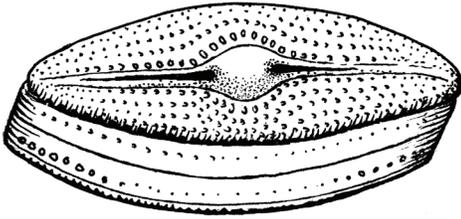


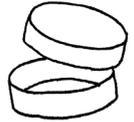
DIATOMS

Diatoms are classified as a type of algae. They make glass shells out of silicon taken from the water.



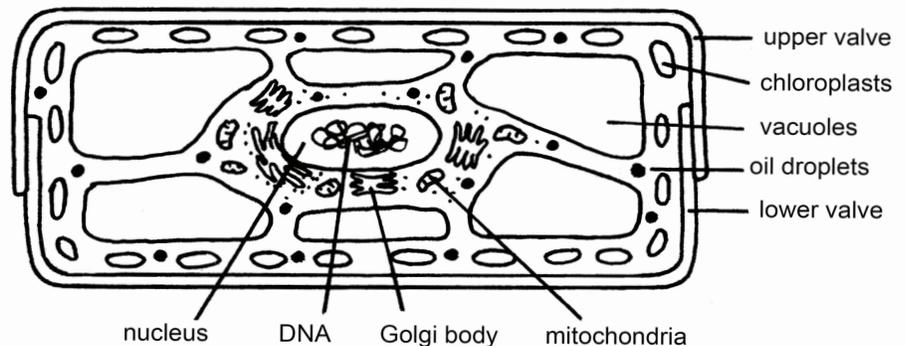
Diatoms can be found in any environment that is consistently wet: lakes, streams, ponds, marshes, damp soil, and all the oceans of the world. Diatoms can survive extreme cold and can even be found on the undersides of ice shelves in the Arctic and Antarctic. Scientists often study the increases and decreases in diatom populations to gauge water quality or other environmental factors.

There is no form of life quite like a diatom. It literally lives in a glass house. In the same way that clams and snails take minerals (such as calcium) out of the water and use them to build their shells, so diatoms take silicon out of the water to build shells of silicon dioxide (glass). The glass shell is called the **frustule**. It consists of two halves, or **valves**, that fit together in such a way that one half overlaps the other half just slightly. Special connective tissue cells keep the two halves together but allow them to separate for reproduction.



Most of the time, diatoms reproduce by splitting in half. The top and bottom valves separate, then each valve grows the missing half. Each “daughter” diatom ends up a little bit smaller than the original. As the diatoms continue this process, the offspring keep getting smaller and smaller until at a certain point, the diatoms know it is time to use their other method of reproduction: they make egg and sperm cells that will join to form baby diatoms. These babies grow until they reach full size. Then it’s back to splitting in half again.

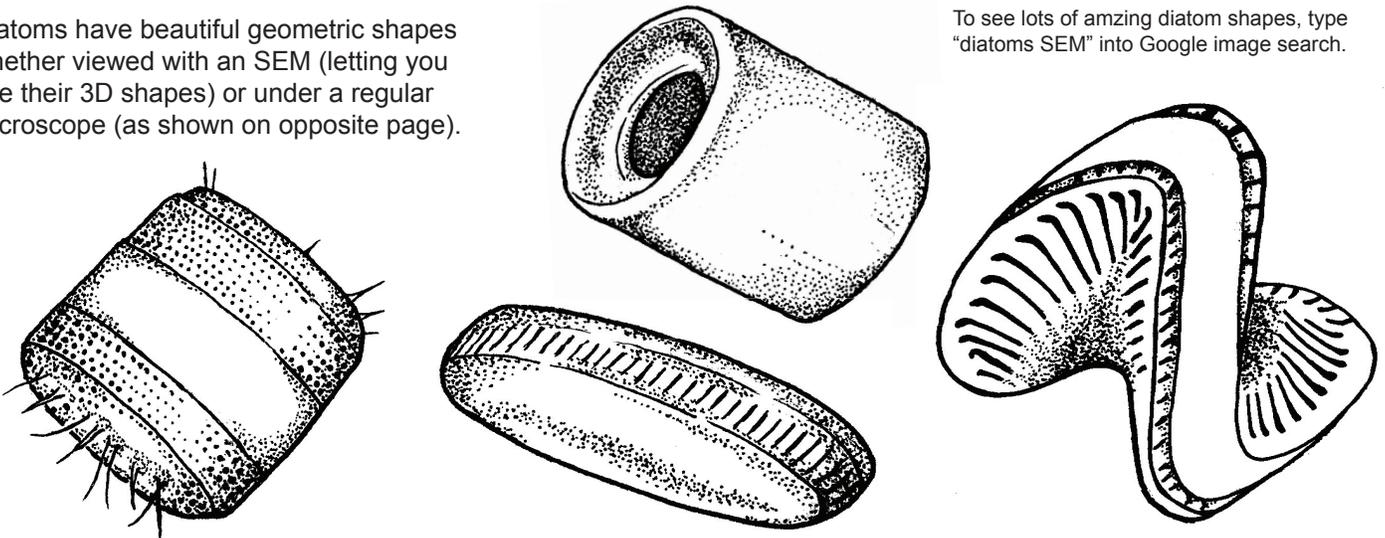
Inside their glass shells, diatoms are similar to other cells. They have a nucleus containing DNA, and they have organelles such as Golgi bodies, mitochondria, ribosomes, and storage vesicles. They also have chloroplasts (just like plants) that use the process of photosynthesis to make food out of sunlight and carbon dioxide. Diatoms differ from plant cells in that their chloroplasts tend to be yellowish-brown, not green, and the food they make is usually oil droplets, not starches and sugars. The oil droplets in diatoms are an important part of the diet of many ocean creatures including small crustaceans and large baleen whales.



The **frustules** (glass shells) of diatoms come in all sorts of interesting geometric shapes. Diatoms need to get food and oxygen from their environment, just like any plant or animal does, so the glass is perforated with tiny holes and slits.

Diatoms have beautiful geometric shapes whether viewed with an SEM (letting you see their 3D shapes) or under a regular microscope (as shown on opposite page).

To see lots of amazing diatom shapes, type “diatoms SEM” into Google image search.





Diatoms can be found as single individuals or in colonies. Sometimes diatoms stick together just at their ends, forming star or zig-zag shapes. The colonial diatoms in this picture are: 1) *Tabellaria*, 2) *Meridon*, 3) *Asterionella*, 4) *Fragillaria*, 17) *Bacillaria paxillifer* (also known as "Carpenter's Rule" diatom)

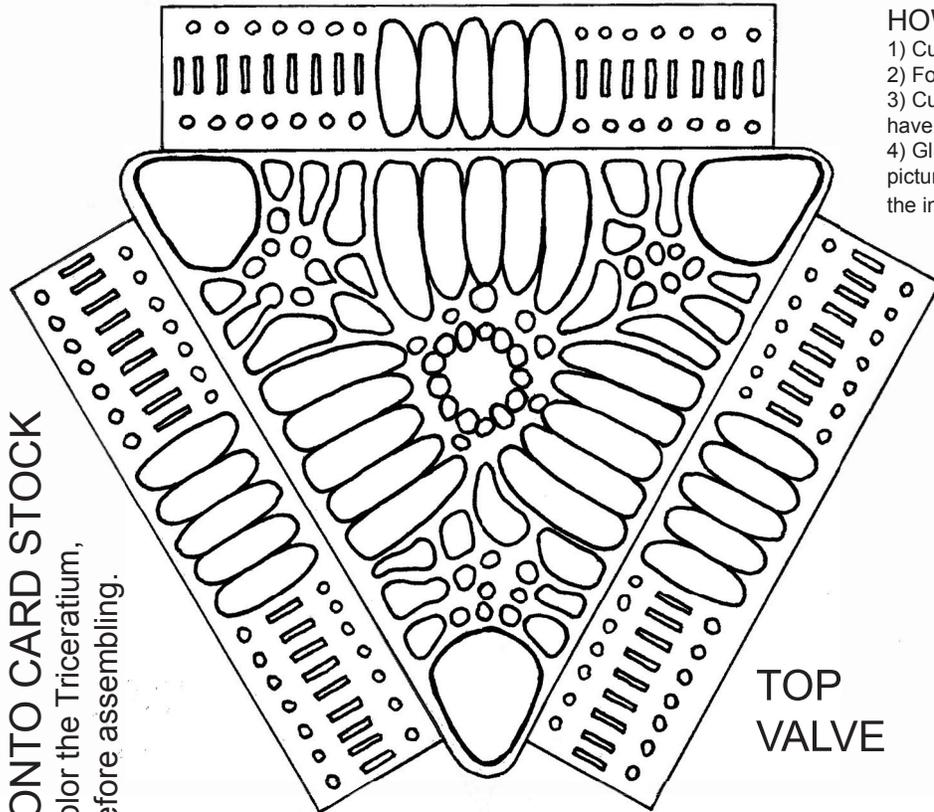
Oval and stick-shaped diatoms are called **pennate diatoms** and are most often found in fresh water.
 5) *Pinnularia*, 6) *Gomphonema*, 8) *Navicula*, 9) *Synedra*, 13) *Diatoma*, 14) *Cocconeis*, 15) *Gyrosigma*, 16) *Suriella*

Round diatoms are called **centric diatoms** and are most often found in or near oceans. (Triangular and star-shaped diatoms are also classified as centric because they have the same radial symmetry as the circles.)
 7) *Stephanodiscus*, 10) *Triceratium formosum*, 11) *Triceratium pentacrinus*, 12) *Cyclotella*

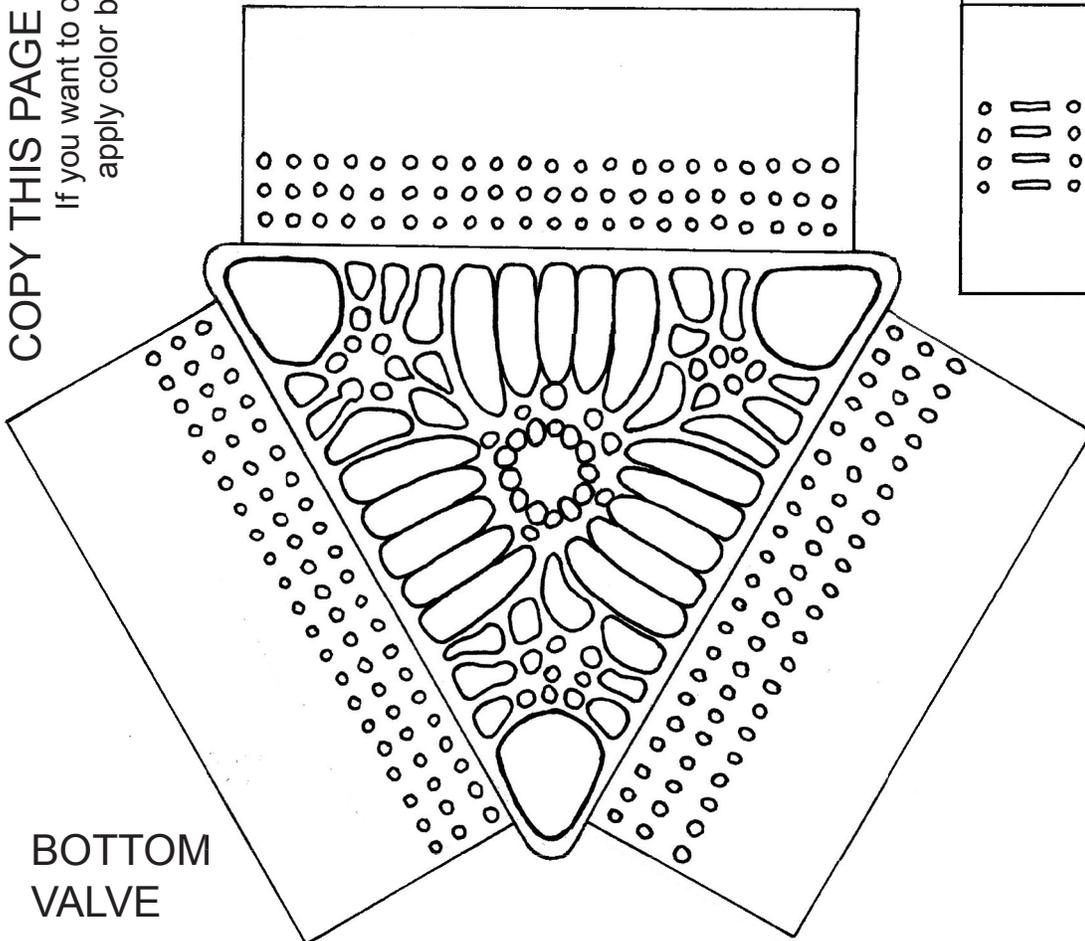
MAKE A DIATOM BOX

This box can hold whatever you want to put into it—paper clips, jewelry, coins, candy, etc. The name of this particular diatom is *Triceratium morlandii*. It is an extinct species found in deposits of diatomaceous earth in New Zealand. Other types of *Triceratium* have different patterns. (You can see lots of them if you type “*Triceratium* diatoms” into Google image search.)

COPY THIS PAGE ONTO CARD STOCK
 If you want to color the *Triceratium*,
 apply color before assembling.



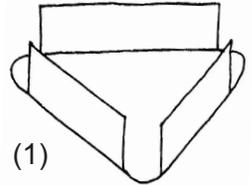
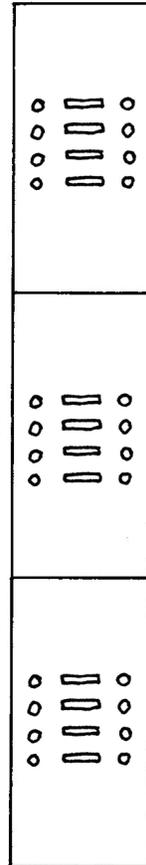
TOP VALVE



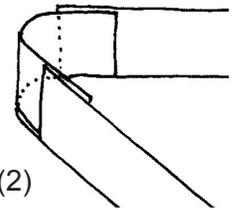
BOTTOM VALVE

HOW TO ASSEMBLE BOX:

- 1) Cut out the triangles with their flaps attached.
- 2) Fold the flaps as shown in picture (1).
- 3) Cut apart the two set of three corner tabs (so you will have three wide tabs and three narrow tabs).
- 4) Glue the tabs to the insides of the flaps, as shown in picture (2). (OPTIONAL: Run a thin bead of glue along the inside of the corners and let dry thoroughly.)



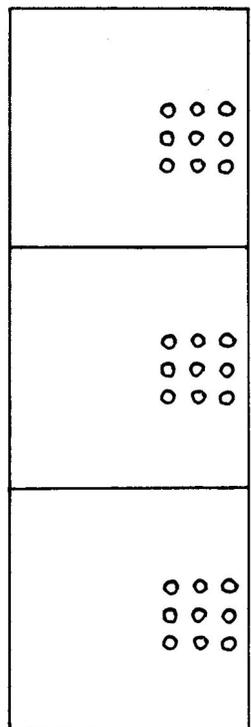
(1)



(2)

GLUING TIPS:

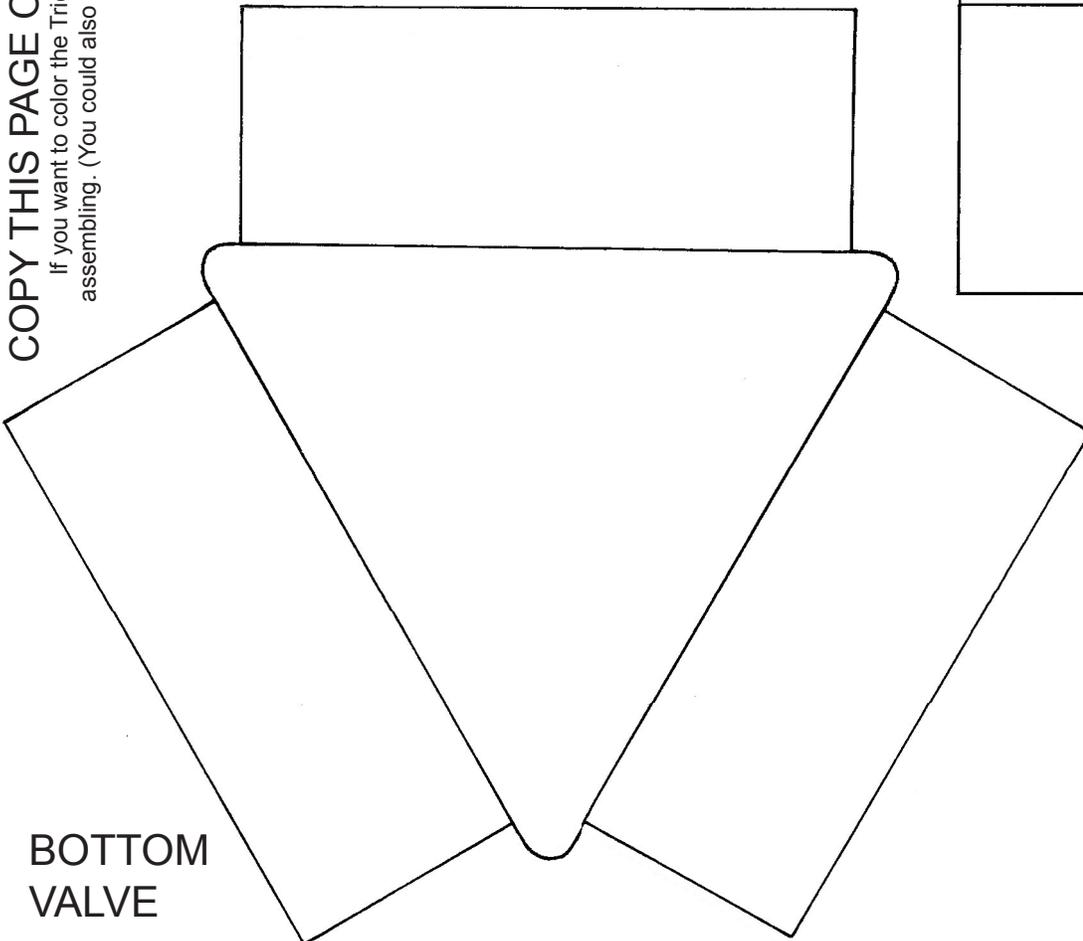
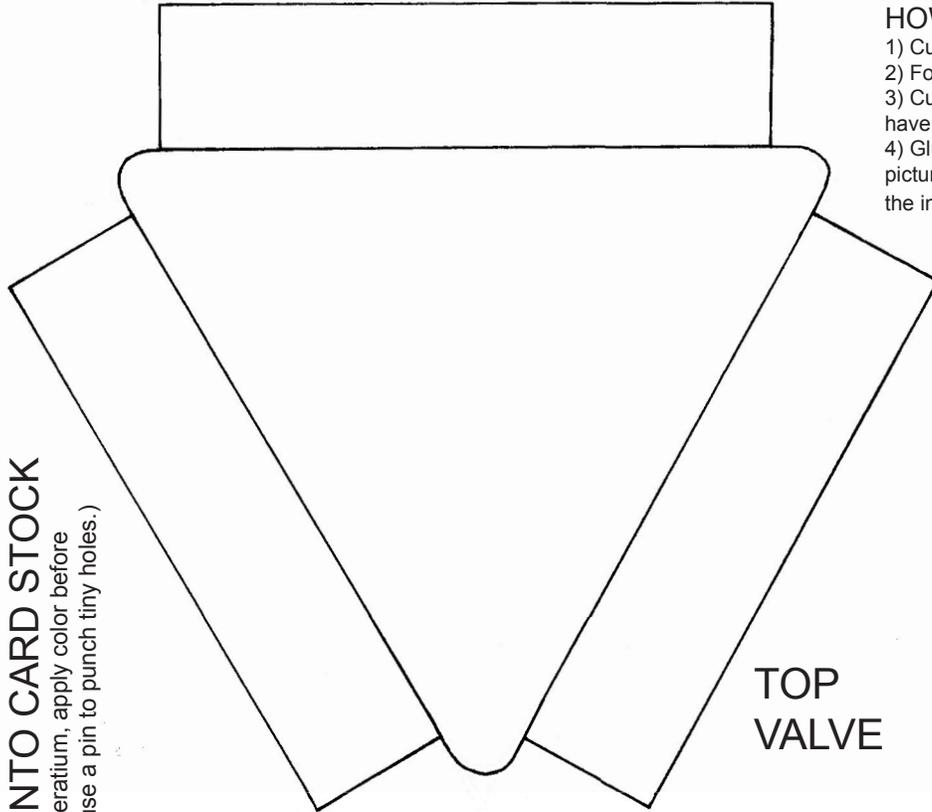
- 1) Professional quality white glue (not “school glue”) will give best results. Use just a tiny dab of glue and spread evenly across surface. If glue oozes out, you’ve used too much.
- 2) If you use a glue stick, try to get a good quality stick, not “school glue.”



MAKE A DIATOM BOX (“design-it-yourself” version)

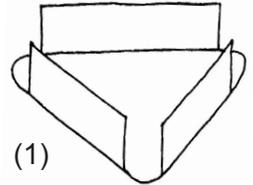
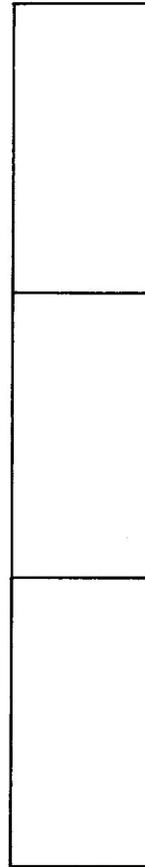
This box can hold whatever you want to put into it—paper clips, jewelry, coins, candy, etc. The name of this particular diatom is *Triceratium morlandii*. It is an extinct species found in deposits of diatomaceous earth in New Zealand. Other types of *Triceratium* have different patterns. (You can see lots of them if you type “*Triceratium* diatoms” into Google image search.)

COPY THIS PAGE ONTO CARD STOCK
If you want to color the *Triceratium*, apply color before assembling. (You could also use a pin to punch tiny holes.)

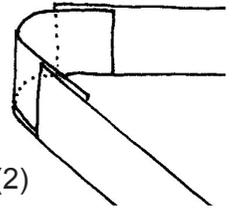


HOW TO ASSEMBLE BOX:

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- 2) Fold the flaps as shown in picture (1).
- 3) Cut apart the two set of three corner tabs (so you will have three wide tabs and three narrow tabs).
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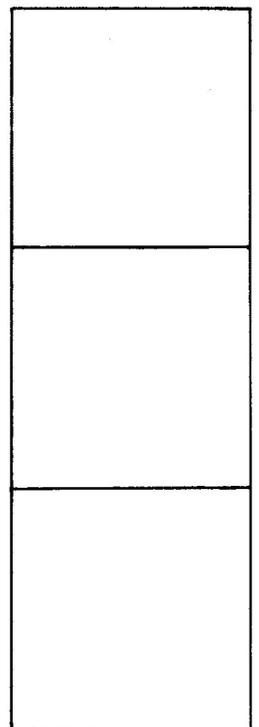
(1)



(2)

GLUING TIPS:

- 1) Professional quality white glue (not “school glue”) will give best results. Use just a tiny dab of glue and spread evenly across surface. If glue oozes out, you’ve used too much.
- 2) If you use a glue stick, try to get a good quality stick, not “school glue.”



MAKE DIATOM ORNAMENTS

You will need some mat board or thin cardboard, as well as some white glue and a small bottle of water-based varnish.

(TIP: Frame shops will often give away small pieces of mat board for free.)

OPTION: Copy this page onto card stock so that the pictures will not wrinkle up as much when you adhere them to the cardboard.

After cutting out these shapes, glue one of each kind onto mat board or thin cardboard. You can use a thin layer of white glue or you can use a thin layer of varnish. (Varnish is usually sticky enough to adhere the paper until you can get several coats built up on top.) When dry, cut the shape out of the cardboard. You now have a one-sided ornament. Glue the matching shape to the reverse side of the cardboard. NOTE: The images of each diatom are reverse images. Make sure the second side fits on properly before you start securing it to the cardboard.

When both images have been secured to the board, start layering coats of varnish. Water-based varnishes usually dry very quickly so it should not take too long to build up several coats. A hair dryer can be used to speed up drying time.

OPTIONAL: You may want to color the thin edges of the ornament to make them match the color of the diatom. You can use acrylic paint, permanent marker, or colored pencil. Do not use water-based markers because the varnish will dissolve the ink. Crayons will repel the varnish.

When done, you can punch a small hole and attach a hanger or string of your choice.

