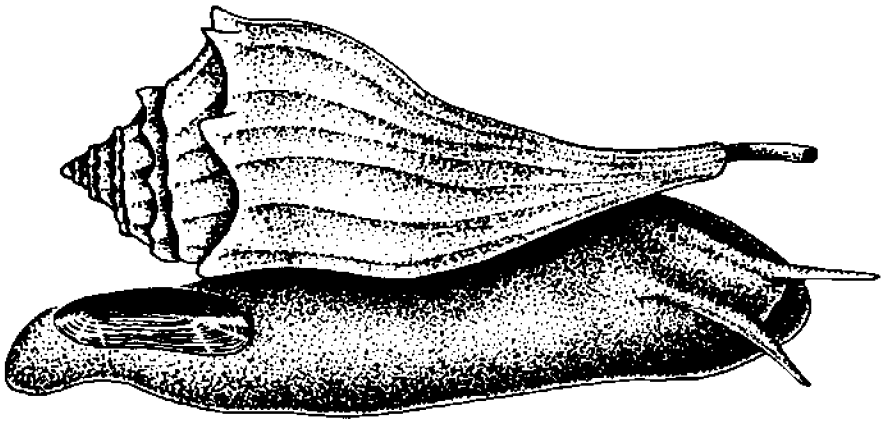
A Guide to Common Whelks



Text by: Arnold G. Eversole, Department of Aquaculture, Fisheries and Wildlife, Clemson University, and William D. Anderson, Office of Fisheries Management, South Carolina Wildlife and Marine Resources Department.

Illustrations by: D. Bryan Stone III, Information and Public Affairs, South Carolina Wildlife and Marine Resources Department.

Recipes by: Donna S. Florio, Office of Fisheries Management, South Carolina Wildlife and Marine Resources Department.

Whelks of South Carolina

A whelk or a conch? ..... What is that large snail you found on the beach? Chances are it is a whelk and not a conch (pronounced 'konk'). Local fisherman often refer to whelks as conchs, but the large snails differ in many ways, including their food habitats, egg capsules, development, and geographical distribution. Four species of whelks live in the waters along our coastline, while conchs are found in the waters of South Florida and the Caribbean.

"A Guide to Common Whelks" was prepared to help beachcombers, coastal vacationers, and local fishermen learn to recognize the shells and egg cases of the four species prevalent in our state. To help you identify your whelk egg case or shell, this pamphlet has been prepared with illustrated descriptions of the four common whelk species. Biological and ecological information pertinent to each species is included to complement the descriptions; shell and egg capsule keys follow for ease of use. A glossary is also included to help the reader with unfamiliar words or terms unique to molluscs. Finally, for those desiring additional information on whelks, a series of articles is listed at the end of the pamphlet.

Although whelks are interesting to find and collect, the meat of the animal may also make a tasty dish. Hopefully, you will try whelks as a food the next time you see them in a market or on a restaurant menu. Recipes are included at the back of this pamphlet to help you prepare whelk at home.

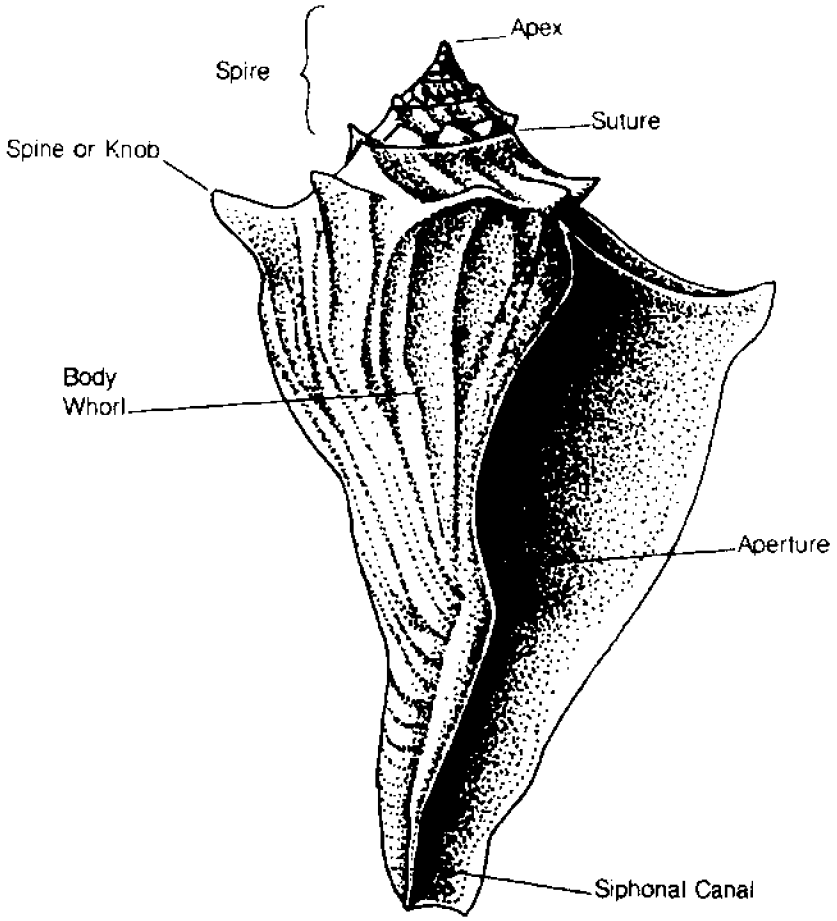
It is characteristic to describe the shell of a snail when explaining a recent find to a friend or shell collector. Therefore, we will briefly describe some basic anatomical structures that may be used to determine the difference between the four whelk species.

General Features of Whelks

Snails with a spiral shaped shell, like the whelks, grow by extending the shell around a central axis, producing turns, or whorls, as they grow. The final whorl, and usually the largest, is called the body whorl. The body whorl terminates, providing an opening, or aperture, into which the snail can withdraw. Whelks also have a separate hard, horny plate called an operculum, which acts like a trap door when the snail withdraws into the shell. Sometimes called a 'shoe' by commercial fishermen, the operculum is attached to the top of the living animal's foot and is seldom found with empty whelk shells.

The shells of the four common whelk species are pear-shaped and the body whorls are strongly shouldered. The sutures, or junctions where two successive whorls meet at the shoulder, are a key shell characteristic used to distinguish different species of whelks. Whelks are further classified by the way the shells are coiled. When viewing the shell from the apex, or top, the direction of coiling may be clockwise or counter-clockwise. Normally, most snails exhibit clockwise coiling with the aperture, or opening, on the right of the body whorl. The central axis, from which the coil extends, forms a groove or canal. These canals, called siphonal canals by malacologists, are well developed in whelks.

The opercula of all four whelk species appear to be formed in the same basic pattern. Opercula are ovate, egg-shaped plates with a series of concentric growth lines around a marginal nucleus. The nucleus is off center, so it is difficult to see rings between the nucleus and the nearest opercular edge. The rings in the operculum are assumed to be similar to the growth rings in a tree; however, considerable work needs to be done before these rings can be used to age whelks. The rings are made of a horny material that appears grayish brown when free of sand. The underside of the operculum, or the side attached to the foot of the whelk, is shiny and is constructed of a different material called 'varnish'. The underside also displays a series of concentric marks, but these bear no relationship


Apex
Spire
Suture
Spine or Knob
Body
Whorl
Aperture
Siphonal Canal

General Features of Whelks

to the uniform set of growth lines on the external, or opposite surface of the operculum. In addition, the underside has areas of changing texture while the external surface is a single texture.

The egg cases of whelks are often objects of curiosity on our beaches at certain times of the year. They consist of a series of flattened leathery capsules attached at one end to a tough cord or string-like structure. Although the shape and size of the individual capsules vary among species, other features of the egg cases appear rather similar. For example, the eggs of each species complete their development within the egg capsule before small juvenile snails emerge through a predesigned exit. Usually, egg cases washed up on beaches are spent (i.e., with open holes or exits to provide evidence of successful hatches). If an intact moist egg case is found, the process of development and hatching may be followed by holding it in a salt water aquarium. Development of eggs within the capsule can normally be observed using a small hand lens. However, be prepared to wait up to several weeks, depending on the stage of development, for all the young whelks to hatch.

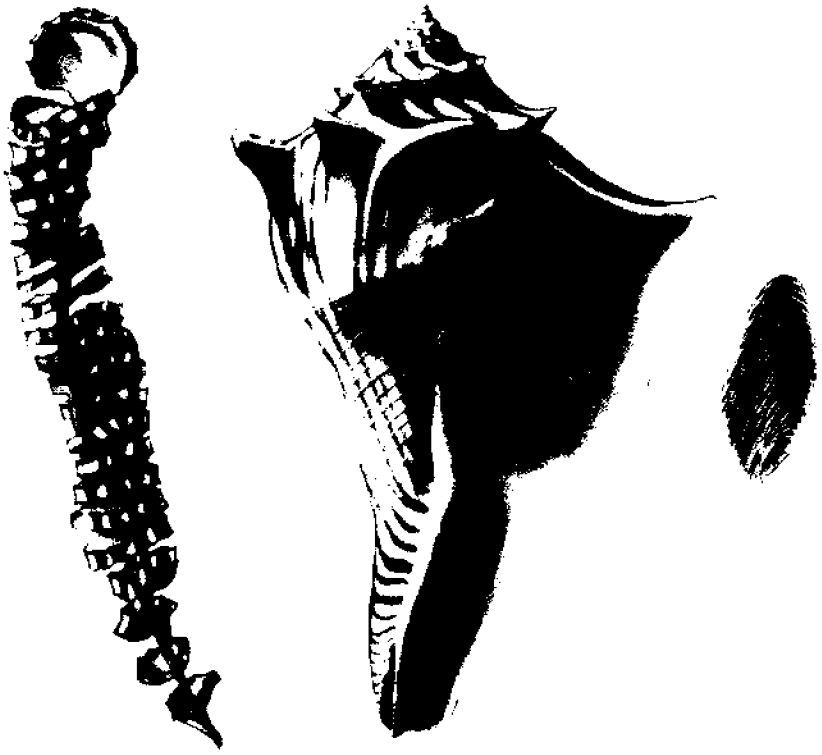
Beachcombing for whelk shells is often productive after heavy seas generated by winter storms. Live whelks may be collected on intertidal sand flats and oyster bars or by crab trapping in high salinity estuaries. Recently laid egg cases occur most frequently on the beach in late spring and fall; however, egg cases in various stages of development can be found in intertidal areas throughout the year.

Knobbed Whelk
Busycon carica

The most common whelk in South Carolina is the knobbed whelk *(Busycon carica)*. Knobbed whelks range from Cape Cod to central eastern Florida, the greatest numbers occurring in southern latitudes. In the southern part of their distribution specimens are found to be much heavier and the knobs on the outer edge of the shoulder are more pronounced. The name Kiener's whelk *(Busycon eliceans)* has sometimes been applied to this more knobby southern form of *Busycon carica*, but it now appears this separation may be unnecessary. Recent genetic studies have provided evidence that these animals are simply highly variable forms of the same species.

The structure and coloration of knobbed whelk shells vary greatly, not only over their geographical range, but also within a locality. It is not unusual to find whelks on our beaches with different knob lengths, knob directions and aperture colors. For example, aperture colors of knobbed whelks in commercial catches in South Carolina range from reddish brown and dark orange to almost white or cream colored. Some fishermen and shell collectors report finding more of one shell color, such as brick red, in one part of the state than in other areas. Differences in shell colors between localities may be genetically determined or are, perhaps, a function of the local population's diet.

Chances are good that if you find a large knobbed whelk on the beach, it is a female. Male knobbed whelks rarely reach the large sizes of their opposite sex. Normally, the female knobbed whelks in South Carolina catches have larger shells, weigh more, and possess a bigger foot (the part of the whelk which is shucked and prepared for consumption in a number of delicious ways -see the recommended recipes). This sexual dimorphism also occurs in the other three whelk species. Whelks are thought to be protandric hermaphrodites; meaning they function first as males when young, then change into females as they grow and age. This phenomenon may lead to a preponderance of females among the older and



Knobbed Whelk
Busycon carica

Knobbed Whelk
Busycon carica

larger-sized individuals in the population. Commercial catches, which selectively fish for the larger whelks, often catch more females than males.

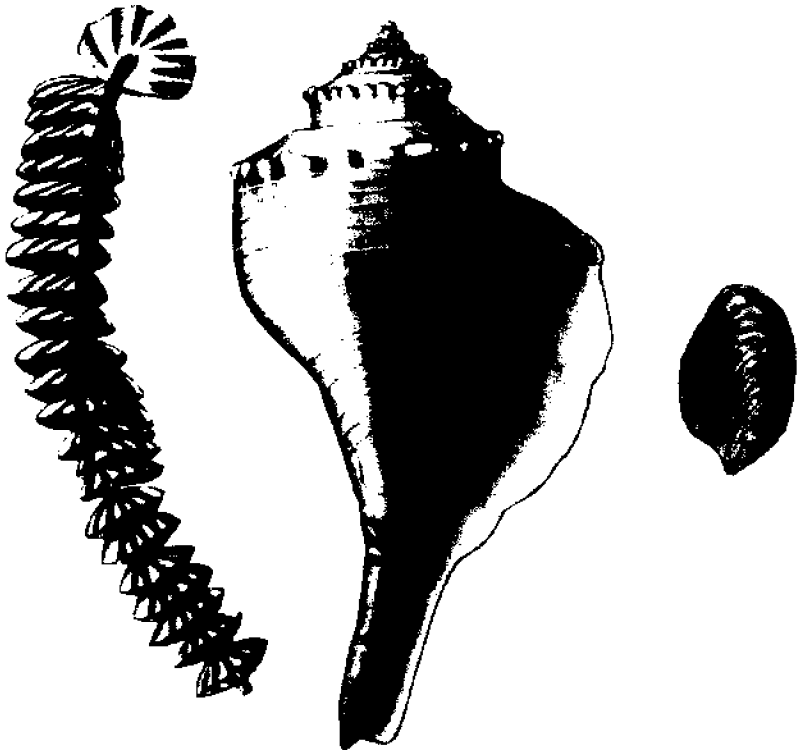
Knobbed whelks in South Carolina lay egg strings twice a year, usually in the fall (September and October) and in the spring (April and May). Egg strings start to appear at times when the water temperature approximates 20 °C (68 °F). Of the two egg laying periods, the fall appears to be the most productive in South Carolina. It is not known if an individual female whelk contributes to both of these egg-laying peaks or if a female lays more than one string per season. However, good estimates of the average number of eggs per capsule (34-35) and capsules per string (100-120) are available for this species.

Channeled Whelk
Busycon canaliculatum

Channeled whelks *(Busycon canaliculatum)* occur from Cape Cod to northern Florida, a geographical range similar to the knobbed whelk. Populations of the two species vary throughout their ranges, channeled whelks being more common in the north than the knobbed whelk. In South Carolina, the channeled whelk is outnumbered by the knobbed whelk by almost 30 to 1. The channeled whelk is the second most abundant whelk found in South Carolina and occupies basically the same type of habitat as the knobbed whelk.

As expected, channeled whelks predominate in commercial catches in northern states. In Narragansett Bay, they are fished with baited traps (or pots) and horseshoe crabs serve as an excellent bait. Knobbed whelks, which appear reluctant to enter pots, may not be readily attracted to conventional commercial baits. Thinner-shelled whelks such as the channeled and pear whelks have different food preferences than the thick-shelled knobbed and lightning whelks. Although pot fishermen in the Northeast have been successful harvesting channeled whelks over many years, fishermen in areas where channeled whelks are less abundant have used other fishing techniques to harvest locally abundant species.

The channeled whelk is characterized by a deep channel at the suture, as its common name suggests, numerous small beads on the shoulder's outer edge, and a shell covered with fine hairy projections. These projections are periostracum in origin and one of the three structural layers characteristic of molluscan shells. The periostracum, with a high organic content and considerable protein, often becomes worn away in older specimens. The remaining two layers of shell, which consist mostly of calcium carbonate crystals, include the massive prismatic layer and the usually shiny innermost nacreous layer. Together these three layers constitute a relatively thin shell in the channeled whelk, a characteristic shared with the pear whelk. The channeled whelk, however, is the only species with a well developed



Channeled Whelk
Busycon canaliculatum

Channeled Whelk
Busycon canaliculatum

periostracum layer.

The channeled whelk is unique among *Busycon* since it deposits egg capsules with a single edge or keel. The upper surface of the capsule is convex, bending down to the planar lower surface to form a single edge. The plug, where hatching whelks exit, is located on the edge 180° from the attachment site of the egg string. The exit plug is digested by an enzyme as young whelks become ready to hatch. Open holes or exits are easily recognizable on egg strings found on beaches.

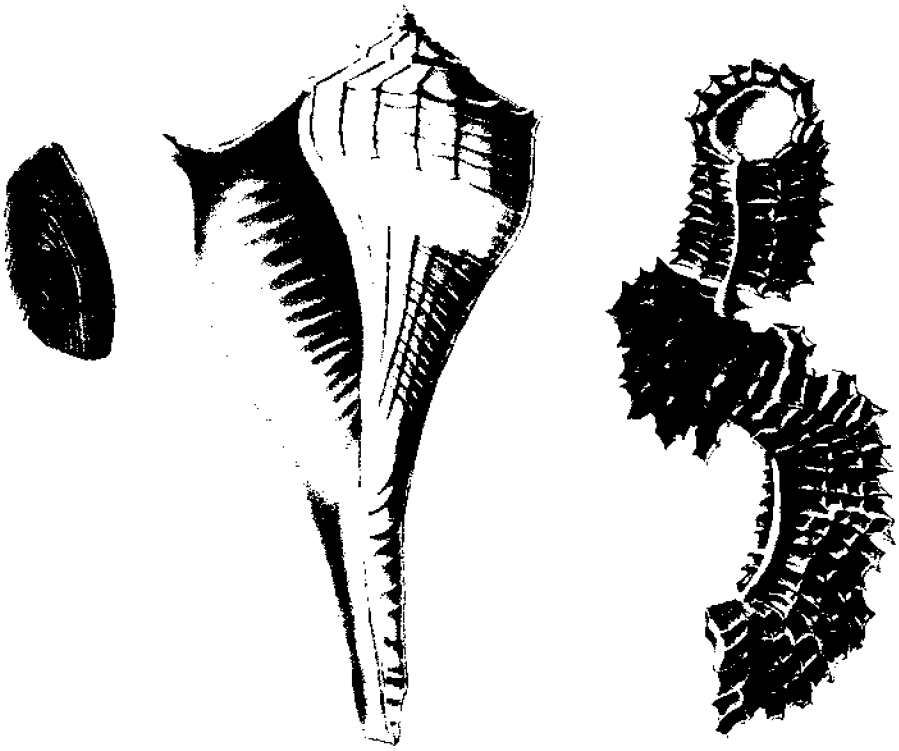
Female whelks form egg capsules one at a time in the capsule gland and pass capsules to the foot where the pedal gland attaches capsules to the egg string. The first 10-20 capsules are small, irregularly shaped and do not contain eggs. These first capsules are buried in the bottom and act as an anchor. Capsules attached above the bottom contain eggs provided by the gonad and packaged by the capsule gland. The number and size of capsules on an egg string usually varies in proportion to the female's size. Often as many as 70 capsules, with 100-120 eggs per capsule, can be found on one string. Rate of capsule formation may reach one capsule every two hours, and if formation is continuous, six to eight days may be required to complete a 70 capsule string. Obviously, female whelks invest considerable time and energy laying egg strings.

Lightning Whelk
Busycon contrarium

Lightning whelks *(Busycon contrarium)* sometimes reach 16 inches in shell length, making them the largest whelk found in South Carolina. The largest and whitest lightning whelks are usually found offshore, but sometimes these large whelks wash up on our beaches during the spring after severe winter storms. On rare occasions lightning whelks are discovered in shallow water, on sand and shell bottoms, or on oyster beds. The chance of finding live lightning whelks in these areas increases during the early fall when mature individuals migrate inshore to breed. Because they are capable of living over a wide range of salinities and tend to remain active during the daylight hours, chances of finding a living lightning whelk are much greater than that of finding the nocturnal pear whelk. However, both species are rather rare residents of South Carolina and are more common in Florida. Lightning whelks range from New Jersey to Florida and along the Gulf coast states.

The lightning whelk is normally the only whelk with counter-clockwise coiling and an aperture that opens on the left side. Among amateur shell collectors, this alteration in form is called a 'left-handed shell'. Coiling or spiral growth that produces whorls to the left is referred to by malacologists as sinistral coiling, as opposed to dextral coiling in the three other species. Except for the coiling difference, the lightning whelk closely resembles the knobbed whelk *(Busycon carica)*; possessing a thick shell, and a shoulder with prominent knobs.

Lightning and knobbed whelks have similar feeding behaviors and diets. Both species display a highly mechanized procedure for opening prey, as illustrated by their methods of attacking a hard clam. Once the whelk locates a clam, it grasps the clam shell with its muscular foot in such a way that the outer lip of its own shell is in direct line with the ventral edges of the two clam valves. Repeated contractions of the columellar muscle brings the whelk shell crashing down against the valve edges with such force that it causes the clam shell to chip or flake.



Lightning Whelk
Busycon contrarium

Lightning Whelk
Busycon contrarium

When enough of the clam shell is chipped away, the whelk will either use its shell for leverage to wedge open the clam, or it will insert its proboscis into the hole to reach the victim's soft parts. These repeated hard blows also cause chipping and breakage of the whelk shell, which is one reason why the outer edges of the shell lip of so many whelks are damaged. In fact, comparatively thinner-shelled whelks like the pear and channeled whelk may have to discontinue chipping of thick-shelled prey because of this shell erosion. However, the relatively thicker-shelled lightning and knobbed whelks may continue their attacks longer before shell repair becomes necessary. Diet studies of the lightning and knobbed whelk indicate some preference for the completely closed, thick-shelled bivalves such as hard clams, oysters, and cross-barred venus clams, rather than for other gastropods, thin-shelled bivalves or carrion. When thick-shelled, completely-closed bivalves are opened by *Busycon* chipping, evidence of this method of entry is quite prominent and noticeable among many of the empty shells (like ark shells) which are found on our beaches.

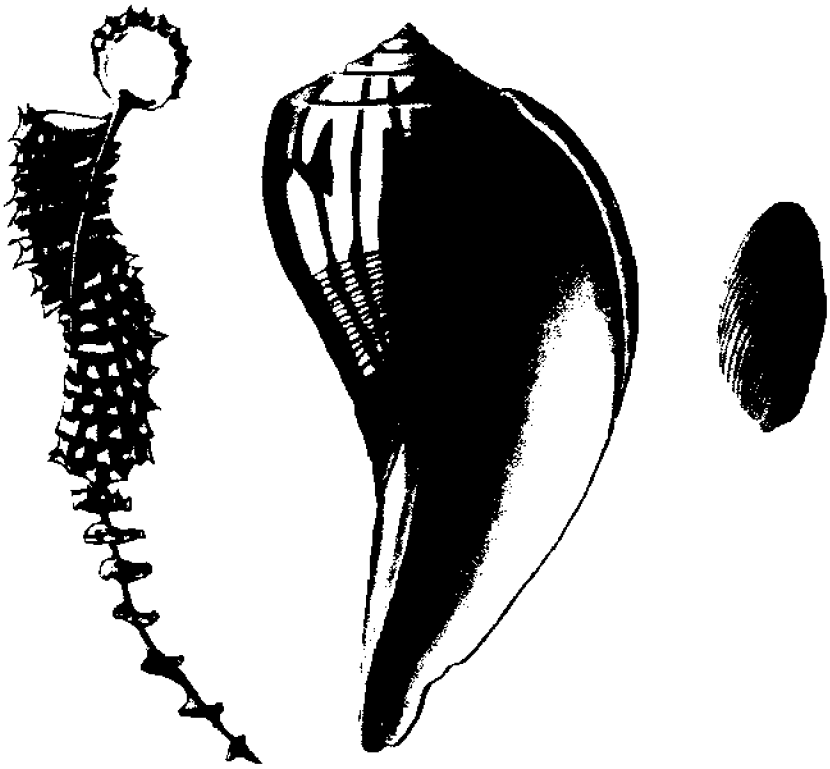
Pear Whelk
Busycon spiratum

The pear whelk *(Busycon spiratum)*, the rarest of the four species found in South Carolina, lives in high salinity subtidal areas. Because of its geographical distribution, North Carolina to Mississippi, shells of pear whelks are most often found along the southern part of our coastline. Pear whelks can be located in higher numbers in the intertidal areas of Florida and Georgia.

As the common name suggests, the pear whelk, *Busycon spiratum* is distinctly pear shaped with a large flaring aperture and broad siphonal canal. The shell lacks knobs, beads and hairy projections like the other species, and the shoulder is well rounded. It is the smallest of the whelks, rarely exceeding six inches in shell length. The shell is relatively thin, similar to the channeled whelk *(Busycon canaliculatum)*.

The feeding habits of the pear whelk appear to be reflected in the architectural features of the shell. Pear whelks attack active and incompletely closing bivalves, such as the razor clam, more successfully than large thick-shelled bivalves like the hard clam. The chipping behavior, characteristic of the lightning whelk *(Busycon contrarium)* method for gaining entry to the fleshy tissue of bivalves, appears poorly developed in the pear whelk.

The pear whelk's shell enhances feeding behavior in two ways. Similar to the channeled whelk, the pear whelk will orient the aperture lip of its shell along the ventral edges of the valves of an active bivalve and wait for the bivalve to open. When the prey opens its valves, the lip of the pear whelk's aperture is forced in as a wedge to prevent closure so that the proboscis can be inserted between the slightly opened valves. Pear whelks also use their shell's broad siphonal canal to trap prey within their aperture. This specialized behavior is very effective when capturing the more mobile gastropods, such as mud and moon snails. The relatively fast crawling rate of the pear whelk also helps it to capture more mobile prey. Regardless of the method of opening prey organisms, pear whelks and the other whelk species consume prey



Pear Whelk
Busycon spiratum

Pear Whelk
Busycon spiratum

by rasping off strips of tissue using a specialized feeding organ called a radula, found within an extensible proboscis. The radula is a long ribbon-like structure, with rows of short teeth, that resembles a wood file both in structure and action. Similar to a file, radular teeth become worn and damaged through continued use; however, new rows of teeth are constantly formed and move forward to replace those worn out. Bits of tissue, which are removed during backward scraping of the teeth, pass to an anteriorly located mouth and are swallowed. No evidence exists to substantiate the argument that digestion occurs externally as once thought. The whole process of food procurement can readily be observed by placing any of the four whelk species in a salt water aquarium with a suitable prey organism.

Shell Key for Four Species of Whelks Found in South Carolina

1. Shell is pear shaped, large, heavy shell, whorls shouldered, outer edge of the body whorl bears knobs . 2.
1. Shell is pear shaped, large thin shell, whorls shouldered, outer edge of the body without knobs . . . . . 3.
2. Whorls coil counter-clockwise, aperture on the left side of body whorl . . . . . lightning whelk *(Busycon contrarium)*.
2. Whorls coil clockwise, aperture on the right side of body whorl, large knobs often occur on the shoulder of the body whorl . . . . . knobbed whelk *(Busycon carica)*.
3. Whorls coil clockwise, aperture on the right side of body, deep channel occurs at the suture. outer edge of shoulders contain numerous small beads, these become flattened with age. shell covered in life with fine hairy projections . . . . . channeled whelk *(Busycon canaliculatum)*.
3. Whorls coil clockwise, aperture on the right side of body, a deep channel at suture is absent, no knobs or beads on shoulders, shoulder rather rounded, lacks fine hairy projections . . . . . pear whelk *(Busycon spiratum)*.

Egg Capsule Key for Four Species of Whelks Found In South Carolina

1. Upper and lower capsule surfaces form two distinct edges with the upright sides as in a many sided coin, geometric shape of a cylinder or polyhedron . . . . . 2.
1. Upper and lower capsule surfaces form a single edge, pronounced ridges radiate from the cord (capsule attachment site) to the capsule edge . . . . . channeled whelk *(Busycon canaliculatum)*.
2. Upper and lower capsule surfaces do not extend beyond the upright sides, shape of a more complete polyhedron 3.
2. Upper and lower capsule surfaces extend beyond the upright sides forming a distinct overhang, the undersides of which are connected with pleats, largest capsule of the four species . . . . lightning whelk *(Busycon contrarium)*.
3. Upper and lower capsule surfaces meet the upright sides with a slight overhang at the connective pleat, least developed connective pleats and most regularly shaped polyhedron of the species . . . . . knobbed whelk *(Busycon carica)*.
3. Upper and lower capsule surfaces overhang at the connective pleats to form acute projections or spines without extending between spines, spines appear to be a continuation of the well developed connective pleats, shape resembles a bottle cap . . pear whelk *(Busycon spiratum)*.

Glossary

APERTURE - the entrance or opening of a snail shell.

APEX - the top of the spire in snail shells.

BIVALVE - the taxonomic class of molluscs with two valves; includes clams, oysters and mussels

CALCIUM CARBONATE - the main structural component of mollusc shells.

CAPSULE GLAND - the gland which packages eggs in capsules or cases.

CARRION dead animal flesh.

COLUMELLAR MUSCLE - the muscle system which attaches the snail to its shell.

DEXTRAL - right-handed or coiled in a clockwise direction when viewed from above; when viewed from the front with apex upward, the aperture is on the right; opposite sinistral.

ESTUARY - a body of water nearly surrounded by land with open connection with the sea, sea water is measurably diluted by freshwater drainage.

FOOT - the large muscular extension of the whelk's body used for locomotion

GASTROPOD - the taxonomic class of molluscs that includes snails, slugs and nudibranchs.

GONAD - reproductive organ which produces gametes (e.g. eggs, sperm.)

INTERTIDAL - area between the high and low tide in coastal regions.

MALACOLOGIST - a person specializing in the study of molluscs; includes the study of shells and their makers (e.g. snails).

NACREOUS - the pearly or iridescent inner layer of some mollusc shells.

NUCLEUS - the initial (earliest) whorl of the shell or operculum.

OPERCULUM - a horny or calcareous plate attached to the foot of a snail that can seal the aperture of some snails when retracted.

OVATE - egg shaped.

PEDAL GLAND - a gland found in the foot of some snails where capsules are molded and fastened to surfaces (e.g. string).

PERIOSTRACUM - the outer organic parchment-like layer of many mollusc shells.

PRISMATIC - the massive layer of a mollusc shell which usually lies between the nacreous layer and periostracum; composed of calcium carbonate crystals.

PROBOSCIS - the flexible, protruded feeding organ of a snail.

PROTANDRIC HERMAPHRODITES - an individual that functions first as a male (produces sperm) and later in life as a female (produces eggs).

RADULA - the feeding organ possessed by most molluscs; composed

Glossary

of a ribbon-like structure to which are fixed teeth used to scrape and tear food.

SEXUAL DIMORPHISM - a condition in which males and females are visibly different (e.g. two forms or different sizes).

SHOULDERED - the flattened upper surface of a whorl; formed by a definite angle (shaped like a shoulder).

SINISTRAL - left-handed or coiled in a counter-clockwise direction when viewed from above; when viewed from the front with apex upwards, the aperture is on the left; opposite dextral.

SIPHONAL CANAL - an extension of the snail shell along the central axis; protects the siphon.

SPIRE - the upper surface of whorls from the apex to the body whorl.

SUBTIDAL - coastal areas below the low tidal mark.

SUTURE - the line marking the junction between the whorls of a snail shell.

VALVE - the calcified parts of a clam shell; two in the case of a bivalve.

VENTRAL - lower part of the shell; side opposite from the hinge in bivalves.

WHORL - a complete turn of a spiral shell; the last whorl before the aperture is the body whorl.

Preparing Whelks for Cooking

Within the secretive spirals of a whelk's shell lives an animal that offers superb fare for humans as well as for other marine organisms. Removing these animals from their protective housing can be a tedious chore, but the persistent cook will be rewarded by firm meat with surprisingly good flavor.

There are several ways of removing a whelk from its shell. The first and perhaps most difficult way is to tap a hole between the third and fourth whorls of the shell's spire. Then insert a sharp, slender knife in the opening and cut the columellar muscle which runs along the central axis of the shell. Twisting and careful tugging of the animal will yield fresh meat.

Other techniques involve either freezing the whelk overnight before attempting to pull it from its shell, or boiling it in water for about 5-10 minutes. A sharp object such as a screwdriver will aid in the removal of meat from cooled or thoroughly defrosted whelks. Trim any viscera and soft parts from the muscular foot and head of the whelk. This will leave edible meat which only needs to be washed before cooking.

Whelks tend to be a little tough, so try long, slow simmering, quick frying, or tenderizing in a pressure cooker for best results. It is excellent in fritters, chowders, and as seviche. And whelk's distinctive taste has long been a favorite in such ethnic dishes as scungilli marinara.

Recipes

Keys Conch Chowder

1 pound conch meat
2 large onions, chopped
3 garlic cloves, mashed
1 green pepper, chopped
1 can (8-ounces) tomato sauce
1 can (8-ounces) tomato paste
3 medium size potatoes, diced
1 tablespoon dried oregano
1/2 tablespoon salt
1/8 teaspoon pepper
1 hot pepper, chopped fine or liquid hot pepper sauce to taste
Sherry

Put conch through a food grinder, using coarse blade of food processor, or pound with a mallet and cut into very small pieces. Cover with water and simmer for 30 minutes. Add onions, garlic, green pepper, tomato sauce, tomato paste, potatoes and 3 more cups water. Add oregano, salt, pepper and hot pepper. Simmer until potatoes are tender, about 30 minutes. Add a dash of sherry to each serving. Makes 4 to 6 main course servings, or 6 to 8 soup course servings.

Whelk Fritters

1 pound whelk meat
1 egg
1/3 cup milk
1-1/3 cups sifted flour
2 teaspoons baking powder
1/2 teaspoon salt
1/2 teaspoon celery seeds, or 1 tablespoon minced onion
2 bird peppers, chopped fine, or 1/4 teaspoon hot pepper sauce
Peanut oil for frying

Put whelk through a food grinder, using coarse blade, or pound with a mallet and cut into very small pieces. Beat egg and add milk. Sift flour with baking powder and salt and add to egg mixture. Add chopped whelk, celery seeds or onion, and chopped peppers or hot pepper sauce. Drop batter by tablespoon into hot oil. Brown on all sides. Drain on absorbent paper. Serve hot with tartar sauce or cocktail sauce, if desired. Makes about 3 dozen fritters.

If serving fritters as a main dish, you may prefer a less spicy flavor. Reduce the amount of bird peppers or hot pepper sauce. Make the fritters larger, about 2 tablespoons of batter for each fritter. Makes about 16 fritters. After draining the fritters of either size, pile them in a pyramid on a folded cloth napkin to serve. Garnish with parsley sprigs and lemon wedges or halves.

Recipes

Scungilli Marinara

1 1/2 pounds whelk meat, parboiled sliced thin
3 tablespoons olive oil
2 garlic cloves, mashed
1 small onion, sliced thin
1 celery rib, minced
2 cups Italian plum tomatoes, drained
2 tablespoons tomato sauce
1/2 teaspoon salt
1/2 teaspoon dried oregano
1/2 teaspoon dried basil
2 bay leaves
1/4 teaspoon dried red pepper flakes

Place the oil, whelk, garlic, onion and celery in a large skillet and brown. Discard the garlic and add tomatoes, tomato sauce and salt. Cover and cook slowly for 5 minutes. Then add the oregano, basil, bay leaves and red pepper flakes. Cook for 5 minutes longer. Discard the bay leaves. Makes 4 servings.

Cream of Conch Soup

6 conchs, bruised
6 cups water
2 celery ribs with leaves, chopped
2 raw carrots, chopped
1 green pepper, chopped
1 large onion, quartered
2 tomatoes, quartered
1/4 teaspoon dried thyme, or sprig of fresh thyme
Salt and pepper
3 tablespoons butter
2 tablespoons flour
2 cups heavy cream
1/4 cup sherry

Put the conchs in a large kettle and add the water, vegetables and thyme. Bring to a boil and simmer for 1 hour. Remove 4 conchs and set aside for another use. Grind remaining 2 conchs and reserve. Strain the broth, pressing all liquid out of the vegetables. Season the broth to taste. Melt the butter in the top part of a double boiler over simmering water. Stir in flour, then the seasoned broth and the ground conch. Mix well and continue to heat but do not let it boil. Just before serving add the cream and heat, then add sherry and serve. Makes 6 servings.

Recipes

Whelk Seviche

3 cups diced whelk
3/4 cup lime or lemon juice
1 cup chopped onions
1 cup tomatoes, seeded and diced
2 teaspoons salt
2 tablespoons cider vinegar
1/2 cup diced chilies or choice peppers
1/2 teaspoon oregano

Clean whelk by freezing over night then prying apart when thawed. Remove viscera and peel skin from foot. Cut meat into 1/4" to 1/8" strips and pound with mallet or back of knife to tenderize. Rinse meat and place in large mixing bowl (glass or stainless steel). Add other ingredients, mix well. Cover and refrigerate for at least one (1) hour. Best flavor will be obtained after 24 hours. Serve cold as side dish or as a low calorie, high protein main course.

Conch Salad

1 pound conch meat
1 large onion, or 3 green onions, chopped fine
6 tablespoons lime juice
1/4 cup cider or wine vinegar
4 tablespoons olive or salad oil
1-1/4 teaspoons Worcestershire sauce
2 bird peppers, chopped fine, or 1/4 teaspoon hot pepper sauce
1 large green pepper, chopped
2 celery ribs, chopped fine
1/2 cucumber, peeled and chopped fine
2 medium-size tomatoes, chopped
1/2 tablespoon salt
1/4 teaspoon pepper

Put conch through a food grinder, using coarse blade, or pound with a mallet and cut into pieces about the size of a small green pea. Combine conch, onion, lime juice, vinegar, olive oil and Worcestershire sauce in a bowl. Mix well. Let stand in refrigerator for 3 or 4 hours, or overnight. Add bird peppers or hot pepper sauce, green pepper, celery, cucumber, tomatoes, salt and pepper. Mix thoroughly and chill. Makes 4 or 5 luncheon servings, or 10 or 11 appetizer servings.

For Further Reading

Abbott, R.T. 1974. American Seashells (2nd edition). D. Van Nostrand Co. Inc. Princeton, N.J. 633 p. (description of shells and egg strings).

Abbott, R.T. 1968. Seashells of North America. Golden Press, New York. 280 p. (description of the process of egg laying).

Brown, F.A., Jr. 1949. Selected Invertebrate Types. John Wiley & Sons, Inc., New York. 597 p. (dissection guide).

Carriker, M.R. 1951. Observation on the penetration of tightly closing bivalves by *Busycon* and other predators. Ecology 32: 73-83. (description of feeding behavior).

Eversole, A.G. and W.D. Anderson. 1982. Whelks. Saltwater Conversation 1982(4): 19-24. (general biology and discussion of the fishery).

Magalhaes, H. 1948. An ecological study of the genus *Busycon* at Beaufort, North Carolina. Ecological Monographs 18: 377-409. (best overall ecological study of whelks).

Paine, R.T. 1962. Ecological diversification in sympatric gastropods of the genus *Busycon*. Evolution 16: 515-523. (discussion of feeding types).

Russell-Hunter, W.D. 1979. A Life of Invertebrates. Macmillan Publishing Co., Inc., New York. 650 p. (general coverage of the phylum Mollusca).