



Scotch Bonnet

Phalium granulatum

A pattern of squares and spiral bands resembling Scottish plaids, and a shape resembling a woolen cap worn by Scottish peasants, give this mollusk its name. It also led North Carolina to choose the Scotch bonnet as its state shell in 1965 in honor of its early Scottish settlers. With this designation, North Carolina became the first to adopt a state shell.

The Scotch bonnet and other helmet shells belong to the class of mollusks called gastropods, which have one shell. About 60 different kinds of bonnets exist throughout the world.

History and Status

Close relatives of the Scotch bonnet have been found on the Pacific side of Central America leading researchers to believe the shells had a common origin when the Atlantic and Pacific oceans were connected several million years ago. Although fewer Scotch bonnets are found on beaches today than in the past, they remain common offshore in their range.

Description

Nature's beauty leaves its imprint on this graceful shell in a pattern of pale brownish squares and spiral bands on a light yellow or whitish background. Beached shells bleached by the sun usually appear chalky white because of a loss of natural oils.

The egg-shaped Scotch bonnet grows 2 to 4 inches high with females usually growing larger than males. This sturdy shell bears about five whorls, or sec-

tions, with coiled grooves. The final and typically largest whorl—the body whorl—contains most of the animal's soft parts.

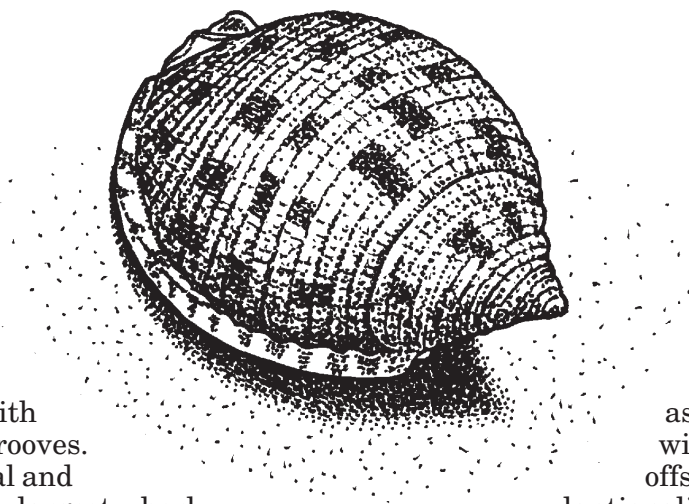
The Scotch Bonnet develops a whorl and thick outer lip, resting during each stage of growth. When it begins to grow again, it absorbs the outer lip. Sometimes, especially in deep-water specimens, the outer lip is not completely absorbed, leaving a mark or scar on whorls of a mature shell. Sutures, or seams, between whorls appear subtle, yet distinct.

A large opening called the aperture lies between a thick, toothed outer lip and a broad inner lip with small bumps at its base.

The snail that grows inside the shell looks much like a typical garden snail with a large foot and a tube-like siphon for passing water and wastes. Eyes lie at the base of slender tentacles, and the mouth contains a tubular extension called a proboscis for feeding. A marine snail, it grows around a pillar inside the shell called the columella that is protected by a shield-like wall.

Habitat and Habits

Scotch bonnets live on shelly sand in moderately shallow water. Divers and commercial fishermen frequently find them offshore in water 50 to 150 feet deep where they are commonly



associated with the offshore At-

lantic calico scallop beds. Shipwrecks sometimes become Scotch bonnet habitat, as well. People rarely see live specimens onshore unless a storm throws the shells onto the beach.

Scotch bonnets are predators. They move along the ocean floor by secreting a slime from glands on the bottom of the foot then sliding along on this slippery layer in rhythmic motion. As they glide, they feed on echinoderms such as sand dollars, sea biscuits and sea urchins.

While feeding, they dissolve the hard outer layer of their prey with a secretion containing sulfuric acid. Then they quickly cut an opening through the softened skeleton to expose, and eat, the flesh. Beachcombers finding a keyhole urchin bearing a neat, 1/16-inch hole, for example, can usually trace its demise to the Scotch bonnet. To break into its prey, the Scotch bonnet uses the secretions instead of a radula, an organ in the mouth cavity with tiny teeth



Range Map:
Occupied range 

used for breaking up food, found in many mollusks.

A rich food supply influences the Scotch bonnet's growth. Plentiful food means a thicker, more ornamented shell with brighter colors and a glossier sheen. A ready food supply, and adequate light and water temperatures in spring, provide good conditions for breeding and early growth, as well.

The female Scotch bonnet, which can grow to the size of an orange, deposits egg capsules in clumps or rounded, woven towers up to 4 or 5 inches high. She sits atop the tower as she lays hundreds of eggs.

Once fertilized, the egg soon develops into a larval form known as a trochophore. Here, a shell gland develops in the egg that eventually becomes the mantle—the mollusk's fleshy organ. At first, the gland secretes a brownish, strengthening substance called conchin and adds shelly layers later. When the young emerge from the egg capsule, they bear a tiny larval shell that becomes the first whorl.

The newly hatched, microscopic veligers grow slowly and remain free-swimming for possibly as long as 14 weeks. When the veliger changes to a juvenile, it sinks to the ocean floor.

Shell growth starts at the apex and revolves, most often, clockwise. As the shell matures, the glands in the mantle continue to secrete new shell material to ensure adequate protection for the animal. Scotch bonnets mature in one to six years.

Predators include crabs such as stone and blue crabs that can crush the shells and fish. The Scotch bonnet's main defense is its trap door, a horny plate called an operculum attached to its foot. When threatened, the snail withdraws inside the shell, fitting this fan-shaped plate into its aperture like a drawbridge closing into a castle.

Range and Distribution

Scotch bonnets range from North Carolina's coast west to Texas and south through West Indies to Brazil. In North Carolina they can be found offshore along the coast, especially from Ocracoke or Morehead City south. While the species can be common offshore, whole Scotch bonnets are extremely hard to find onshore—pieces are much more common.

People Interactions

Since the Scotch bonnet became North Carolina's state shell, Tar Heel beachcombers have continually searched for prime specimens. Yet for most the Scotch Bonnet remains elusive. Experienced shell seekers recommend the first few days after a spring storm as the best time to look for Scotch bonnets. Explore the backs of dunes where high tides and winds from storms push shells, especially on barrier islands such as Cape Lookout, Shackleford and Portsmouth.

Once a more prolific shell, this mollusk's populations have fallen because of increased collection and accidental harvesting by commercial fishermen, and other factors.

References

Porter, Hugh and Jim Tyler. *Seashells Common to North Carolina* (Raleigh: N.C. Department of Natural and Economic Resources Division of Marine Resources, 1971).

Rehder, Harald A. *The Audubon Society Field Guide to North American Seashells* (New York: Alfred A. Knopf, 1981).

Credits

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SCOTCH BONNET

Classification

Class: Gastropoda

Order: Caenogastropoda

Average Size

2 to 4 in.

Food

Ecineroderms such as sand dollars, sea biscuits and sea urchins.

Breeding

Spring breeding. Females lay clumps or towers of hundreds of eggs.

Young

Eggs transform into an early larval form called trochophore where they begin to create shell material. Hatched eggs become free-swimming, microscopic larvae called veligers, which swim and are carried by ocean currents for possibly as long as 14 weeks. During this time they may be carried hundreds of miles from where they were hatched before sinking and changing into juvenile bonnets.

Life Expectancy

Scotch bonnets mature in one to six years. May live several more years.