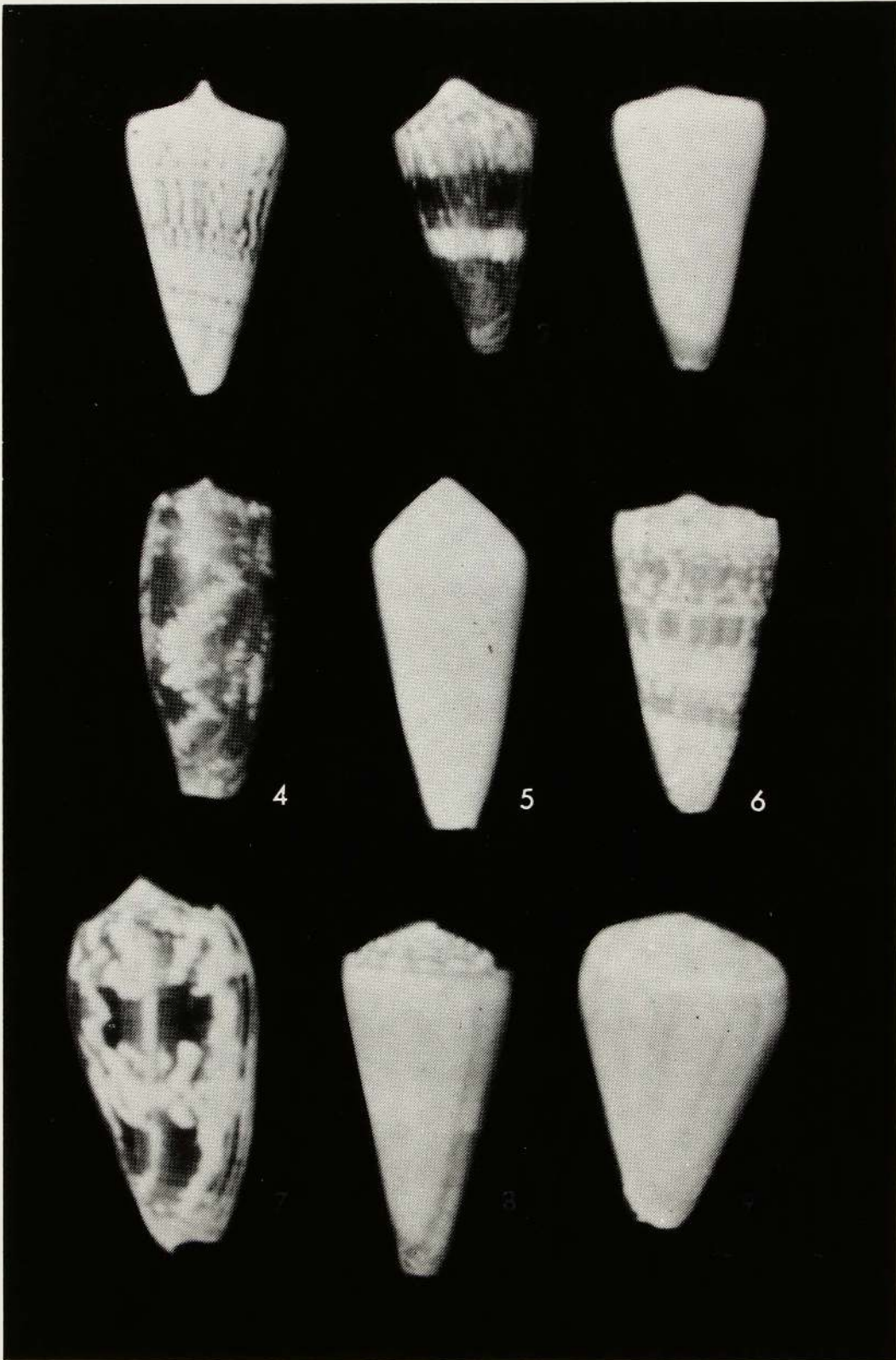


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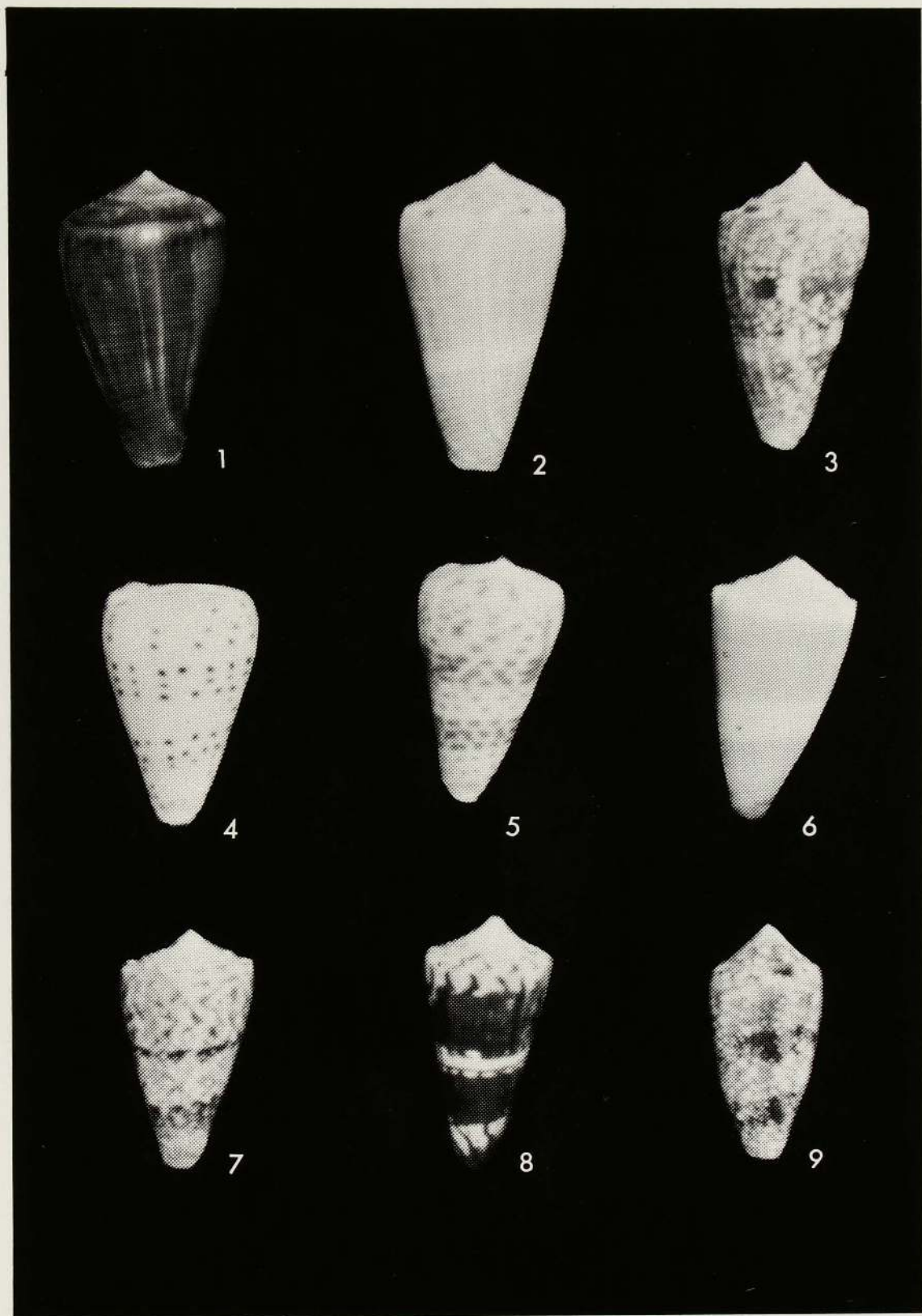


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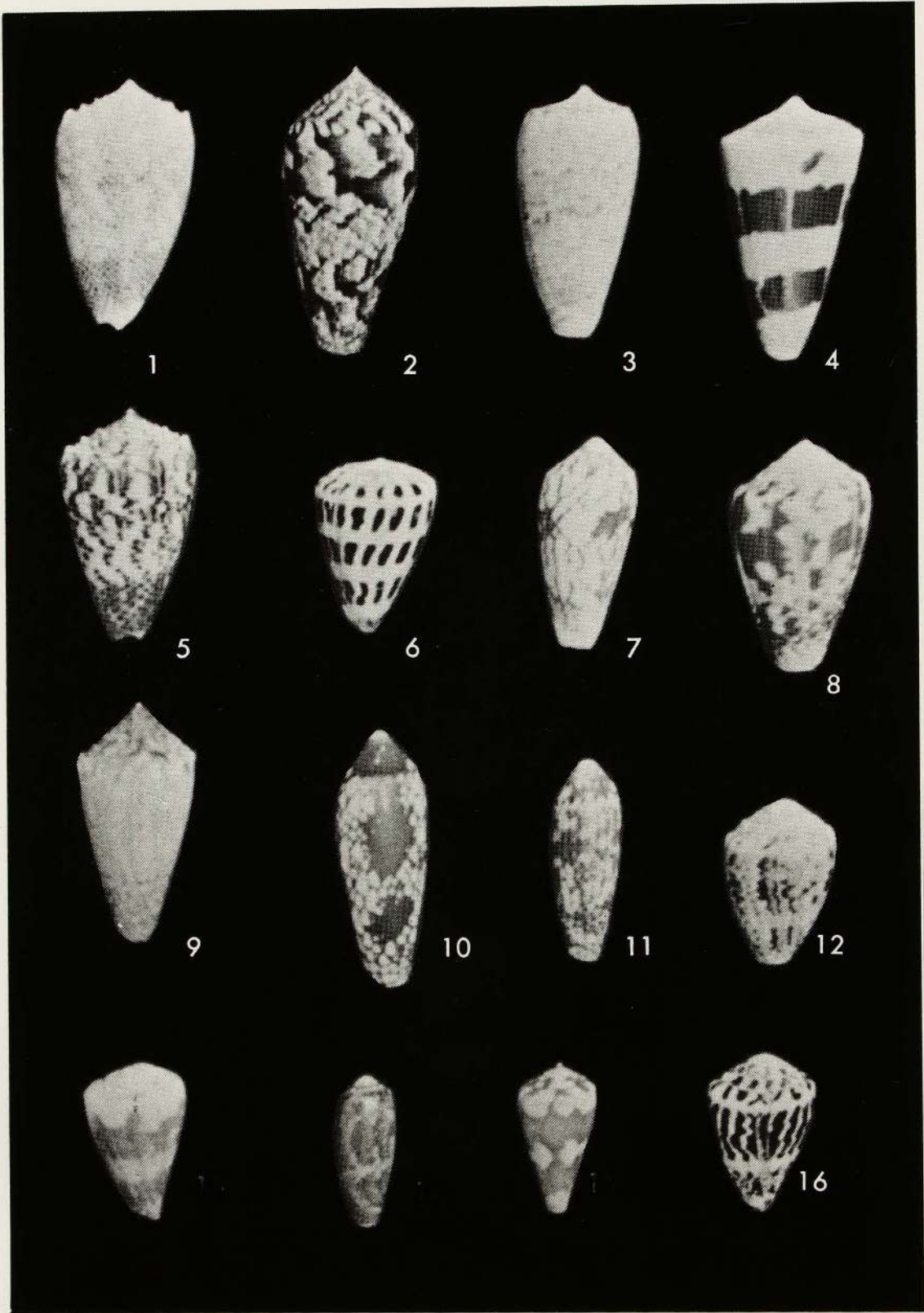


PLATE 58 <sup>15</sup> <sup>13</sup> <sup>14</sup> (Text on pp. 101-3)

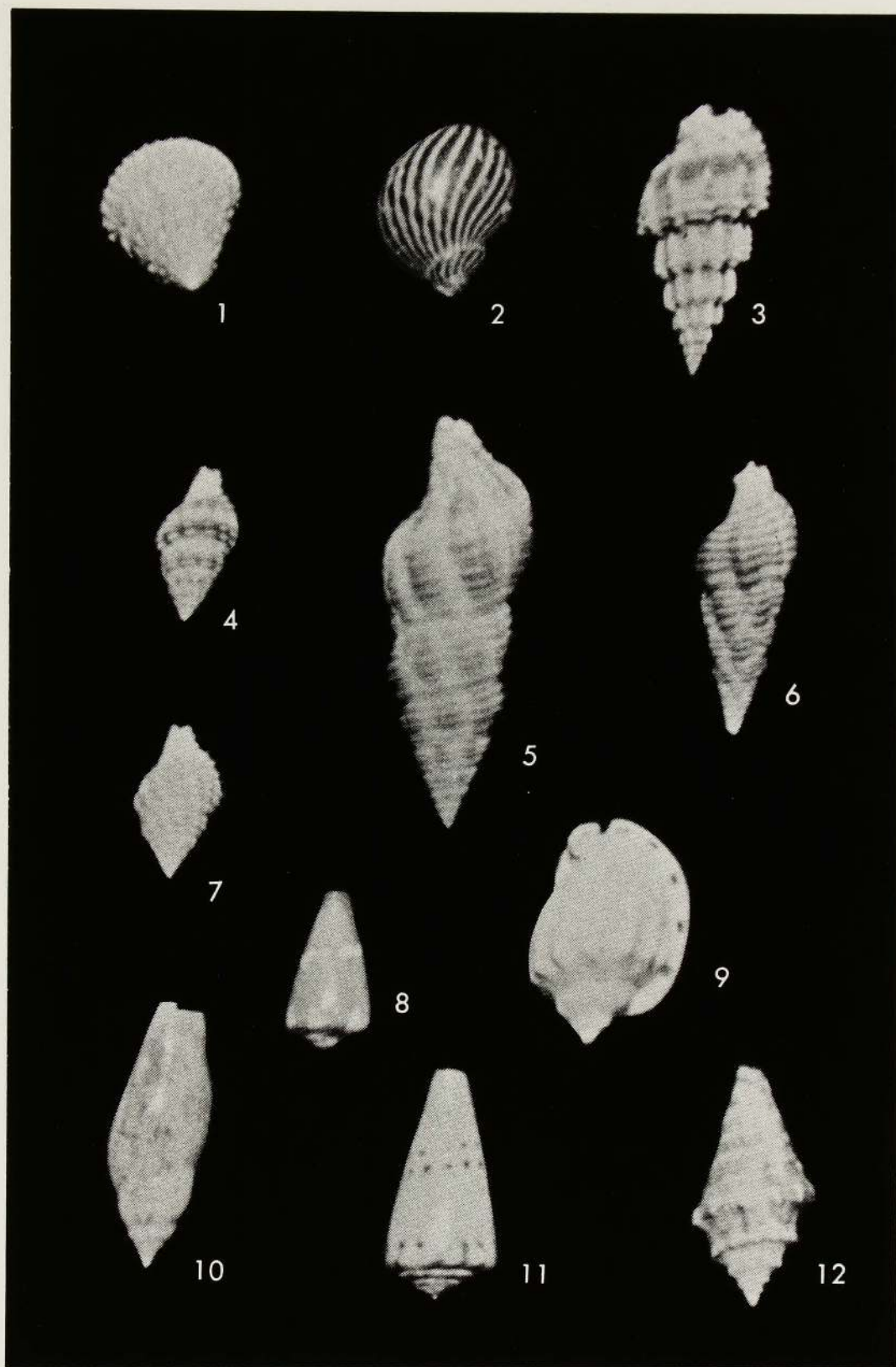


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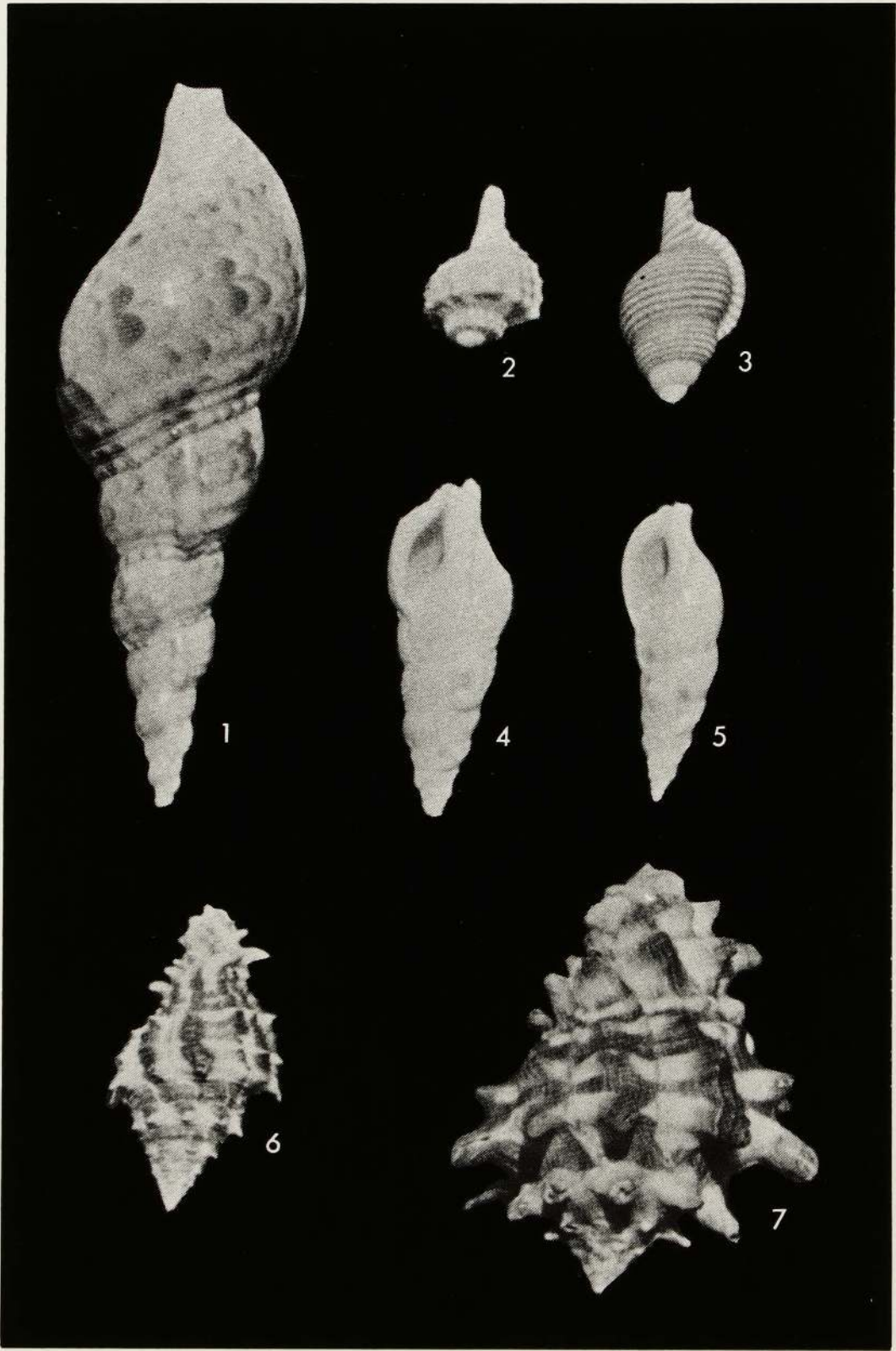


PLATE 60

(Text on pp. 106-7)



PART  
III

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SHELLS OF  
CEPHALOPODA

(Plate 61)

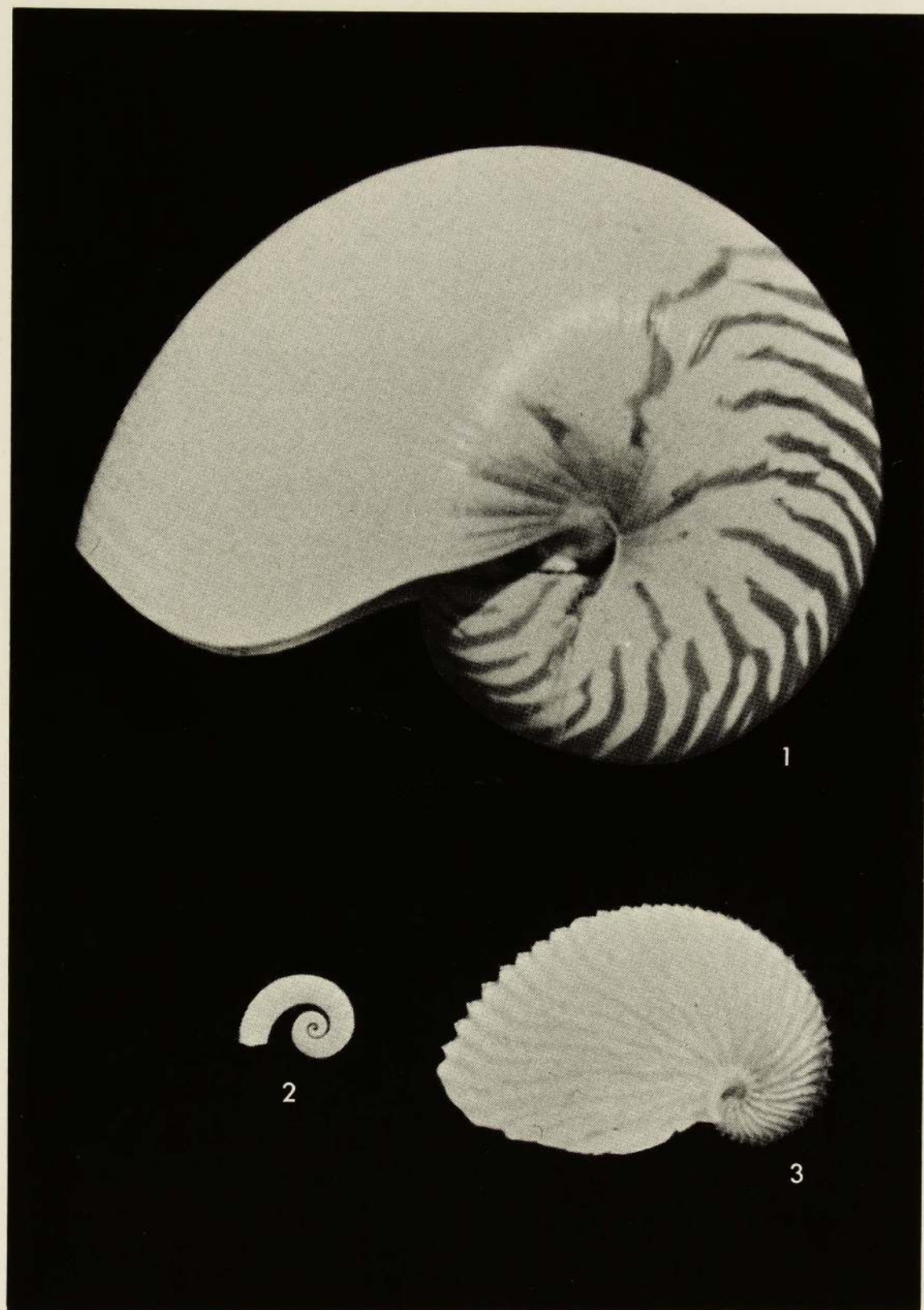


PLATE 61

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| <i>Bullia vitata</i>                   | 93          | 53 (166)            | 7             |
| <i>Bursa crumenoides</i>               | 64          | 34 (148)            | 7             |
| <i>lampas</i>                          | 64          | 35 (149)            | 1             |
| <i>rana</i>                            | 64          | 34 (148)            | 8             |

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| Cancellaria scalarina          | 79          | 45 (158)            | 4             |
| Cantharus tranquebaricus       | 81-82       | 47 (160)            | 3             |
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| Cardita bicolor                | 27          | 12 (125)            | 3             |
| sp.                            | 27          | 12 (125)            | 2             |
| variegata                      | 26-27       | 12 (125)            | 1             |
| carneola, Ponda                | 71          | 41 (155)            | 4             |
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| Cellana eucosmia               | 50          | 26 (140)            | 6, 7          |
| luchuana                       | 51          | 26 (140)            | 14            |
| radiata                        | 50-51       | 26 (140)            | 8-12, 16      |
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| Cerithium echinatum            | 57          | 30 (144)            | 8             |
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| gloriosus                  | 16          | 2 (115)             | 8             |
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| nobilis                    | 16          | 2 (115)             | 5             |
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| Chrysame ambigua           | 80          | 46 (159)            | 5             |
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**Parakrama Kirtisinghe**, now retired from professional life, has spent years exploring the shell-rich shores of Sri Lanka. A graduate of the University of London with a master's in science, he held the positions of assistant professor at Ceylon University and head of the Department of Zoology at Aquinas University College, Colombo. He has also been an active participant in professional societies and served first as secretary and then as president of the Ceylon Natural History Society, as president of the Natural History Section of the Ceylon Association for the Advancement of Science, and as Ceylon's representative to the 1954 meeting of the British Association for the Advancement of Science.

Aware that the waters around his retirement home were attracting collectors and shell-seeking expeditions from around the world, the author soon realized that chronicles and guidebooks on the many shells were as scarce as the shells were numerous. His systematized commentary on molluscs represents an attempt to fill the void.

In addition to having written *Sea Shells of Sri Lanka*, Kirtisinghe is the author of *The Amphibia of Ceylon*.

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