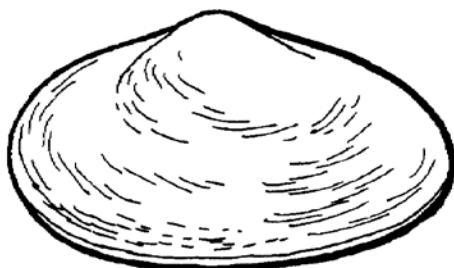




# What's a Clam?

Facts and Fun  
with soft shell clams



Massachusetts Division of Marine Fisheries  
Shellfish Purification Plant  
84 82<sup>nd</sup> Street  
Newburyport, MA 01950

Clams are **invertebrates**. Invertebrates are animals that do not have a backbone. Clams belong to a group of invertebrates called **mollusks**. There are over 100,000 kinds of animals or **species** in the Mollusca **phylum** or category.



Clams are also known as **shellfish**. The term shellfish includes members of the mollusk phylum and the crustacean subphylum. Crustaceans are lobsters, crabs and shrimp. Crustaceans are really more related to insects than to clams.

Some shellfish or mollusks only have one shell, such as snails. Soft shell clams have two shells so they are known as **bivalve** mollusks. The shells are held together with a hinge.

Other bivalves are scallops, oysters, mussels and the hard shell clam or **quahog**. It's hard to believe but there are some shellfish which have **no** outside shells. Squid and octopus are examples of shellfish which have no outside shells.

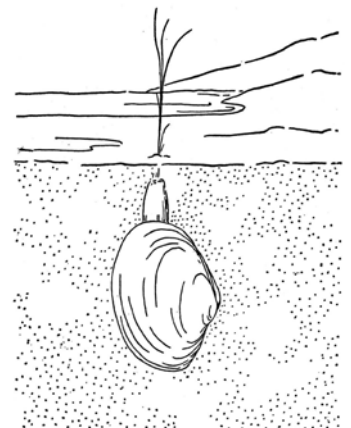


### Did you know??

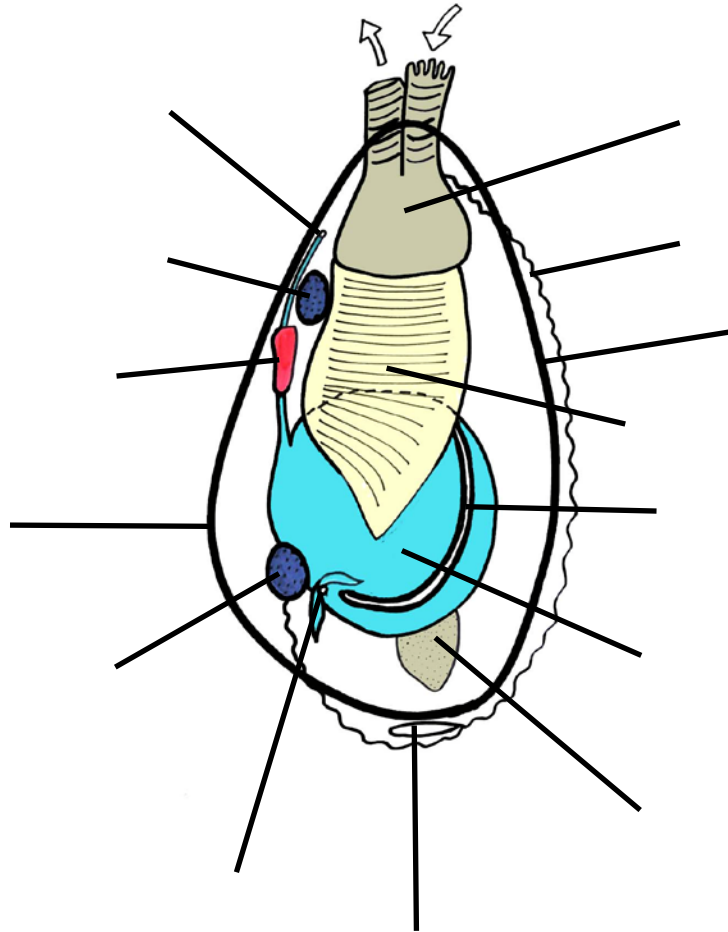
- There are over 15,000 different species of clams world wide.
- The biggest clam is the *Giant Clam, Tridacna gigas*. It can grow up to 4.8 feet long and weigh 550 pounds.
- *Mya arenaria*, the soft shell clam, typically measures about 4 inches and weighs less than a quarter of a pound.
- Soft shell clams are found on the East Coast from Northern Canada to Cape Hatteras, North Carolina. They also in the Pacific Coast regions of Alaska, Washington, California and in Western Europe.
- Soft shell clams are also known as steamers, nannynose or long necks.

Soft shell clams live in the **intertidal** zone, the wet area exposed between high and low tide. Clams are under the water during high tide and are uncovered on the tide flats during low tide. To protect themselves clams burrow down in the mud and sand using their foot. They can burrow more than 11 inches! When the tide comes in, they stick their siphons out and inhale fresh seawater to get oxygen so they can breathe. They also obtain algae, so they can eat.

Did you know that clams actually live in the sand upside down? The mouth of the clam is next to the foot or at the anterior end. The anus, where waste is secreted is at the top or posterior end. Let's see what the inside of a clam looks like:



## Can you name the parts of the Soft Shell Clam, *Mya arenaria*?



**exhalant siphon** – channel where water is excreted from the clam

**inhalant siphon** – channel where water enters the clam

**umbo** – the oldest part of the clam shell containing the valve which holds the shells together

**foot** – appendage used for digging or burrowing into the mud

**visceral mass** – area containing the internal body parts

**crystalline style** – rod that spins in the stomach to sort food and aid digestion

**gills** – used for obtaining oxygen

**shell** – hard outer protection layer

**mantle** – a thin membrane surrounding the body of the clam that secretes the shell

**siphon flap** – fused mantle tissue from which projects the siphons

**foot slit** – area where foot is able to extend through the mantle

**mouth** – area to which food is brought when swept from the gills

**front adductor muscle** – the anterior muscle that holds the shells together

**back adductor muscle** – the posterior muscle that holds the shells together

**heart** – organ that pumps primitive blood

**anus** – region where waste is excreted

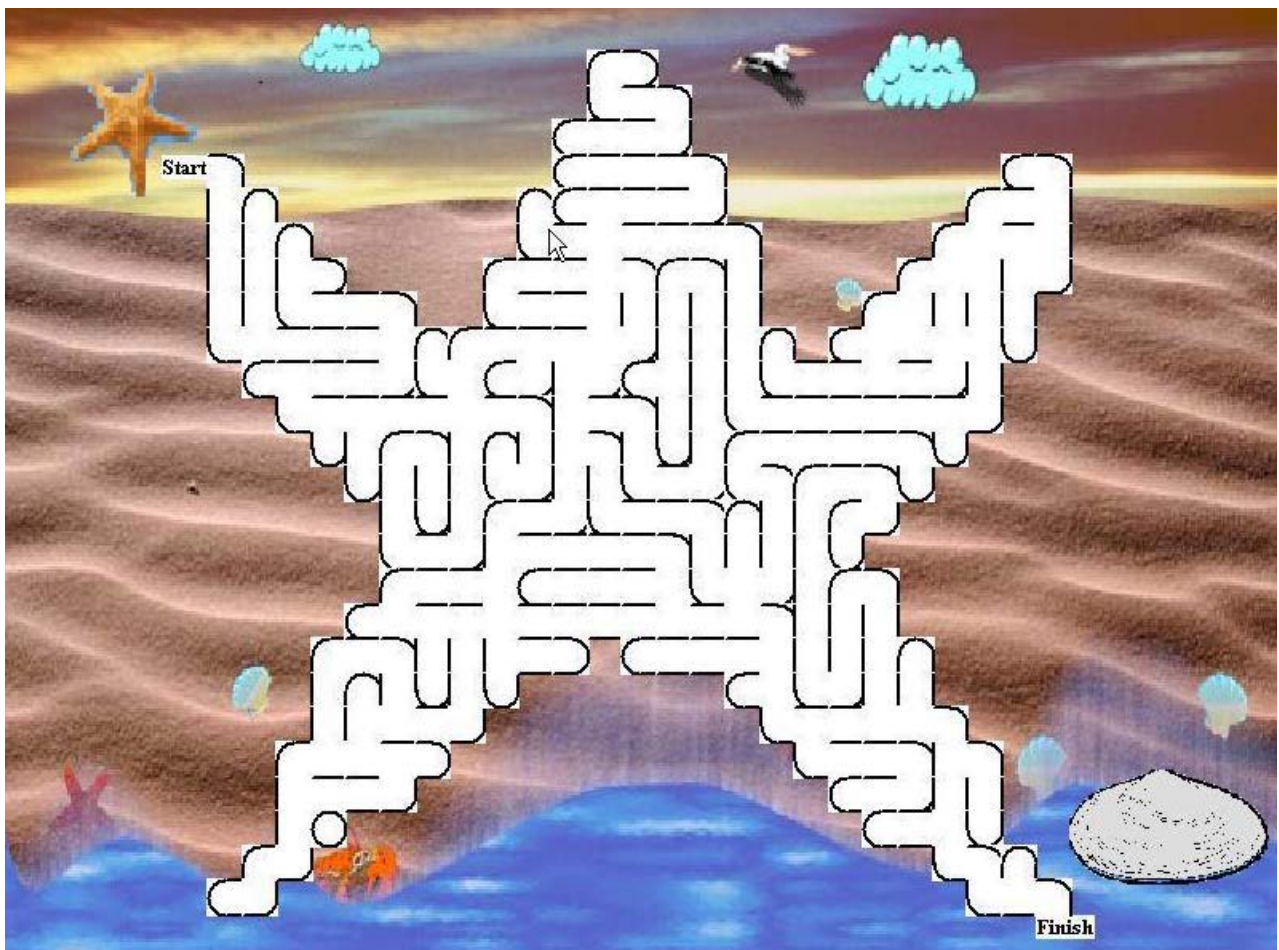


○ In some clam species the crystalline style can rotate at speeds in excess of 500 rpm's!

## ★ Life Cycle ★

It's not easy being a soft shell clam. Baby clams start their lives as small free swimming larva. Here they can easily be eaten by fish, swept away by ocean currents or stranded on the beach. Only about one tenth of 1% of all larvae in the ocean survive to become adult clams. After 4 to 6 weeks of free swimming, the young clams settle and attach themselves to the ocean bottom or to seaweed with thin byssal threads. Four months later, the byssal threads disappear and the heavier shelled juvenile clams are moved by the ocean wave action toward the intertidal zone. They are deposited here and left to burrow into the sand and mud. The intertidal zone is also a difficult place for a clam to live. Many animals like to eat clams such as: horseshoe crabs, starfish, whelks, green crabs, moon snails, seagulls and humans.

### Help the Starfish find the Clam



### Did you Know?

- It takes 2 years for a soft shell clam to grow to the Massachusetts minimum harvest size of 2 inches.
- Soft shell clams can live for 10-12 years. Some may have lived for as long as 28 years.
- A green crab can eat as many as 15 clams a day.

# A Clammy Tale

Hi! I'm \_\_\_\_\_ and I'm a clam. When I was a baby clam I used to float in the water.  
(your name)

I used to \_\_\_\_\_ in the water all day. This however can be very dangerous for a  
(verb)

baby clam. I could have been eaten by fish, \_\_\_\_\_ or other ocean animals. As  
(animal, plural)

I got bigger and heavier I found that I could no longer float like I used to and so I settled down  
on the \_\_\_\_\_ sand of the beach. But the \_\_\_\_\_ also can be a dangerous place for  
(adjective) (place)

a young clam. Lying on the beach I could have been eaten by seagulls, crabs, \_\_\_\_\_ or  
(animal, plural)

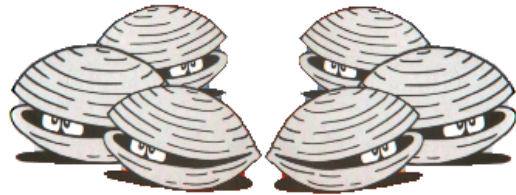
stepped on by humans. As I \_\_\_\_\_ around on the sand I discovered that I had grown  
(verb, past tense)

a \_\_\_\_\_ so I decided to dig myself down into the sand for safety. Not even  
(body part)

\_\_\_\_\_ would be able to find me now! I kept my siphon sticking out so even  
(friend's name)

when buried in the sand I would still be able to drink the \_\_\_\_\_ seawater above me.  
(adjective)

And so, here I sit, \_\_\_\_\_ the clam, happy as a clam beneath the sand.  
(your name)



Let's see if we can solve the riddle:

Q:

\_  
 Ψ Σ @ ♥ % † • † ♠ # @ ≈ ≈ @ # ≈ @ ∞  
?

\_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_  
 Ψ Σ † % † € ♦ Ω † ♥ ♦ Σ @ ♣ €

A:

\_ \_ \_ \_ \_ \_ \_ \_ \_ \_  
 ♦ Σ € ≈ ≈ ‰ ∂ ♦ Σ

Code:

|   |    |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---|----|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| @ | \$ | # | % | € | ‰ | £ | Σ | ∂ | Δ | ♦ | ≈ | ∞ | Ω | † | ‡ | □ | ♣ | ♦ | ♥ | ♠ | + | Ψ | ⊗ | • | ⇒ |
| A | B  | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z |



## Depuration



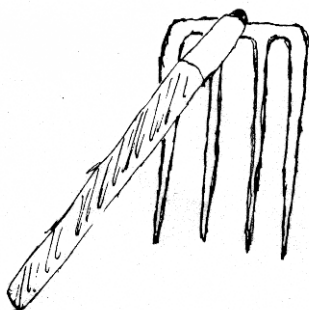
As soft shell clams filter water for oxygen, other things found in the water like algae, sand and bacteria can get stuck on their gills. Most clams in Massachusetts live in water that is clean. However, some clams live in water that is contaminated with **fecal coliform bacteria**. This bacteria is commonly found in sewerage. Clams that accumulate this bacteria are unsafe for human consumption. In 1928, the **City of Newburyport, Massachusetts** decided to build a **purification plant** to cleanse these contaminated clams and make them safe to eat. Currently this plant is operated by the **Massachusetts Division of Marine Fisheries** and is the oldest operating depuration plant in the world.

**Depuration** is a process that cleans shellfish by removing harmful bacteria. At the purification plant, bushel racks of soft shell clams are placed in big tanks of clean seawater. As the clams take in and flush themselves clean with seawater, the tank water containing the fecal coliform bacteria is sterilized by **ultraviolet light**. This light kills all bacteria. The depuration process takes a minimum of forty four hours to reduce the bacteria to safe levels. At the Newburyport plant the shellfish are tested daily in the laboratory to determine how contaminated they are when they come in and when they are safe enough to leave. After the process the clams are sold to shellfish dealers and restaurants. The Newburyport plant is the only state government owned and operated depuration facility in the country. Other depuration plants are privately owned and operated.



### Clam Facts

- A bushel of soft shelled clams weighs about 60 pounds.
- A single soft shelled clam can pump 10 gallons of sea water a day.
- Massachusetts only depurates the soft shell clam, *Mya arenaria*.
- On average the depuration plant processes a third of the total Massachusetts soft shell clam production.



← This is a clam fork. Clam diggers use this to dig clams out of the mud and sand.



**Can you say this ten times fast?**

Clyde the clam came to clean clothes... Clyde the clam came to clean clothes...



# Recipes



Soft shell clams have been used as food since long before the Pilgrims. Here are a few recipes that you and a grown up can make to enjoy soft shell clams.



## Steamed Clams a la Denis

3 quarts soft shell clams with shells  
1 cup water  
(adults may use a beer or wine/water combination)  
melted butter

Place the water in a large pot. Cover with a tight fitting lid and bring to a boil. Wash clams thoroughly removing the sand and mud from the outer shell. Place the clams in a basket or steamer and place the basket inside the pot with boiling water. Cover and steam for 5 to 10 minutes or until the clam shells are open. Discard any clams that do not open. Remove from heat and drain, saving the broth. Place the clams in a

big bowl, and the broth and butter in small bowls. To eat - open a clam and remove the shells. Holding the clam by the neck, dip the clam into the broth to remove any sand and then dip the clam into the butter. Everything may be eaten except for the tough skin of the neck.

## Diane's sweet as honey Fried Clams

1 quart shucked (without shells) soft shell clams  
2 eggs, beaten  
 $\frac{3}{4}$  cup milk  
2 Tablespoon honey  
 $\frac{1}{2}$  cup dry bread crumbs  
 $\frac{1}{2}$  cup flour or corn flour  
Dash pepper, salt or other seasonings  
Vegetable Frying oil at 375°F

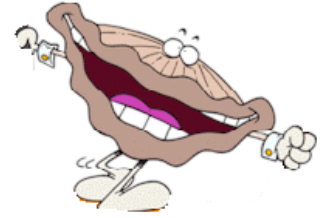


Drain clams and dry on a paper towel. Combine the eggs, milk and honey in one bowl. Combine the bread crumbs, flour and seasonings in another bowl. Dip the clams in the egg mixture then roll the clams in the flour mixture. Place clams in a basket and fry in oil for 2 to 3 minutes or until brown. Drain on paper towels.



## It's strictly New England Clam Chowder for Jeff

2 strips bacon or piece of salt pork  
¼ cup diced onions  
1 quart shucked and chopped clams, save clam juice.  
1 cup water  
¾ cup diced potatoes  
½ teaspoon salt  
½ teaspoon dried oregano  
¼ teaspoon dried basil  
2 cups milk  
pat of butter



Brown bacon or salt pork in heavy skillet. Remove the bacon/salt pork and save. Add onions to the skillet and brown onions until translucent, about 3 minutes. In a saucepot add water, salt and potatoes. Cook potatoes until just tender, about 8 minutes. Add onions, clams, clam juice and seasonings to saucepot and cook for additional 4 minutes. This is the chowder base. When cool, this may be refrigerated or frozen. When serving chowder, add milk and a pat of butter to this base and heat. Serve chowder in bowls with crumbled bacon or salt pork on top. Goes well with large pilot crackers.

## Clam Crafts

**Paint a clam shell.** They can be used to hold small items or keep jewelry safe and organized.

### **Pretty Lady Tree Ornament:**

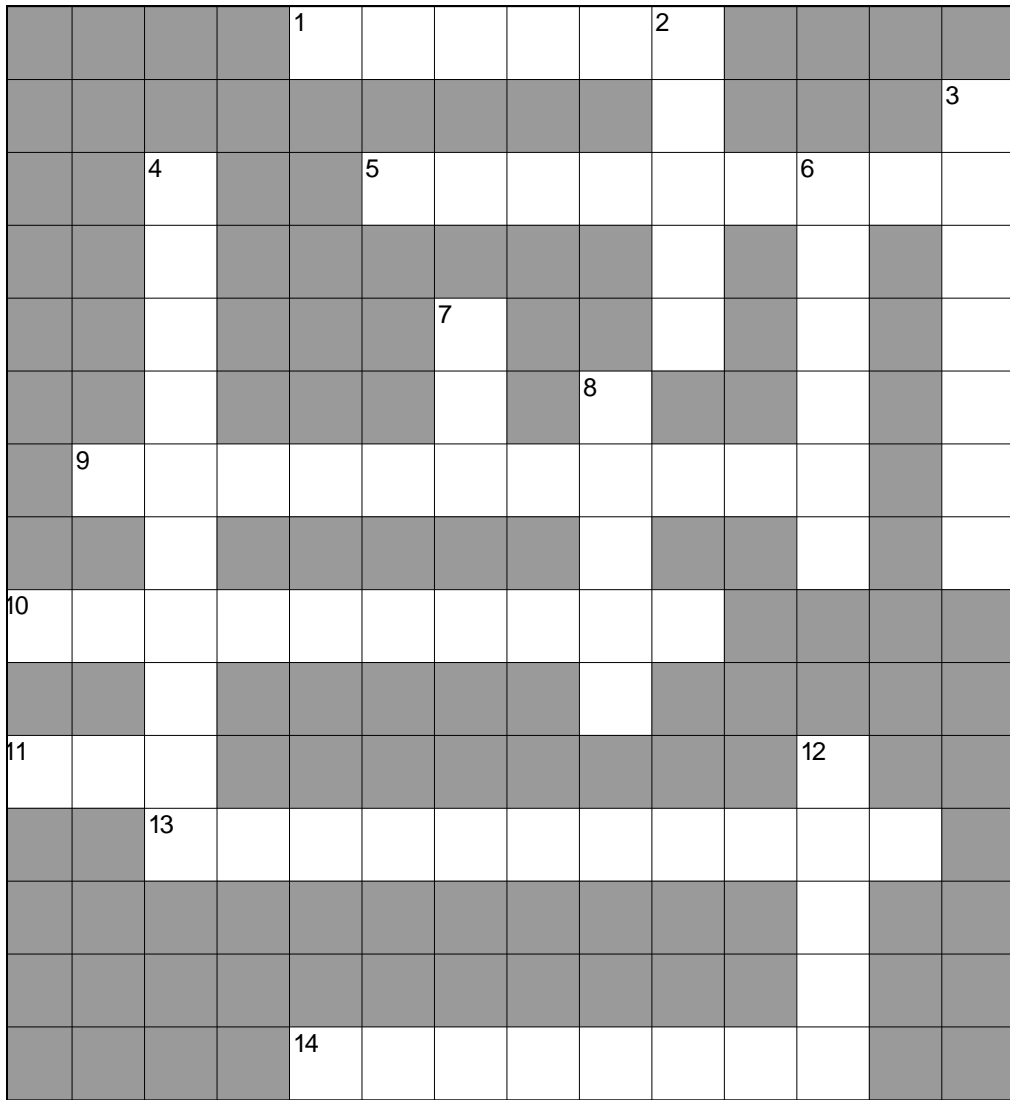
You will need:

A clothes pin with a round head  
2 clam shells that are flat at the hinge area.  
paint, sparkles and doll hair  
Pipe cleaner  
small eyelet screw  
glue  
small saw



Screw the small eyelet into the top of the rounded head of the clothes pin. The umbo or top of the clam shell will be placed just below this rounded head. On the clothes pin, measure where the bottom of the clam shell will fall and cut the remaining part of the clothes pin off with a saw. Paint the clothes pin. Glue the clam shells to the clothes pin, one in front and one in back. The rounded part of the clothes pin will be her head; the clam shells, her dress. Thread a pipe cleaner through the legs of the clothes pin and wrap the ends in front of her top shell for arms. Decorate her head with paint and hair. Decorate her dress with paint and sparkles. Thread a ribbon through the eyelet and hang her up to dance.

# The Clam Connection



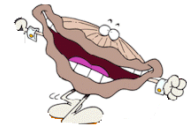
## Across

1. A hard shelled clam is also called a \_\_\_\_\_.
5. Clams, lobsters and oysters are examples of \_\_\_\_\_.
9. In the clam's belly, the \_\_\_\_\_ style stirs the food around aiding in digestion.
10. Clams live in the \_\_\_\_\_ zone.
11. Clams have this many shells.
13. The oldest purification plant in the world is located in \_\_\_\_\_, Massachusetts.
14. Soft shelled clams are also called \_\_\_\_\_.

## Down

2. Clams and fish need these to breathe.
3. A type of soup made with clams.
4. The process that removes dangerous bacteria from clams.
6. In Massachusetts the minimum harvest size for soft shelled clams is two \_\_\_\_\_.
7. The scientific name for soft shelled clam is \_\_\_\_\_ arenaria.
8. What clams like to eat.
12. An enemy of clams.

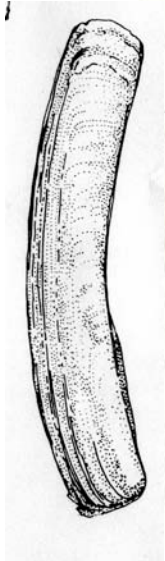
# Colorful Clams



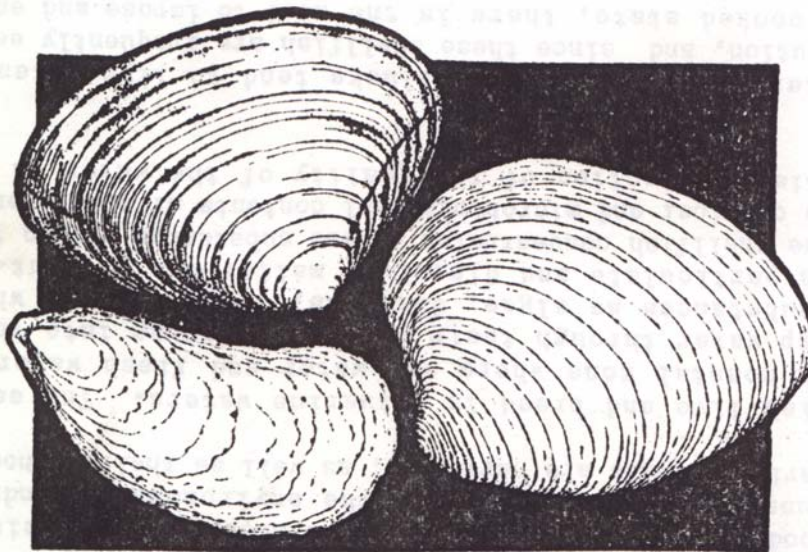
The *Marine Fisheries* Shellfish Plant could really use some pretty color!  
Could you please brighten up the plant by coloring it in?



Here are some other species of shellfish that could use your help as well.

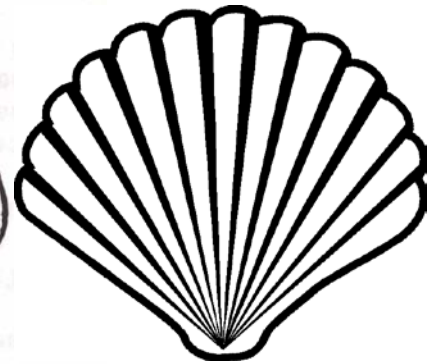


Razor Clam



Oyster

Quahog-Hard Shell Clam



Scallop



# Clam Word Search



V P V B A C T E R I A D O S D J Z H  
 A L X C I A Z S C T W F N S X V M Z  
 E U B R N R S K K O R U E C S J A G  
 C B U Y T P Q R B Y J G W A L C R R  
 C I S S E Z U C F S B O B L U W I E  
 F V H T R A A O I T S R U L S J N E  
 P A E A T Y H Z S E Y E R O I K E N  
 K L L L I Q O V H R A M Y P P F O C  
 S V K L D E G L A G U L P I H U B R  
 T E U I A J T E L K T A O R O W L A  
 E S F N L T D A M W V A R U N U O B  
 A B G E X A P R E W W L T F L B B Y  
 M G I S B N K O M G I L L S N B S C  
 E R L T S K D E P U R A T I O N T L  
 R F L Y S S Y S O F T S H E L L E A  
 S L S L B I L S H E L L F I S H R M  
 D L Q E P D S A L Z H M U S S E L U  
 M B H O F O O T Y S E A W A T E R X

MARINE  
 SHELLFISH  
 FISH  
 QUAHOG  
 CLAM  
 OYSTER  
 SCALLOP  
 MUSSEL

LOBSTER  
 SOFTSHELL  
 STEAMERS  
 GILLS  
 NEWBURYPORT  
 BACTERIA  
 INTERTIDAL  
 DEPURATION

GREENCRAB  
 SIPHON  
 FOOT  
 BIVALVE  
 SEAWATER  
 TANKS  
 CRYSTALLINE STYLE  
 BUSHEL

One word is found twice in the puzzle. Can you find which word it is?

Yea!! Good  
 Job! Hope  
 you had fun!



Distributed by:  
 Massachusetts *Marine Fisheries*  
 Shellfish Purification Plant  
 Newburyport, MA 01950  
 Please contact 978-465-3553 for reproduction and distribution

Credits:  
 Internal clam drawing: D.Boswell Lane  
 Starfish Maze ©Joe Tompkins  
 DTR-2003/2013