VAMPIRE SQUID ACTIVITY

Vampire squids live at great depths (1-2 miles/1500-3000 meters) in total darkness. You can see on the little map where they have been found around the world. (Atlantic and Pacific)

The name is very misleading as they have no vampire behavior at all and they really are not squids. Whoever named the vampire squid thought its webbing looked like a cape and the cirri under its body looked like teeth. Its dark red color added to the effect. It cannot properly be classified as a squid, but neither can it be classified as an octopus. It was given its own classification group as a unique member of the cephalopods.

All other cephalopods are predators, hunting and eating smaller animals. The vampire squid feeds on tiny particles called "marine snow" that drift down from the surface. (Marine snow is a mixture of many types of debris: dead plankton of all kinds, bit of rotting plants, animal feces, decayed animals, and dust from the air above. It really does look like snow by the time it gets to the bottom of the ocean. It can take weeks or months for these particles to get to the bottom.) The vampire squid dangles one of its long sensory tentacles in the water and particles of marine snow stick to it. Then it reels in the tentacle and uses its eight arm-like tentacles to wipe the particles into its mouth. You can see the mouth in the picture that shows the underside. It is the bump in the center at the bottom. (In other cephalopods the mouth is a hard "beak" that can be used for biting prey.) NOTE: Some scientists think the vampire squid might also collect small living organisms such as tiny shrimp.

The vampire squid has few predators, since it lives at depths where larger animals can't survive. The vampire squid itself is only about the size of a (American) football. In the event that it does feel threatened, it can hide by pulling its webbing up over its body. As you can see from the picture, the underside has rows of things that look like spines. They are called cirri and they are really not dangerous. They would feel more like rubber than like hard teeth.(But don't tell that to the predators!)

The vampire squid is not very strong. Scientists say that it has weak muscles. It is capable of jet propulsion, like octopi and other squids, but it avoid jetting because this take a lot of energy. Its primary method of locomotion is swimming slowly by flapping its fins.

Because it is not very strong, and there isn't a lot of oxygen in the water, it must conserve energy as much as possible. Another way it conserves energy is by being neutrally buoyant. This means that it is the same density as the water around it so it neither sinks nor floats upward. It does not have to work hard to keep itself from sinking because its body is filled with a special gel-like substance that is the same density as water. Natural neutral buoyancy is not that common in ocean animals. Most organisms have other strategies for not sinking such as having a swim bladder (in fish), having geometric shapes that naturally float (lots of plankton), using motion (sharks who swim constantly), attaching themselves to something that uses one of these methods (barnacles who attach to boats and whales). Of course, some animals like to live on the bottom so they don't worry about staying up!

The oxygen levels at these great depths are very low. In order to make the most of what oxygen there is, the vampire squid has blood that can hold onto oxygen molecules very well. Its blood is based on copper instead of iron (like that of most animals including humans). The copper makes the blood look blue instead of red.

Like most deep ocean animals, the vampire squid has bioluminescence. It has cells all over its body called photophores which make glow-in-the-dark chemicals just like fireflies do. The glow is especially bright right at the tips of the arm-like tentacles. It can also squirt out glow-in-the-dark mucus in order to confuse predators and give it time to escape. Most cephalopods can squirt ink, but the vampire squid only squirts this glowing mucus.

There are male and female vampire squids. When a male meets a female (which might not happen very often down there in the dark!) he can give her a packet of sperm that she can keep in her mantle, like tucking it into a pocket. The packet can stay there for months, until she is ready to produce eggs.

This activity has three parts:

VIDEOS: Watching some videos of vampire squids.
LAB: Doing a lab about neutral buoyancy.
CRAFT: Making a craft about them.

VIDEOS: Use YouTube to watch some video captured by marine biologists.

Suggestions:

1) A research boat called the E/V Nautilus takes videos using ROVs (remotely operated vehicles) and posts them for public viewing. Their website is www.nautiluslive.org. You can find out more about them on their site. If you type "E/V Nautilus vampire squid" into the YouTube search box, you will find their video. This video is short, about 2 minutes.

2) The MBARI (Monterey Bay Aquarium Research Institute) has posted a fabulous mini-documentary (less than 5 minutes long) about the vampire squid, with absolutely stunning video quality. Search for "MBARI vampire squid" or use the video's YouTube title, "What the vampire squid really eats."

TIME-SAVING TIP: These two short videos have pretty much all the information available. You can click on extra side bar videos if you want to, but they will have mostly the same footage and will give you pretty much exactly the same information that you heard in the recommended videos listed above. (The National Geographic video just uses parts of the MBARI video.)

NOTE: Make sure to notice the marine snow as you watch the videos!
NOTE 2: Also, you can read about the vampire squid by using Wikipedia.

LAB EXPERIMENT: Demonstrate neutral buoyancy

The vampire squid's body is neutrally buoyant. This makes it very easy to stay at the correct depth in the water. In this experiment you will try to make something neutrally buoyant. (It's tricky!)

You will need a tall clear glass almost filled with water, a lump of clay (the oily kind that does not dry out or dissolved in water), and a piece of Styrofoam® or other hard, light foam (I used a piece of Nerf dart). Also, you might want to have a spoon handy for retrieving the clap from the bottom of the glass.

Put the foam into the water to confirm that it floats. Now wrap a bit of clay around it (or stuck to it somehow). Does it still float? If it does, all more clay. If it sinks, take some clay off. Keeping adding or taking away clay until your blob (your vampire squid?) stays right in the middle of the water, neither sinking nor floating. It take a little patience but it can be done. (Sometimes it will stay for half a minute or so then start going up or down very, very slowing. Count this as a success.)

OPTION: Once you get a blob to be neutrally buoyant, add some salt to the water and see what happens. (If you stir, do it gently.) Does salt water give more or less buoyancy?

CRAFT: Make a vampire squid picture

<u>You will need:</u>
- a piece of black paper (or black card stock, as sometimes black card stock is easier to find than black paper)
- a copy of the "10 Facts" page, a copy of the squid page printed in color if possible
- a pair of scissors
- a glue stick
- a 12-inch (30 cm) piece of thin string
- a few colored pencils in very light colors such as white, light tan, light green (or use paint or crayons)
- Optional: Glow in the dark paint (available in most craft departments, including WalMart)

How to assemble:

1) Cut the piece of black paper in half. Out of one half, cut a rectangle the size shown on the right hand side of the 10 Facts page. Do NOT cut out the rectangle on the 10 Facts page! The rectangle printed on this page is simply a helpful template showing how big to make your black rectangle. Take note of where this rectangle is printed. This is the position where you will glue your black flap in just a minute. However, placement of the flap does not have to be precise. It's just a general guideline.

2) Now glue the other half of the black paper to the blank side of the 10 Facts page, covering the picture of the rectangle.

3) Fold over the top edge of the small black rectangle, to make it into a flap. Glue the flap in place with a glue stick or white glue.

5) Cut out the squid and glue it to the top of the flap, as shown in picture. Then cut out the blue square picture (of the prickly inside) and glue it to the inside of the flap. It can help if you fold the blue picture in half first, then glue it in.

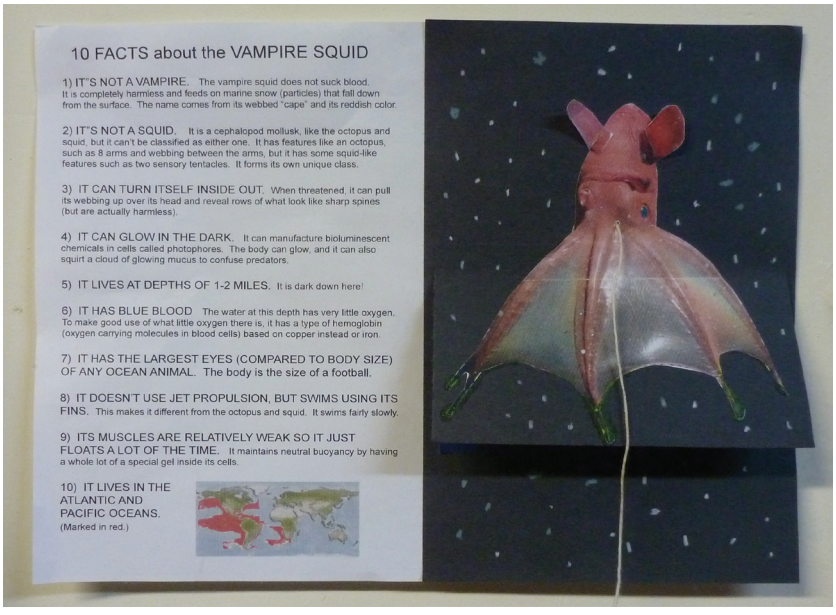
6) Cut out the fins and glue just the bases to the squid, to the fins stick up and out a bit. (Use photo as guide for positioning.)

7) Puncture a small hole to the left of the eye and insert one end of the string. Secure on the back with a knot or with a small piece of tape. The squid can curl this tentacle up, but it can also let it let it dangle down straight. Your squid is dangling his/hers down straight right now, collecting food particles. The string will hang out of your picture, but you can wrap it around the flap for storage.

8) Speaking of food, use light colored pencils (or paint) to make marine snow all around the squid. The marine snow will look very much like snow! You might want to make a few bigger particles, too. In one of the videos you see a fairly good-sized flake.

9) Cut out map and glue in place.

10) OPTIONAL: Add some glow-in-the-dark paint to the ends of the arm-like tentacles (or anywhere else you saw glowing in the videos). (Or a cloud of bioluminescent mucus if you really want to use that glow paint.)



10 FACTS about the VAMPIRE SQUID

1) IT"S NOT A VAMPIRE. The vampire squid does not suck blood. It is completely harmless and feeds on marine snow (particles) that fall down from the surface. The name comes from its webbed "cape" and its reddish color.

2) IT"S NOT A SQUID. It is a cephalopod mollusk, like the octopus and squid, but it can't be classified as either one. It has features like an octopus, such as 8 arms and webbing between the arms, but it has some squid-like features such as two sensory tentacles. It forms its own unique class.

3) IT CAN TURN ITSELF INSIDE OUT. When threatened, it can pull its webbing up over its head and reveal rows of what look like sharp spines (but are actually harmless).

4) IT CAN GLOW IN THE DARK. It can manufacture bioluminescent chemicals in cells called photophores. The body can glow, and it can also squirt a cloud of glowing mucus to confuse predators.

5) IT LIVES AT DEPTHS OF 1-2 MILES. It is dark down here!

6) IT HAS BLUE BLOOD The water at this depth has very little oxygen. To make good use of what little oxygen there is, it has a type of hemoglobin (oxygen carrying molecules in blood cells) based on copper instead or iron.

7) IT HAS THE LARGEST EYES (COMPARED TO BODY SIZE) OF ANY OCEAN ANIMAL. The body is the size of a football.

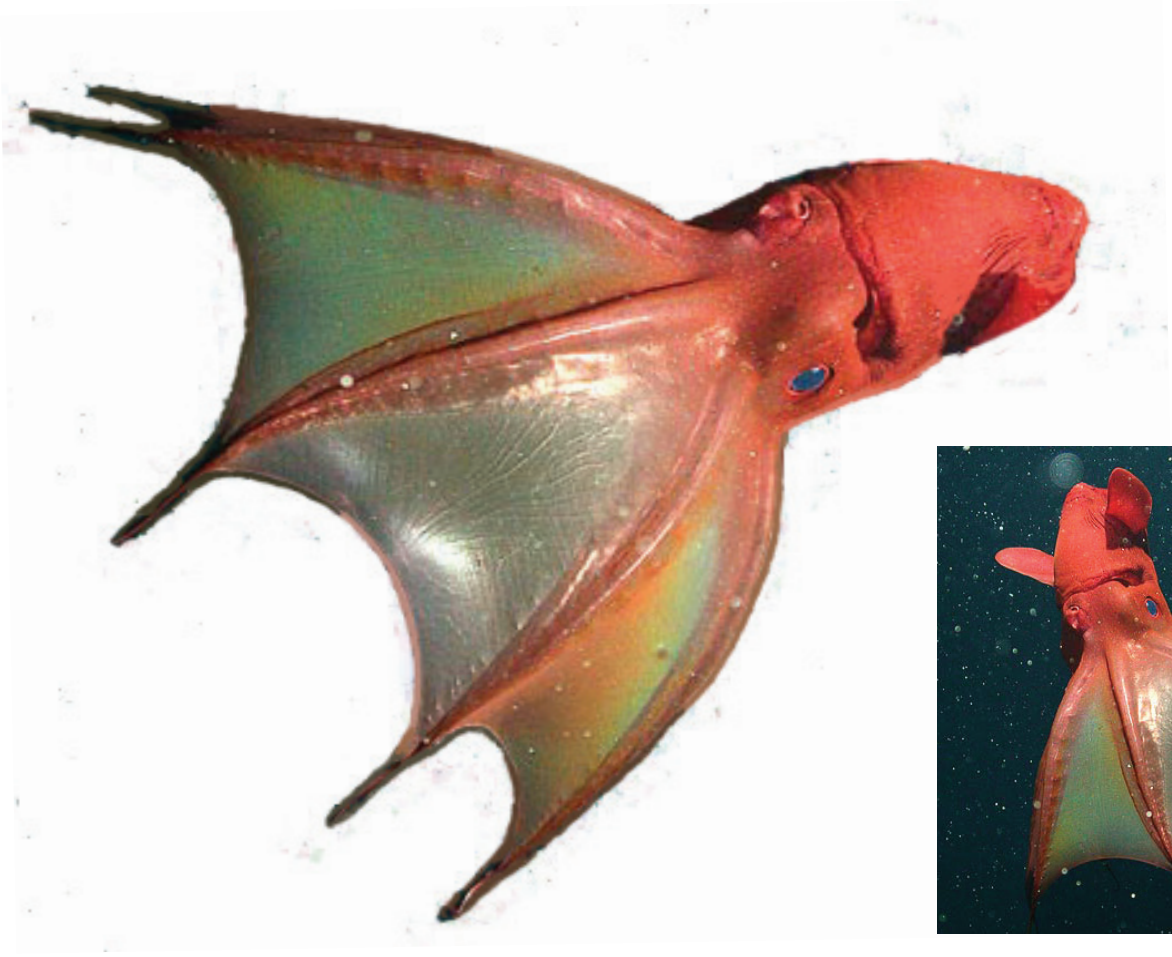
8) IT DOESN'T USE JET PROPULSION, BUT SWIMS USING ITS FINS. This makes it different from the octopus and squid. It swims fairly slowly.

9) ITS MUSCLES ARE RELATIVELY WEAK SO IT JUST FLOATS A LOT OF THE TIME. It maintains neutral buoyancy by having a whole lot of a special gel inside its cells.

10) IT LIVES IN THE ATLANTIC AND PACIFIC OCEANS.
(Marked in red.)

Glue map here.

DO **NOT** CUT THIS OUT!
This is only to show you how large to make your black flap piece. Size is approximate-- precision not required.



Original picture