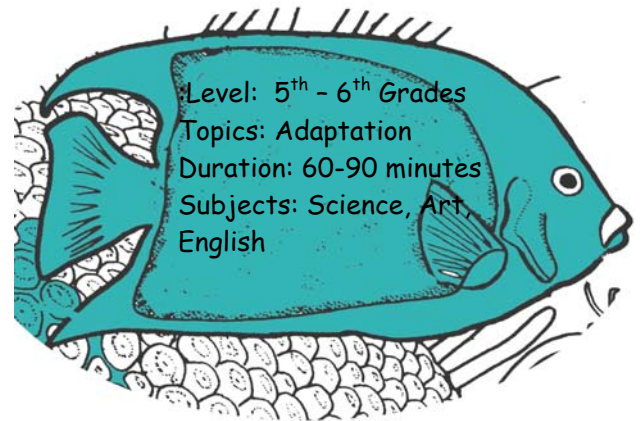


Who Am I?



Objective:

Observe the different external characteristics of fish in relation to their habits and adaptations to their environment.

Learning Skills: Observation, comparisons, differentiation, identification, illustration, and explanations

Materials: Fish silhouettes (those found in the aquarium, see appendix), colored pencils, drawing paper, fish poster with parts and variations.

What is a fish?

Fish are vertebrate animals adapted to an environment 800 times more dense than air and extract oxygen from water. The majority of fish can see, smell, and feel rather well. Additionally they have a "lateral line" which is used to detect near movement in water and helps them avoid or obtain prey. They reproduce predominately through external fertilization and produce eggs. Few care for their young, although in many species, males as well as females protect the nest. There are some female fish which deposit eggs in the male's abdomen or mouth where they incubate until hatched. Their body form, size, color and behavior vary with their environmental conditions. By just observing a fish, you can tell much about where it lives, how it swims, and what it eats.

Their body form or shapes are classified as: Streamlined/**fusiform** or "torpedo" shape which is found in the majority of the fish and typical of the great swimmers due to the hydrodynamic shape. Laterally compressed fish are flat from side to side and can move with great speed and agility. This shape is common among reef fish where they must maneuver around obstacles. Others are compressed horizontally and are best adapted to living on the bottom. Elongate fish live or hide in caves or cracks. They are predators who wait to ambush their prey. Globular fish swim slowly and possess general special adaptations for avoiding predators.

The caudal fin provides propulsion and tells us much about the velocity that the fish may swim. They are classified as: lunate, forked, concave, straight, double truncated, round, or heterocercal with uneven lobules (like the shark).

The position of the mouth can help us understand what a fish eats. For example, fish with their mouth in the middle terminus position eat food that is in front of them. They are usually fast hunters or may be herbivores. The fish with their mouth in the superior terminus position eat food above them and is typical of benthic predatory fish that wait for their prey to swim above them. The fish with their mouth in the inferior terminus position usually feed on organisms buried on the bottom.

Vocabulary: Adaptation, vertebrate, fish, fins, compressed, fusiforme, globular, and truncate.

Procedure:

1. After welcoming and introducing the docents, begin by emphasizing the inhabitants of the ocean and fish. Take the students to the classroom to see the video "What is a Fish?" Proceed to the aquariums and allow them some time for observation. Later ask: 1- "What are their characteristics?" 2- How do they breathe?, 3- What are their fins used for? 4- How do they float? 5- How do they protect themselves?, 6- What do they eat?" And lastly ask: "Are all the fish the same? How are they different?" Explain that they will learn to recognize many of them after this exercise. Separate into groups according to the amount of silhouettes available (it is important that all the families be represented in the silhouettes that are found in the aquarium, or use only the ones that are present). Give one silhouette per group and have them find the corresponding fish in the aquarium. Give them drawing paper and colored pencils to draw and color their fish (they can trace the silhouette). Have them compare their fish to the poster of fish parts and variations to find the ones that best represent their fish. "How do you think they eat? Do you think they swim fast or slow? How do they defend themselves? Do they use camouflage?"
2. Each group must give a report on the fish they were given to work with. At this point, you may complete with any additional information (i.e. an interesting story or life history of that fish). One student from each group reads the characteristics of the fish that are written on the back of each silhouette.

3. Read the text of each silhouette and pick one of the groups to guess which fish is being described. This serves as a closing game, review and evaluation.

Suggestions for the Docent:

If the group is active it is possible to go deeper into the topic. Talk about the different movements of the fish: pushing with their tails, the tail and body undulating, the pectoral or dorsal fins, etc.

Suggested Classroom Activities:

With drawings, pictures or examples of commercial fish, the teacher can make the same deductions about their adaptations (the majority will be open water fish compared to those found in the aquarium).

Evaluation: The closing game will serve as an evaluation.

Reference:

Ecology of Fishes in Tropical Waters. R.H. Lowe, McConnell, D.S.C.

Reef Fishes of the Sea of Cortez

Hand Guide to the Coral Reef Fishes of the Caribbean. F. Joseph Stokes 1980.

Ecology of Fishes on Coral Reefs. Peter F. Sale

Peces del Pacifico Oriental. Ross Robertson

Appendix

Principle Families of reef fishes that is present in the aquariums:

Chaetodontidae (butterfly fish): Its delicate shape, design, colors and gracefulness make this fish one of the most appreciated of the aquariums. They may reach up to 30 cm. The body is compressed with a small elongated mouth oftentimes **protractile**. They are active during the day predominately in tropical waters. The majority of these fish feed on polyps although there are species that feed on benthic invertebrates and algae.

Pomacanthidae (angel fish): These are the favorite "pets" of the aquarium because of their brilliant colors. They are commonly found in reefs and shallow water. Their body is compressed and lives alone or in schools. Their colors change drastically from juvenile to adult. They need places to hide like caves and cracks in corals. They are very territorial. During the day they swim along the bottom looking for food. Some feed exclusively on algae and detritus while others feed on sponges or benthic invertebrates.

Acanthuridae (surgeon fish): The majority are herbivores. They prefer to live in reefs forming large schools which protect them from aggressive attacks from bottom fish. They prefer to swim on the surface in strong currents. They get their name from a sharp spine in the shape of a scalpel found on the base of the tail. Normally this spine is flush with the body. In others it is shaped like a keel. The scales are small and appear nonexistent. As adults they are able to change color from dark to light and visa versa.

Pomacentridae (damselfish): This group is the most abundant in reefs. The body is compressed with a single dorsal fin. The scales covering the head are relatively large. They aggressively defend their territory from intruders. The two parents build the nest but it is the male that protects the eggs. They majority feed on algae but a few on plankton.

Cirrihitide (hawk fish): These sedentary fish remain immobile on the bottom for long intervals and periodically swim to a new location on the reef. They are characterized by their spines on their dorsal fins terminating with long strings forming a fringe. The bones on the fins are strong and are used to support them on the bottom or hold on to a coral. Some feed on fish while others feed on crabs, shrimp and other crustaceans.

Labridae (wrasses): This is a numerous group which live tropical and subtropical waters in a variety of habitats. Their reproductive biology is very interesting and includes sex reversals. The fish release the eggs in groups or in pairs. They feed on a variety of foods including zooplankton, fish, polychaetes, brittle stars, sea urchins, mollusks, crustaceans, soft corals and algae.

Tetraodontidae (blow fish): They live in all tropical oceans. They have a round body and swim slowly. They are able to blow up their body by swallowing water. They do this to dissuade any would-be predators although they are still eaten by large sharks. They have thick scale-less skin, oftentimes with small spines that stand up when they inflate their body. Their mouth contains two plates that resemble a beak. Not only do they inflate their body to avoid depredation, they also produce a strong venom "tetraodontoxima" in their liver and ovaries. They feed on sea urchins, sponges, sea stars, corals, crabs, mollusks, and worms.

Haemulidae (grunts): They live in almost all the oceans of the world in tropical, subtropical and temperate waters. They get their name from the grunt-like noise they make by rubbing fringed plates in their mouth which is amplified in their nasal passages. They are nocturnal and hide in the reefs during the day. Many form large schools near reefs to rest. They feed on

benthic invertebrates although juveniles can feed predominately on plankton. They are considered good eating. The majority of the species have distinctive markings.

Note: Other families may be included in this list according to the availability of fish in the aquariums.