



M. G. HARASEWYCH & FABIO MORETZSOHN

THE BOOK OF SHELLS

A LIFE-SIZE GUIDE TO IDENTIFYING AND
CLASSIFYING SIX HUNDRED SEASHELLS



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LEFT Shells are traditionally stored in shallow cabinet draws, protected from the fading effects of strong sunlight. The level of organization found in shell collections varies greatly.

BELOW It is simple to find shells, and in places they are washed up by the tide in their thousands. Sifted apart from the sea's flotsam and jetsam by their weight, they form intriguing drifts of delicate shapes and patterns.

INTRODUCTION

Since prehistoric times, humans have been fascinated with shells and they hold a visceral appeal. Shells have been collected, used for tools, and incorporated into art, often by those who have no clear understanding of their biological origins.

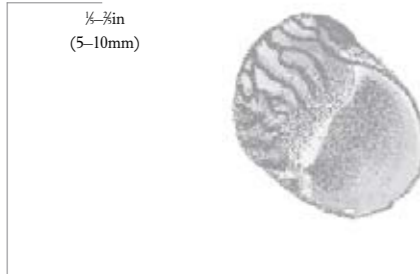
Shells are the external skeletons of mollusks, an ancient and diverse phylum of invertebrates that was present in the earliest fossil record of multicellular life from the Cambrian period, over 500 million years ago. Mollusks are second only to the insects in terms of species numbers. Over 100,000 kinds have been recorded and some estimates of yet to be discovered species exceed a million. Some breathe air; others live in fresh water, but most live in the ocean. They range in size from a grain of sand to a meter in length and many hundreds of kilograms in weight.

Anyone who has been to the seaside, the shore of a lake or river, or the woods, or simply spent time in their garden, has probably picked up a few shells. Some may have brought these shells home and formed the rudiments of a casual collection without giving the matter much further thought. Few have paused to consider the extraordinary variety of forms into which mollusks mold their shells, each adapted to a particular habitat. The seashells represented in this book together account for but a fraction of a percent of the different kinds of shells made by mollusks living today. Some will likely be familiar to the reader, others have been seen by only a very few people, mostly scientists working in museums, universities, or on oceanographic research vessels. Collectively, they represent an overview of the sizes, shapes, sculptures, and color patterns produced by mollusks in response to practically every habitat on earth.





FAMILY	Neritidae
SHELL SIZE RANGE	1/4 to 3/4 in (5 to 10mm)
DISTRIBUTION	Southeast USA to Caribbean and Bermuda
ABUNDANCE	Abundant ☆☆☆
DEPTH	Intertidal to 1m (3ft)
HABITAT	Intertidal rocky shores and tide pools
FEEDING HABIT	Grazer, feeds on diatom films on rocky shores
OPERCULUM	Calcareous, paucispiral, with a terminal nucleus and an internal peg



PUPERITA PUPA (LINNAEUS, 1767)

ZEBRA NERITE

The shell pattern of the Zebra Nerite varies with salinity, with shells living near freshwater inflows being mostly black with white spots (known as *Puperita pupa* form *tristis* (d'Orbigny, 1842)). If transplanted to a region with different salinity, the shell pattern in the newly secreted lip will change color. The operculum has an internal peg that helps keep it tightly closed. As in other nerites, no two shells have the same pattern.

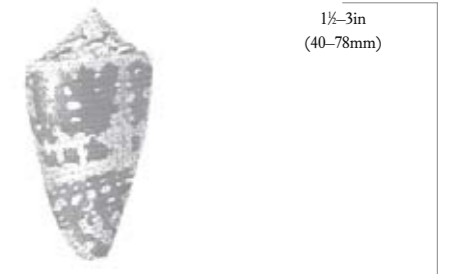
Related species: There are hundreds of species of nerites living mostly in the tropics worldwide, with some in brackish and freshwater habitats. Several species have patterns similar to *Puperita pupa*, such as *Neritina virginea* (Linnaeus, 1758) from Florida and the Caribbean to Brazil; *Neritina communis* (Quoy and Gaimard, 1832) and *Neritina turrita* (Gmelin, 1791), both from the southwest Pacific.



The shell of the Zebra Nerite is globular, thick, and solid. It is small, being often less than 3/4 in (7mm) in length, although it may grow to a little over 3/4 in (10mm). The spire is low and often eroded. The body whorl is large and is rounded and smooth, with very fine axial or spiral lines. The aperture is typically half-moon shaped as in most nerites, and is yellow to orange in color, closed by a calcareous operculum of the same shape. The columella is straight, with four denticles in the mid-columella and a callous parietal shield. Shell color is white with irregular black zigzags.



FAMILY	Conidae
SHELL SIZE RANGE	1 1/2 to 3 in (40 to 78mm)
DISTRIBUTION	St. Lucia and adjacent islands, West Indies
ABUNDANCE	Rare ☆
DEPTH	6 to 165ft (2 to 50m)
HABITAT	Under coral slabs
FEEDING HABIT	Carnivore, feeds on polychaete worms
OPERCULUM	Corneous, with terminal nucleus, rather small size



CONUS CEDONULLI (LINNAEUS, 1767)

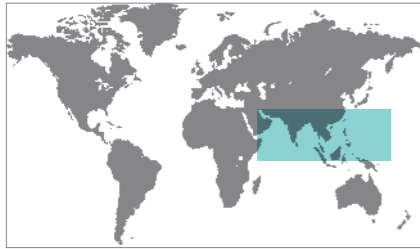
MATCHLESS CONE

The Matchless Cone was one of the rarest shells in the 18th Century. Indeed, in 1796 a specimen was sold for more than six times as much as a painting by Vermeer sold at the same auction. It is still considered rare to uncommon and is prized by collectors for its beautiful patterns, although with the advent of scuba-diving it is now found more often. All cone shells are venomous and should be handled with care when alive. Some species of *Conus*, such as *C. geographus* (Linnaeus, 1758), eat fish. Their venom has caused more than thirty known human deaths throughout their range.

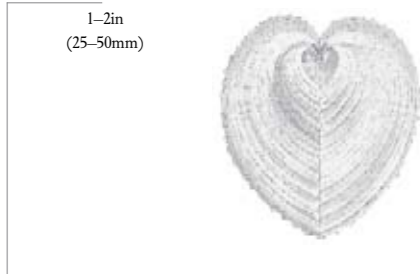
Related species: *Conus* is one of the largest genera of marine invertebrates, with more than 500 species recognized. The *Conus cedonulli* complex includes closely related species such as *C. mappa* (Lighfoot, 1786) from the southern Caribbean and northern South America; *C. aurantius* (Hwass, 1792) and *C. pseudaurantius* (Vink, 1985), both from the Lesser Antilles.



The shell of the Matchless Cone is thick and conical, with a long and narrow aperture. The spire is short and stepped, with a straight-sided body whorl featuring a fine sculpture of spiral lines which are strongest near the base. The shell is white and handsomely decorated with irregular spiral lines, beads, and blotches, varying from yellow to orange to brown. The shell pattern is very variable, and several subspecies have been named.



FAMILY	Cardiidae
SHELL SIZE RANGE	1 to 2in (25 to 50mm)
DISTRIBUTION	Indo West Pacific
ABUNDANCE	Common ☆☆
DEPTH	Intertidal to 65ft (20m)
HABITAT	Sandy bottom, near coral reefs
FEEDING HABIT	Filter feeder



CORCULUM CARDISSA (LINNAEUS, 1758)

HEART COCKLE

The Heart Cockle is a well-known bivalve and is very popular in shell crafts, not surprisingly given its beguiling heart-shaped appearance. It is a common species that lives near coral reefs, resting on sandy ocean floors in shallow water. The shell is thin, with small translucent “windows” that allow light to reach inside the shell. Like a few other bivalves, *C. cardissa* grows algae within its tissue to provide nutrients to the clam.

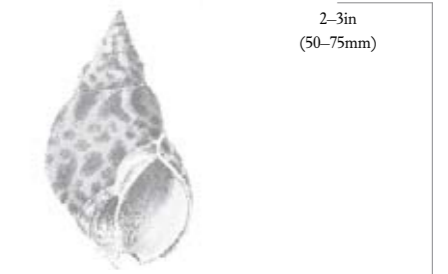
Related species: There are many species in the genus *Corculum*, some of which also have heart-shaped shells, although *C. cardissa* is the closest to a classical heart outline. Other similar species include *C. monstrosum* (Gmelin, 1791) from the Indo-West Pacific, and *C. impressum* (Lightfoot, 1786) from the Philippines.



The shell of the Heart Cockle is flattened antero-posteriorly and expanded laterally, creating a heart shape. The sharp keel around the margins of the shell is sometimes jagged. The surface is sculptured with radial ribs, and the umbones overlap. Shell shape, sculpture, and color vary widely; the color can be white, yellow, pink, or violet.



FAMILY	Babyloniidae
SHELL SIZE RANGE	50 to 75mm (2 to 3in)
DISTRIBUTION	Indian Ocean
ABUNDANCE	Abundant ☆☆☆
DEPTH	Shallow, 2 to 50m (6 to 164ft)
HABITAT	Intertidal sand and rocks
FEEDING HABIT	Carnivore and scavenger
OPERCULUM	Corneous, thin and flexible, with terminal nucleus



BABYLONIA ZEYLANICA (BRUGUIÈRE, 1789)

INDIAN BABYLON

The Indian Babylon is a slender and smooth shell, with a well-marked suture, a large body whorl, and a high spire. The pattern is a distinctive irregular arrangement of blotches and flames, reminiscent of the markings on a giraffe’s hide. The animal is edible, and the local species of Babylon shells are commonly seen sold alive at markets throughout Asia. This species is also used in the aquarium trade.

Related species: There are several species in the genus *Babylonia*, all of which are restricted to the Indian or Pacific Oceans. Other species include *Babylonia spirata* (Linnaeus, 1758) from the Indian Ocean to the West Pacific; *B. areolata* (Link, 1807) from Taiwan to Sri Lanka; and *B. japonica* (Reeve, 1842) from Japan and Taiwan. Most species are abundant and live in shallow water.

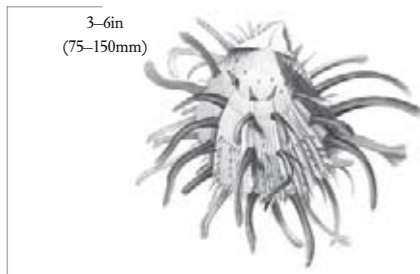


The shell of the Indian Babylon has a large body whorl with fine axial lines and a lanceolate aperture with a short siphonal canal. The columella is smooth, with a single fold near the top of the aperture; it has a white columellar callus and deep umbilicus. The shell color is white, decorated with spiral rows of brown to light-brown blotches and flames. The umbilicus and apex are tinged with violet.





FAMILY	Spondylidae
SHELL SIZE RANGE	3 to 6in (75 to 150mm)
DISTRIBUTION	North Carolina to Brazil
ABUNDANCE	Common ☆☆
DEPTH	Shallow to 460ft (140m)
HABITAT	Cemented permanently to rocks and coral
FEEDING HABIT	Filter feeder



SPONDYLUS AMERICANUS (HERMANN, 1781)
ATLANTIC THORNY OYSTER

Thorny oysters are among the most popular bivalves for collectors. *Spondylus americanus* is one of the largest, most spinose, and most colorful of the species. This is a common species often found attached to oil rigs and shipwrecks in the Gulf of Mexico. The shell of the Atlantic Thorny Oyster is usually covered with sponges and other encrustations, making it well camouflaged.

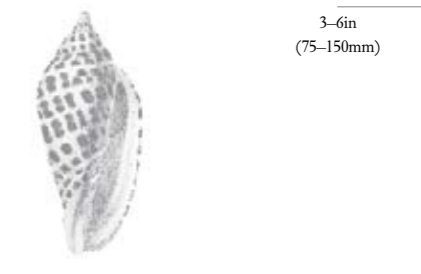
Related species: There are some 100 species in the family worldwide. Some of the more popular and spinose species include *Spondylus regius* (Linnaeus, 1758) from the Western Pacific; *S. princeps* (Broderip, 1833) from the Gulf of California to Panama; and *S. linguafelis* (Sowerby, 1847) from Hawaii.



The shell of the Atlantic Thorny Oyster has a large, oval to circular shape, with solid, unequivalve valves, decorated with radial ribs and erect spines up to 3in (75mm) in length. The lower valve is permanently attached to a hard substrate, and is larger than the upper valve. The valves have a hinge structure with strong, interlocking teeth that form a ball-and-socket joint. Exterior color varies from white and yellow, to pink and red; the interior is white and reddish purple near the margins. The shape and sculpture are extremely variable.



FAMILY	Volutidae
SHELL SIZE RANGE	75 to 150mm (3 to 6in)
DISTRIBUTION	North Carolina to Florida Keys, Gulf of Mexico
ABUNDANCE	Uncommon ☆
DEPTH	30 to 90m (100 to 300ft)
HABITAT	Offshore sand bars and sandy bottoms
FEEDING HABIT	Carnivore, feeds on other invertebrates



SCAPHELLA JUNONIA (LAMARCK, 1804)
JUNONIA

The Junonia lives on sand offshore and it is often found on shrimp grounds, from North Carolina to the Florida Keys and the Gulf of Mexico. Like all volutids, it is a carnivore and feeds on other invertebrates. The Junonia was rare and prized in the 19th Century, until shrimp boats started to harvest them regularly. Perfect specimens are still rare as most shells have healed growth scars.

Related species: About ten species have been recognized in the genus, although most might be variants of a widely distributed species, *Scaphella dohrni* (Sowerby III, 1903). Other species include *S. dubia* (Broderip, 1827) and *S. robusta* (Dall, 1889). All are from the southeastern USA and Gulf of Mexico.



The shell of the Junonia is fusiform and solid, and grows up to 5in (130mm) in length. It has a large and smooth protoconch with one-and-a-half to two whorls, and a teleoconch with five whorls, finely sculptured with axial ribs, with the last two whorls smooth. The shell color is cream to pale yellow with spiral rows of brown, rectangular blotches, with a pinkish, long aperture and four columellar folds.

THE BOOK OF SHELLS

A LIFE-SIZE GUIDE TO IDENTIFYING AND CLASSIFYING SIX HUNDRED
OF THE WORLD'S MOST SIGNIFICANT SEASHELLS

M. G. HARASEWYCH and FABIO MORETZSOHN

Who among us hasn't marveled at the diversity and beauty of shells? Or picked one up, held it to our ear, and then gazed in wonder at its shape and hue. Many a lifelong shell collector has cut teeth (and toes) on the beaches of the Jersey Shore, the Outer Banks, or the coasts of Sanibel Island. Some have even dived to the depths of the ocean. But most of us are not familiar with the biological origin of shells, their role in explaining evolutionary history, and the incredible variety of forms in which they come.

Shells are the external skeletons of mollusks, an ancient and diverse phylum of invertebrates that are in the earliest fossil record of multicellular life over 500 million years ago. There are over 100,000 kinds of recorded mollusks and some estimate that there are *over a million more* that have yet to be discovered. Some breathe air, others live in fresh water, but most live in the ocean. They range in size from a grain of sand to a beach ball and in weight from a few grams to several hundred pounds. And in this lavishly illustrated volume they finally get their full due.

The Book of Shells offers a visually stunning and scientifically engaging guide to 600 of the most charismatic and intriguing mollusk shells, each chosen to illustrate the range of shapes and sizes that occur across a range of species. Each shell is reproduced here at its actual size, in full color, and is accompanied by an explanation of the shell's range, distribution, abundance, habitat, and features. Brief scientific and historical accounts of each shell and related species include fun-filled facts and anecdotes that broaden its portrait.

The Matchless Cone, for instance, or *Conus ce-donulli*, was one of the rarest shells collected during the eighteenth century. So much so, in fact, that a specimen in 1796 was sold for more than six times as much as a painting by Vermeer at the same auction. But since the advent of scuba diving, this shell has become far more accessible to collectors—though not without certain risks. Some species of *Conus* produce venom that has caused more than thirty known human deaths.

The Zebra Nerite, the Heart Cockle, the Indian Babylon, the Junonia, the Atlantic Thorny Oyster—shells from habitats spanning the poles and the tropics, from the highest mountains to the ocean's deepest recesses, are all on display in this definitive work.

M. G. Harasewych is research zoologist and curator of marine mollusks at the Department of Invertebrate Zoology at the Smithsonian Institution in Washington, D.C., which houses one of the world's largest mollusk collections. He has discovered and described dozens of new genera and species, written widely for scientific journals and periodicals, and is the author of *Shells: Jewels from the Sea*.

Fabio Moretzsohn has a doctorate in zoology and is a researcher for the Harte Research Institute in Texas. He has discovered a few new species of mollusks and is a coauthor of the *Encyclopedia of Texas Seashells*.

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