Margaret "Margie" Maseda
COSEE-WEST/LAUSD
Lesson Plan
Summer 2008

Cnidarians

Introduction:
This lesson is modified for ESL, Sheltered, and resource students. The focus is on 7th grade California Science standards 5a.,and 5b., which will integrate 7th grade California Language Art standard 1.0.

Focus questions:
1. What are the body variations among Cnidarians?
2. What type of reproduction do Cnidarians use?
3. How do the senses of Cnidarians assist in their survival?

Objective:
Introduce Cnidarians through inquiry visuals, vocabulary building strategies, and kinesthetic application.
Students will learn the types of Cnidarians, anatomy of each,and give examples of each.
Students will create a model of a Cnidarian.

Materials:
Photos of Cnidarian types.
Book reading (Holt)p. 432 or Information sheet (handout) on jellyfish.
Art supplies for drawing and creating artificial Cnidarians.

Pre- activity: To activate prior knowledge and address misconceptions.

Show photo of Cnidarian types (actual, but drawings ok) Can use book visuals or photocopy sketches for each group, or project one via LCD.

Divide students into small groups and have each group write down 15-20 questions about Cnidarians based on photos. This activity is known as Unique Idea Only (Becijos,1997). Round robin the questions (one per group) and students cross off similar ideas until 15-20 questions are reached among the classroom students.

Reading: Students to read information on jellyfish with SDAIE strategy.

Divide students into same small groups and assign each group a paragraph from the reading. Each group is responsible for giving the important facts from their reading. [This can be done with students in each group writing the facts down on poster paper and then presenting findings.]

Writing: Students to write in science journals key words found in reading with definitions and illustrations as applicable.

Key words:

Invertebrates	Cnidocytes
Tentacles	Budding
Radially symmetrical	Hydrozoans
Medusa	Sea anemones
Polyp	Corals

Activity with key words:

Students use SDAIE thinking map to correlate facts and anatomy parts of Cnidarians(types).

Students can compare reproductive types for each body type.

Thinking maps: circle, bubble, flow chart, tree, and/or brace. [This will enable students to gather facts for a final writing assignment]

Teacher

Hands-on Activity [Culminating project]

Construct a Cnidarian. Several methods can be applied here.

1. Clothes wire construction with sheer fabric and ribbons
2. Paper mache with balloons and yarn/ribbons
3. Paper towel rolls and string
4. Two and one dimensional drawings with labels[parts and function]

Assessments:

1. Blank handout of Cnidarians for labeling.
2. Cloze activity for function and information.
3. Group presentations of pre-activity questions, reading facts, and final group project.
4. Grading science notebooks: vocabulary, class notes, and draft drawings.
5. Final grade– culminating activity, oral testing, and written test.

Beyond:

1. Students do specific report on Cnidarian type.
2. Creation of poetry, song, or other original piece to demonstrate understanding.
3. Advanced focus questions:

1. Describe some of the bodily variations that can be found in jellyfish, and explain how these variations help jellyfish survive in their habitats.
2. Jellyfish alternate between asexual and sexual reproduction. What evolutionary benefits would an organism gain from reproducing this way? How would human society have evolved differently if we had the same form of reproduction?
3. Discuss the senses of a jellyfish. Give some examples of the stimuli they can detect, and explain how these senses help them to survive.

Teacher Evaluation:

1. Did the students understand the Cnidarian types?
2. Can the students give examples of Cnidarian body types?
3. Were the students able to answer the focus questions after the lesson?
4. Did the final project allow the students to identify and present understanding of Cnidarians?

Resources:

Becijos, Jeanne, SDAIE Strategies for Teachers of English Learners

Reading sites:

http://my.hrw.com – use p. 432 , also visual concepts (video)
http://www.biology4kids.com/files/invert_jellyfish2.html
http://www.tnaqua.org/Newsroom/jelliesfacts.asp

Handout(s) for Jellyfish anatomy:

http://www.enchantedlearning.com/subjects/invertebrates/jellyfish/Jellyfishcoloring.shtml
http://www.biology4kids.com/files/invert_jellyfish2.html

JELLIES: PHANTOMS OF THE DEEP
Facts

Jelly Myth and Meaning
Scientists call the adult form of jellies "medusae", after the mythological Medusa, a dangerous snake-haired woman who could paralyze humans on sight, changing them into stone. Perhaps more to the point, jellies belong to the phylum Cnidaria (nigh-dahr-ee-uh), which means "stinging thread." Some cultures around the world call jellies "living water"- the Portuguese call them aguas vivas and in Brazil, they're agua viva. Known to have existed 650 million years ago, they lived on Earth even before the first sharks. **The King of Sting**
Jellyfish tentacles are studded with stinging cells that behave like tiny harpoons armed with toxic chemicals. This stinging ability makes the jelly an efficient predator and helps protect it against animals that want to eat its soft body. Jellies don't sting people on purpose. It's just that when the tentacles brush against something, thousands of the cells explode, launching barbs into the victim. Of the estimated 2,000 species of jellies, only around 70 are known to sting humans-and many of these give no more than an itchy rash. Some jellies can sting long after they're dead-a good reason for leaving dead jellies alone. In one of the Sherlock Holmes mysteries, a lion's mane jelly is the killer.

Jelly-bellies
Jellies dine as they drift, spreading a live-wire net of tentacles. They catch and eat smaller plankton, larval fish, invertebrates, small shrimp and even other jellies by using nerve cells to help them move and react to food. The tentacles sting the food, then the oral arms capture whatever comes in contact with the body structure. Cilia on the tentacles may be used to direct food toward the mouth. Food enters at the mouth, and the mouth cavity has lubricating slime glands to help the jelly swallow and digest food -not necessarily in that order. Digestion also begins outside the body when the jelly secretes enzymes onto the prey, then sweeps the partially digested food particles into its mouth. When food is in short supply, jellies have the unusual ability to shrink in size, thus requiring less food.

Jelly-eaters
Jellies are a treat to eat for some people. In Asian countries, notably Japan, they're salted and dried as a snack. The texture, reportedly, is crispy, yet elastic-like an old rubber band. In addition to people who eat jellies, it's quite common for jellies to become cannibalistic-to eat each other. Sea turtles, blue rockfish and ocean sunfish find them tasty too. Under stress (temperature shock or an attack by a predator), jellies may lose their tentacles and mouths but then grow replacements.

Jelly Anatomy
Jellyfish-in spite of their name-are not fish, but invertebrates, relatives of sea anemones and corals. Jellies are 97 percent water. With no heart, no brain and no real eyes, jellyfish have three main parts: the round umbrella-like bodies or bells which propel the animals with a pumping or pulsating motion; tentacles that sting and immobilize prey; and oral arms or flaps that are used to eat their prey. With this basic equipment, jellies manage to defend themselves from danger, make daily and seasonal journeys, stay together and occupy all the oceans of the world. Simple in design, fragile in build, jellies have few of the complex features many animals use to survive.

Jellysex
Jellyfish reproduce asexually as well as sexually. Jellyfish young are called larvae, and they begin life by attaching to a solid surface and grow to resemble a tiny flower-a polyp. In hidden caverns and under rocky ledges, polyps perform their own kind of reproduction-not with eggs and sperm, but by cloning themselves. First they produce identical new polyps. Then they begin to form free-swimming jellies, a process as strange as if a caterpillar could divide itself into dozens of butterflies. At the Aquarium, aquarists can "trigger" the jellies to reproduce by changing the temperature of the water from cold to warm or by introducing a chemical trigger. Small amounts of iodine solution often stimulate jelly polyps to release many new larvae. A jelly's lifespan ranges from weeks to years, depending on the species. Some jellies at the Tennessee Aquarium are bred here, while other species are acquired from other aquariums.

The big, the bad and the beautiful
With its tentacles fully stretched, the Arctic lion's mane jelly is probably the longest animal on Earth-longer than a 100-foot blue whale! The bell of this jelly can be up to six feet across. The smallest jellies measure only a quarter

of an inch across. The sea wasp is probably the deadliest animal in the ocean-more dangerous to humans than any shark. People have died within three minutes of being stung. To guard against sea wasps' potent toxins, Australian lifeguards cover their bodies with pantyhose when rescuing swimmers.

Going with the flow
In the society of the sea, jellies are drifters, riding the ocean's currents. Aimless as it may seem, a jelly can travel far and wide with little expense of energy. By going with the flow, jellies end up swimming in rich drifts of food. The currents are like a mass-transit system-so many jellies ride the seaways that during certain times of the year, swarms of jellyfish have been reported as oil spills off the California coast. Some jellies travel up to 3,600 feet daily, the equivalent of a person walking 33 miles. The majority of jellies inhabit coastal waters, although there are some deep sea dwellers.

Propelling jellies
Jellies aren't totally at the mercy of the currents; they can also swim on their own power. Their graceful pulsing is a form of jet propulsion-each pulse sends a stream of water jetting out from the jelly's belly, propelling the animal in the opposite direction.

Life-support system
Keeping jellyfish in an aquarium presents challenges to aquarists. Because jellies are incredibly delicate-no body armor of skin, scales or a skeletal system-a special life-support system is necessary. Some jellies get stuck in corners and tear easily; therefore the tanks are cylindrical or oval, with no corners. Kreisel (German for carousel) tanks have circular currents which act as a buffer between the jellies and the tank walls. This current also prevents the animals from being "inhaled" into the water treatment system.

Space jellies
In May 1991, 2,500 moon jellies blasted into space aboard Space Shuttle Columbia. Scientists studied how their balance organs developed in a weightless environment.

Bubble-Bubble Toil and Trouble
Jellies can be damaged by air bubbles, so aquarists keep the tanks as bubble-free as possible with quiet non-aerated flows. Jelly "indigestion" occurs when air bubbles get under the jelly's bell, and imbed in its tissue, interfering with eating, respiration and eventually killing them. Bubbles don't seem to bother baby jellies, which haven't developed the undulating bells of the adults.

Deadly jelly look-a-likes
Jellies are a major food item for sea turtles, sea birds and many fishes. Unfortunately, so are inedible jelly look-alikes: bags and other plastic trash that people toss into the oceans. Thousands of jelly eaters, including endangered sea turtles, die each year when they swallow indigestible wads of plastic. Global warming and the impact of waste people dump into our oceans are growing threats that could affect the entire ocean food web, including jellies.

JELLYFISH - CNIDARIANS

We'll start by explaining that anemone, coral and jellyfish are all related. We broke them up into two different sections because of their body types. They are all from the phylum **Cnidaria**. Comb jellies are a side step away from jellyfish. They are in the phylum **Ctenophora**. They look similar, but are different in some important ways.

we discussed the basic ideas of Cnidarians when we talked about anemone and coral. Jellyfish are different in that they are not anchored to anything. Where jellyfish and coral are considered **polyp** shapes, jellyfish are in a **medusa** shape. Medusas are free swimming shapes that have their tentacles on the bottom of their body (not facing up like anemone). Since they move around, that newly evolved nervous system comes in handy.

The main body of a jellyfish is called the **bell**. That bell moves through a **coordinated contraction** that forces water out and thrusts the jellyfish forward. They spend their whole life cycle floating with the currents and capturing prey in their tentacles. They also have those stinging cells (**nematocysts**) on the tentacles to paralyze fish and then eat them.

COMB JELLIES

Comb jellies are not true jelly fish, they are kind of one step up. The big differences...

- Comb jellies use cilia flapping on their sides to move. They do not contract a bell like jellyfish.

- Comb jellies use cells called **colloblasts** to capture their prey. These cells stick to the prey, not harpoon them.

- They have two (2) holes. While true jellies have a sealed bell with only one opening (like the one opening of an anemone), comb jellies have a small opening at the top of their body and one at the bottom so that water can flow through them.

- They often have plates for protection on the outside of their bodies. The plates help comb jellies maintain their shape. Since they don't move by contracting their whole body, it helps keep them a little more streamline.

CNIDARIAN ANATOMY

Anemone and coral are shaped with one end attached to something solid and the other end with **tentacles** moving out into the water. The shape is generally called a **polyp** form. Yes, even coral have that going on. When you think of a coral, you are probably thinking of a hard thing. That hard exoskeleton is what is left of the coral after it dies. When it is alive, hundreds of thousands of cells are alive and waiting for food to come by.

Back to the anatomy of the cnidarians. Anemone and coral are an improvement on sponges. One big improvement is that they have a **nervous system**. That doesn't mean that they are thinking and planning how to catch food. It does mean that the whole organism can have a coordinated response. That response means if something happens in one part of the anemone, the rest of the anemone can act in a certain way. Maybe a fish is captured on the left side. The right side would then move over to help hold the fish so that it can't escape. They aren't thinking yet. They are acting based on a stimulus.

SPECIALIZED TISSUES

The cnidarian family also has **tissues**. Tissues are specially developed groups of cells with one function. There could be tissue to digest food, tissue to help the anemone move, and tissue that helps the anemone stay attached to its rock. All of them work together and have specialized jobs.

THE NEMATOCYST

There seems to be a theme here regarding special cells. The cnidarians have one called a **nematocyst**. It's basically a little **harpoon** or spear that it shoots at passing prey. That harpoon has a poisonous protein that it injects into the prey to stop it from escaping. Nematocysts are also described as stinging cells. Those cells make it dangerous to touch anemone and jellyfish with your bare hands. The poison of some cnidarians can even kill you.