



COAST GUARD ONLY

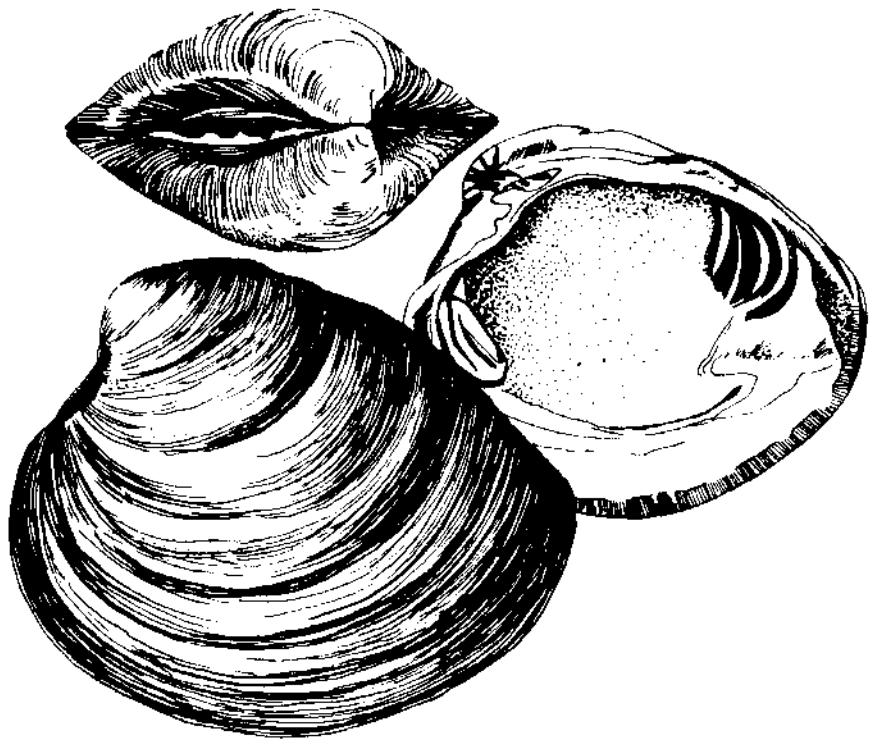
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A New England clambake... Clams casino... Manhattan clam chowder. Got your mouth watering yet? If not, you probably won't qualify as a clam gourmand. But even if clams aren't your cup of tea, there *is* something here for you. You can read about how to catch the little creatures — sport and commercial clamming — and about how clams live and reproduce in the bays and estuaries of the East Coast.

The hard clam (*Mercenaria mercenaria*) is the subject. Its scientific name comes from the Latin *mercenari* which means "hired for wages" or "hired one." Hard clams are found all along the East Coast and around the Gulf Coast from Nova Scotia to the Yucatan. Introduced populations are found in the state of Washington and in England. Hard clams can't tolerate fresh water, so you'll usually find most of them at the lower end of bays where the water is saltiest.

Nature has taken special precautions to insure survival, enclosing the little critter in a rock-hard shell and burying it in the bottom of our estuaries. But that doesn't seem to bother the thousands of enthusiastic people who go clamming every summer.

It didn't seem to bother the American Indians either. At one time, huge mounds of shells or

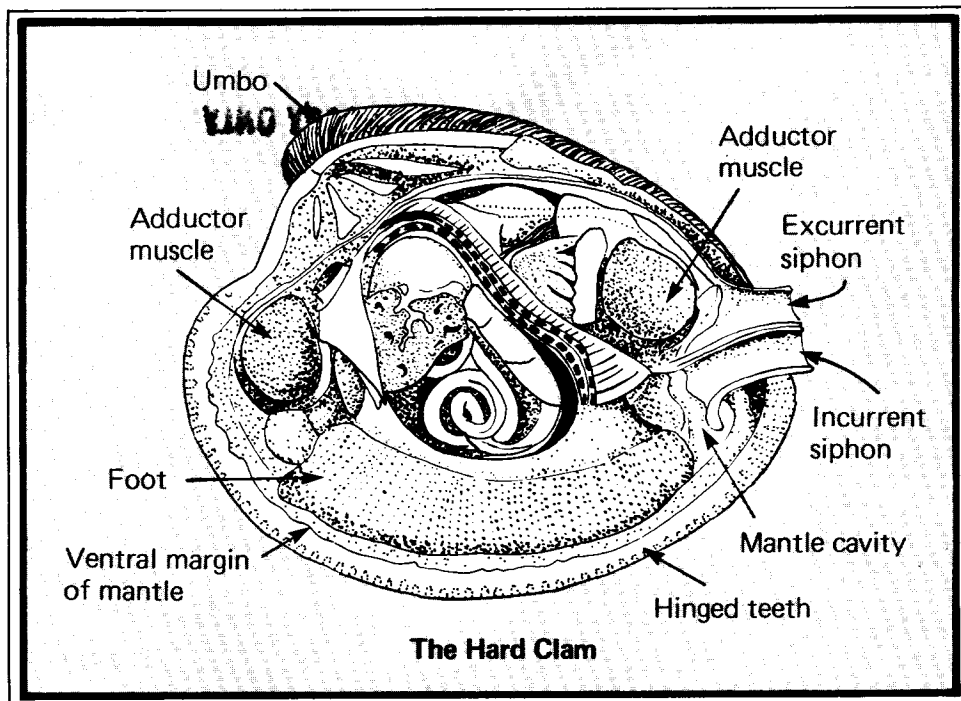


"kitchen middens" could be found all along the northeastern shore of the U.S. A kitchen midden was where the Indians deposited their garbage, and hard clam shells accounted for quite a bit of that garbage. But not all the shell was thrown away. The Indians used the purple or dark blue border on the inside of the shell to make bead necklaces for wampum. They also made white beads from whelk and periwinkle shells but the purple clam shell was more valuable to them.

Wampum originally had a sacred significance to the Indians.

It was only after the first European settlers arrived that wampum began to be used as money and became accepted as a standard of value.

In many areas, the hard clam is known as the "quahaug," actually a corruption of the Narragansett Indian name "Poquauhock" which the early settlers couldn't pronounce. Cherrystone and little-neck, though sometimes used to mean different kinds of clams, are really names for different sizes of the hard clam. In some areas along the East Coast hard clams are called round clams.



### Biology of the Hard Clam

Hard clams are invertebrates (they don't have a backbone). Beyond that they are classified as *bivalve mollusks*, meaning they have two valves or shells and a soft body. Oysters, mussels and scallops are bivalve mollusks, too — there are about 10,000 different bivalves worldwide.

In the mid-Atlantic region a new population of hard clams begins every summer. It is the warm water (about 79°F or 26°C) that stimulates the hard clam's spawning cycle. Sperm, released by the male into the surrounding water, stimulates the female and she releases eggs. Water currents mix the sperm and eggs and fertilization occurs in the water. This is known as external fertilization.

The fertilized eggs don't waste any time. By the end of the first day, they have become *veliger larvae*. In this stage they swim and feed while drifting with the water currents. The drifting or planktonic stage is nature's way of repopulating old clam beds and starting new populations in places that may not have had clams before.

Soon the skin-like outside tissue, called the *mantle*, starts to

form the two shells and the *umbo* (the rounded area of the shell just above the hinge). All this extra weight makes the clams heavier and by the sixth to tenth day, they can no longer swim freely. The clams settle to the bottom to find a new home. Only about 10% of the eggs that were originally fertilized will survive this long. Some will have become food for hungry fish or crabs; others will have been carried by the water currents to places where conditions were not right for growth (pollution, wrong salinity or poor food).

How do clams decide where to settle and live? Even the scientists don't know the answer to that question. Some studies have shown that more adult clams are found on shell-covered bottoms than on any other kind. Next most preferred material is a mud/sand combination, followed by sand, gravel, and pure mud (silt). The answer to "why a shell-covered bottom" isn't known. Maybe something allows juvenile clams to choose the bottom type, or maybe the survival of young clams is simply greater on a shell bottom.

After settling, young clams attach to the bottom by producing byssus threads. These threads are

thin strands of secreted material similar to the material that mussels use to anchor themselves to rocks and pilings. The valve hinge on clams is made of byssus threads, too. Unlike mussels, clams lose the ability to make byssus thread as they grow older.

As clams mature, they use a muscular foot to burrow into the bottom. By alternately extending, swelling and contracting, the body is pulled down into the bottom mud or sand. Most clams don't burrow down very far, remaining close enough to the surface so the tips of their siphons are exposed. These two siphons, sometimes called the "neck," help the clam to breathe and eat. One siphon brings in water that carries oxygen for respiration and food (microscopic algae) for growth. This incoming water passes over the gills where oxygen is absorbed and algae are filtered out by thousands of hair-like cilia on the gills. Some algae are retained as food and are passed on to the clam's mouth. Other algae, foreign particles, and the filtered water are then expelled through the other siphon.

When the clam is disturbed or frightened, it burrows deeper to avoid the enemy. Hard clams have quite a few enemies. Some of the more common predators are blue crabs, conchs, sting rays, horseshoe crabs, and moon snails. Most predators feed on juvenile or small clams since the larger ones have heavy shells and are well protected.

As with many animals, growth of clams slows with increasing age, but certain sizes usually indicate an approximate age. In the mid-Atlantic region, it takes about three years for a clam to reach 1-1/2" — the legal harvesting size in Delaware (and even then some are not sexually mature or able to produce eggs or sperm). Over the next seven to eight years perhaps only another inch and a half is added. After that, growth slows even more. For example, in the next six years or so, the clam will add only an inch or less to its size. Hard clams are known to live for 30 years, and some may live to be much older!

## Commercial Clamming

Fourteen clam species are harvested in the United States and the hard clam industry is the largest and most valuable of all. Although the hard clam represents only 17% of all the clams harvested, it accounts for 53% of the dockside value. On public lands, hard clams are usually harvested by hand methods. On leased lands, depending on the state laws, clams may be harvested mechanically with a dredge or patent tongs. In 1977, most states reported their stocks of hard clams were being harvested at or very close to the maximum sustainable yield (MSY). MSY, in any fishery, is that level of fishing effort at which you can take the greatest amount of catch without affecting the size of the stock's population, because it is being replenished by natural growth.

In Delaware, resident commercial clambers are charged \$50 per year for a license that entitles them to 2,500 clams per day, using tongs or a rake. A separate license or permit is needed for dredging where and when permitted. Non-residents may buy a commercial license for \$500. Most clambers work from a small boat and use a bull rake, called that because of the tremendous strength needed to pull one all day. A bull rake is a large version of a non-commercial clam rake and has a head 32 to 36 inches across and handles extending to 25 feet.

In all cases, commercial clamming on Sunday is not permitted in Delaware and all clams must be unloaded within the state.

Clams are graded according to four sizes. The smaller ones are *littlenecks* and *cherrystones*, both in heavy demand and bringing a premium price. Littlenecks and cherrystones are the ones that are eaten raw or steamed. Many times the demand is greater than the supply. The same cannot be said for the *medium* and *chowder* size clams. Because of their larger size they are used in various clam dishes, stews and chowders rather than eaten alone steamed or raw.

All clams harvested in Delaware must be larger than 1-1/2 inches. Some dealers may have smaller clams for sale, usually at a premium price. These clams were harvested in other states where state laws permit it.

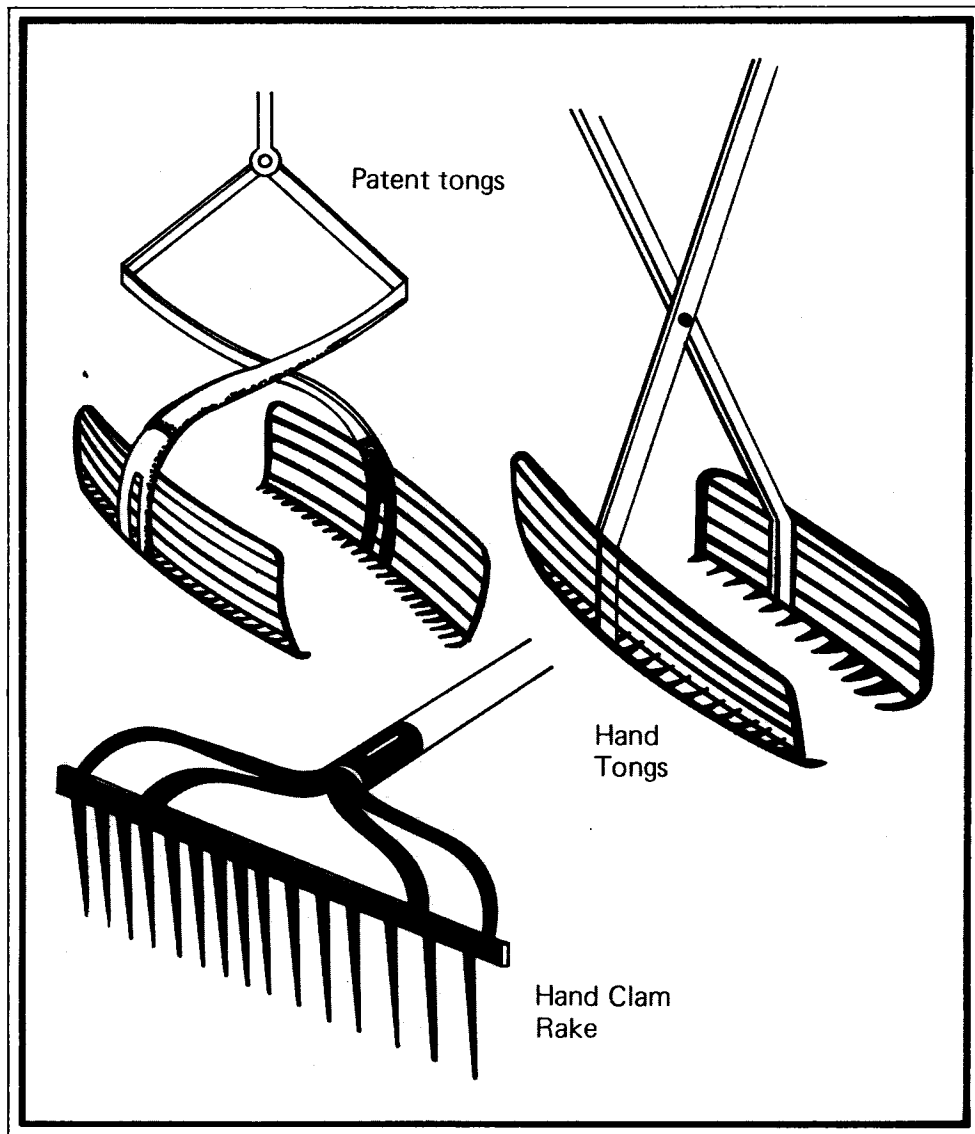
## Recreational Clamming

Digging for clams is a favorite family activity during the summer. It's fun to pack a picnic lunch and make the trip an all-day affair. Here's the usual clamming gear that's taken along: a clam *rake* (the tines are twice as long as a garden rake), an *inflated inner tube with a bushel basket* tied securely inside, and a short piece of *rope* to tie the inner

tube to your waist so that both hands are free. Wear a pair of old sneakers to avoid cutting your feet on broken shells or glass.

There's really no secret to digging for clams — it's quite simple. Draw the rake through the muddy bottom till you feel a clam or hear the tines scraping a shell. Then work the tines down under the clam and pry it out of the bottom. Hold the rake vertically and lift it hand over hand to the surface. The rake will probably be full of mud and sand, so just turn the rake sideways, tines up, and wash it out by shaking it in the water. This will clean the rake and leave the clams. Then dump the clams in the basket.

Clams are much easier to dig in shallow water, so before you set out for a day of clamming, check



the tides and plan to dig clams during low tide.

Some people like to clam in their bare feet so they can feel for the clams with their toes. Although this *does* work, it's not recommended — for obvious safety reasons. You might injure your "clam rake".

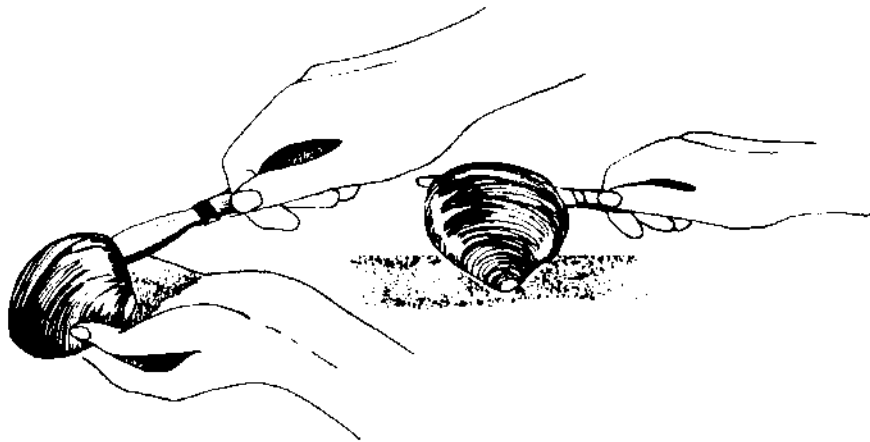
In Delaware as in most states, there are rules and regulations about digging clams. Clamming is allowed in all of Delaware's coastal waters except where prohibited by the Department of Natural Resources and Environmental Control and the State Board of Health. One of the tests regularly performed on Delaware waters by the State Board of Health is for coliform bacteria and is known as the "coliform count". Coliform bacteria are often present in the water but in low concentration. When high concentrations are detected, the state closes those particular clamming areas. It's not the coliform bacteria that can cause harm — but the presence of coliform is an indicator of the possibility of other harmful bacteria or viruses.

You may wonder why clamming is prohibited in certain areas but crabbing or fishing in the same areas is not. There are several reasons:

- Bivalves, including clams, are filter feeders. Crabs and fish are not. The filtering process allows clams to take in various kinds of microscopic algae from the water. But it can also allow them to take in harmful bacteria and/or viruses that could then be eaten by humans.
- We often eat clams either raw or partially cooked and we eat the entire animal including the digestive tract. With fish and crabs we only eat the muscle tissue and it's usually well cooked.
- Most bivalves are sedentary, burrowing in the bottom and staying in the same general area. Therefore, they are continuously subjected to water quality in that one area.

## GLOSSARY OF CLAMMING TERMS

- Adductors:** two muscles that adduct or close the valves (or shells) of the clam.
- Adductor (muscle) scars:** depressions on the shell that mark the attachment area of the muscle.
- Beak:** the umbo or rounded extremity just above the hinge; the point at which the shell began to grow.
- Byssus:** bundle of small threads secreted by the foot; used by juvenile clams to anchor to rocks or sand grains.
- Cherrystone clam:** a 2 - 3" hard clam.
- Commercial purpose:** a person's intent to sell shellfish to another.
- Chowder clam:** a hard clam over 3-1/2" in size.
- Culled:** separated live shellfish from all other material organisms.
- Cultivation:** process of preparing and/or improving shellfish grounds to foster the growth and survival of shellfish.
- Foot:** muscular, fleshy organ of locomotion in mollusks.
- Gill:** respiratory organ of a mollusk.
- Hand tongs:** any grasping device consisting of two pieces joined to one end of a pivot and manipulated by person's physical exertion.
- Hinge (ligment):** elastic material connecting the two valves.
- Hinge teeth:** small teeth on each valve that lock together when the valves are tightly closed.
- Littleneck clam:** a hard clam under 2".
- Mantle:** skin-like tissue that lines each valve and secretes the new layer of shell.
- Medium clam:** a 3 to 3-1/2" hard clam.
- Mechanical device:** an apparatus operated by a machine used to take shellfish.
- Mother of Pearl:** shiny or pearly layer on the inside surface of each valve often called the na'cre layer.
- Non-resident:** any person not an alien who has not continuously resided in the state for one year.
- Neck:** the siphon.
- Patent tongs:** any grasping device consisting of two pieces joined at one end by a pivot and raised with a rope cable or other hoisting device used to take shellfish.
- Resident:** any person not an alien who has continuously resided in the state for one year or more.
- Siphon:** sometimes referred to as the "neck"; actually a tube-like extension of the mantle consisting of one tube to bring water in and one to expel it.
- Shellfish:** any mollusk or crustacean including oysters, mussels, whelks, clams, lobsters, crabs, and shrimp.
- Shellfishing:** to attempt to take, catch, kill, or reduce to possession any shellfish by any means whatsoever.
- Valve:** one of the shells enclosing the clam.
- Veliger:** the larval, swimming stage of a mollusk.



*Sometimes freezing the clam first makes it easier to shuck.*

### Shucking and Storage

Clams are quite hardy and will live for several days if you're careful about how you store them after digging them up:

*NEVER put clams in sunlight  
NEVER put clams in fresh water*

*NEVER use a clam that has opened (it's dead)*

*DO cover clams with a wet burlap bag*

*DO keep clams in a cool, shady place or refrigerate them*

*DO shuck them as soon as possible*

Shucking clams looks easy but it does take some care and practice.

Before you do anything, wash and scrub the clams. Then set them aside for awhile. Hard clams have hinge teeth that lock together when the animal is disturbed. You need to give the clam time to relax the hinges so you can slip a knife between the valves. Hold the clam in the palm of one hand with the hinged end against your thumb. Insert the knife between the halves of the shell, twisting the knife to pry open the clam. Cut the two adductor muscles free of the shell.

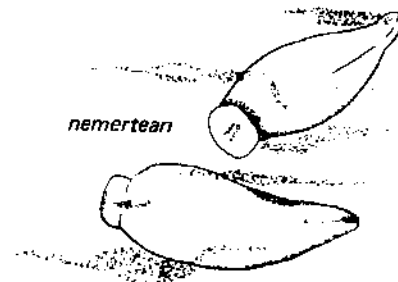
Don't force a clam to open. Forcing the knife may result in a cracked shell -- or worse -- a cut hand. If you have trouble, simply lay

the clam aside and come back to it later when it has relaxed its adductor muscles.

If you are not in a hurry, an easier way to open your clams is to freeze them first. Then put them under hot running water for about a minute. This will thaw the animal enough to allow you to insert a knife and open the shell.

You'll find many varieties of commercial clam openers on the market. One works like a paper cutter, but has the blade in the center of the board instead of on one side. Another works like a pair of scissors and is usually used for halving smaller clams.

In a few cases you might come across a tiny worm inside the clam shell. This *nemertean* is harmless, both to you and the clam. The two share a commensal relationship -- the worm gets a home and food from the clam without physically harming it. Just discard the worm.



*Nemerteans (small marine worms) are sometimes found in clams.*

## RECREATIONAL CLAMMING IN DELAWARE

1. It is unlawful to use a device other than a hand-held rake with a head 14 inches or smaller and a handle 7 feet or less.
2. All clamming must be done during the period one half hour after sunrise to one half hour before sunset.
3. Resident recreational clambers without a permit are allowed 100 clams per day. Resident recreational clambers with a permit are allowed 500 clams per day.
4. Non-resident clambers are allowed 50 clams per day only.
5. Legal size clams are at least 1-1/2" across. Measure the clam from the *umbo* (the rounded area of the shell just above the hinge) across the valve to the outer edge. A matchbook makes a good measuring stick, since it is exactly 1-1/2" long.

For specific details, write or call:

*Division of Fish and Wildlife  
Edward Tatnall Building  
Dover, DE 19901  
(302) 678-4431*