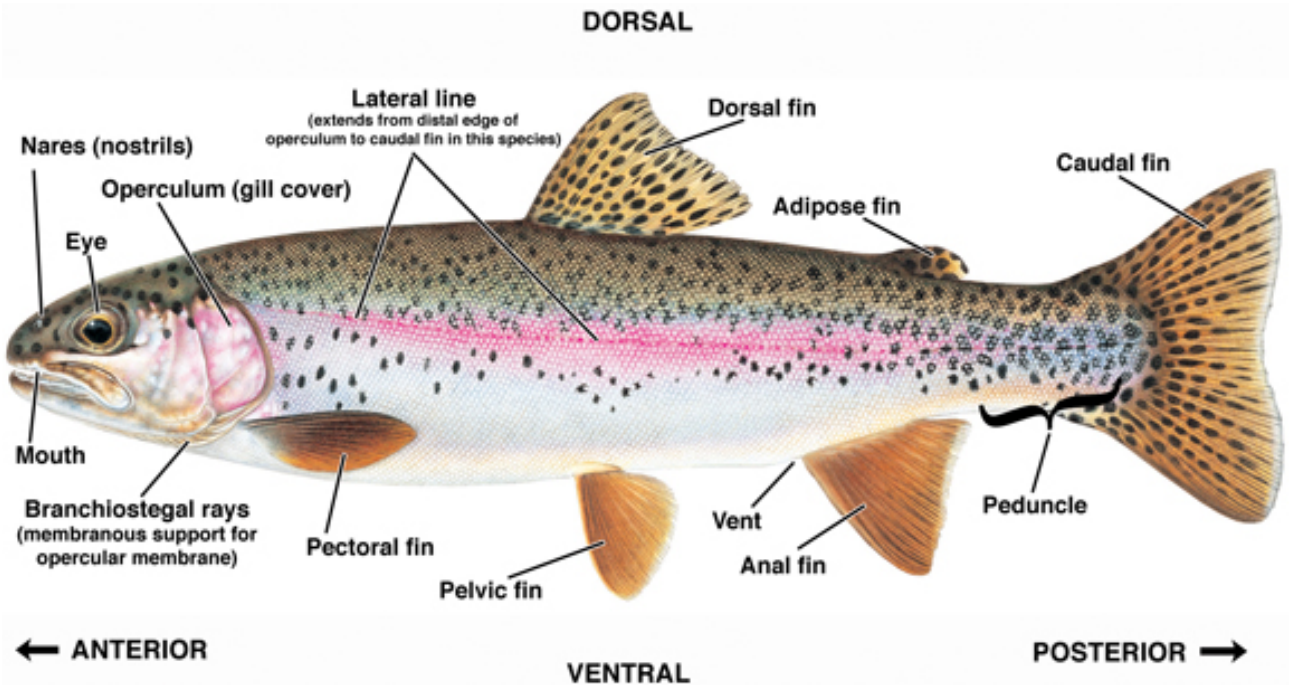
Fish Dissection

The Fish Dissection program at Hatfield Marine Science Center is a 50-minute hands-on program for 4th through 12th grade students. Students will work in small groups as they examine a variety of fish, study the internal and external anatomy, and learn how and why researchers collect fisheries-related data.

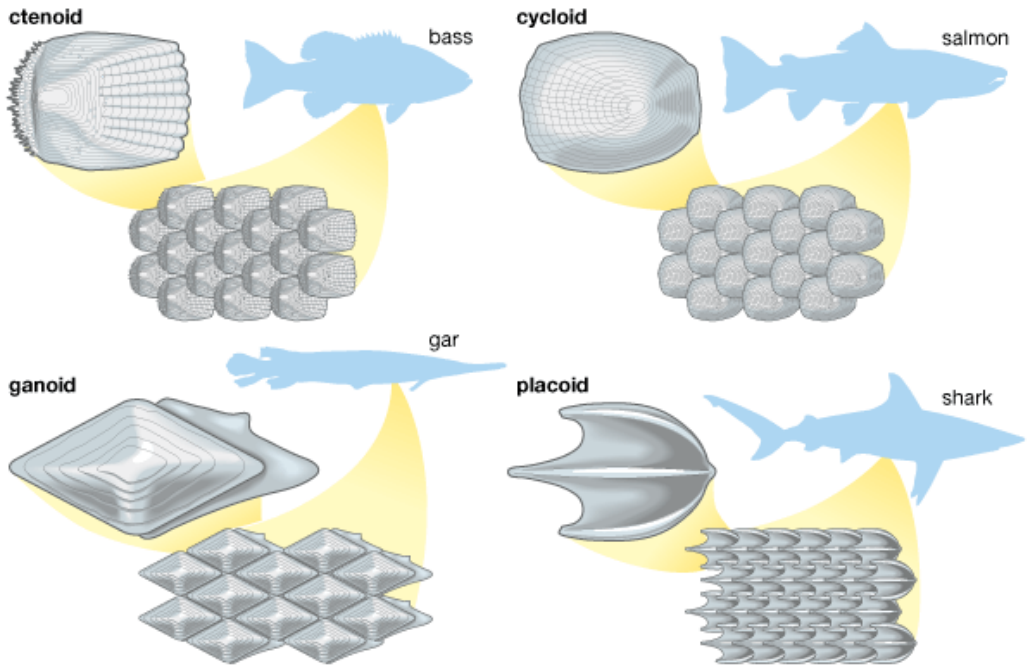
Background

Fish are cold-blooded vertebrates that breathe through gills and use fins for locomotion. The class Osteichthyes (bony fishes) shares several characteristics including: a skeleton of bone, scales, paired fins, one pair of gill openings, jaws, and paired nostrils. This class includes the largest number of living species of vertebrates, more than 23,500 species. The class Osteichthyes also contains about 96% of all fish species. Fishes not included in the Osteichthyes are the Chondrichthyes (sharks, skates and rays), the Myxini (hagfishes), and the Cephalaspidomorphi (lampreys).

Fins are one of the most distinctive features of a fish and serve as a means for the fish to move, whether it is swimming, gliding or crawling along the bottom. Fins located in different places on the fish serve different purposes, such as moving forward, turning, and maintaining an upright position. In bony fish, most fins have spines or rays. Spines are generally stiff and sharp while rays are relatively soft, flexible and segmented.



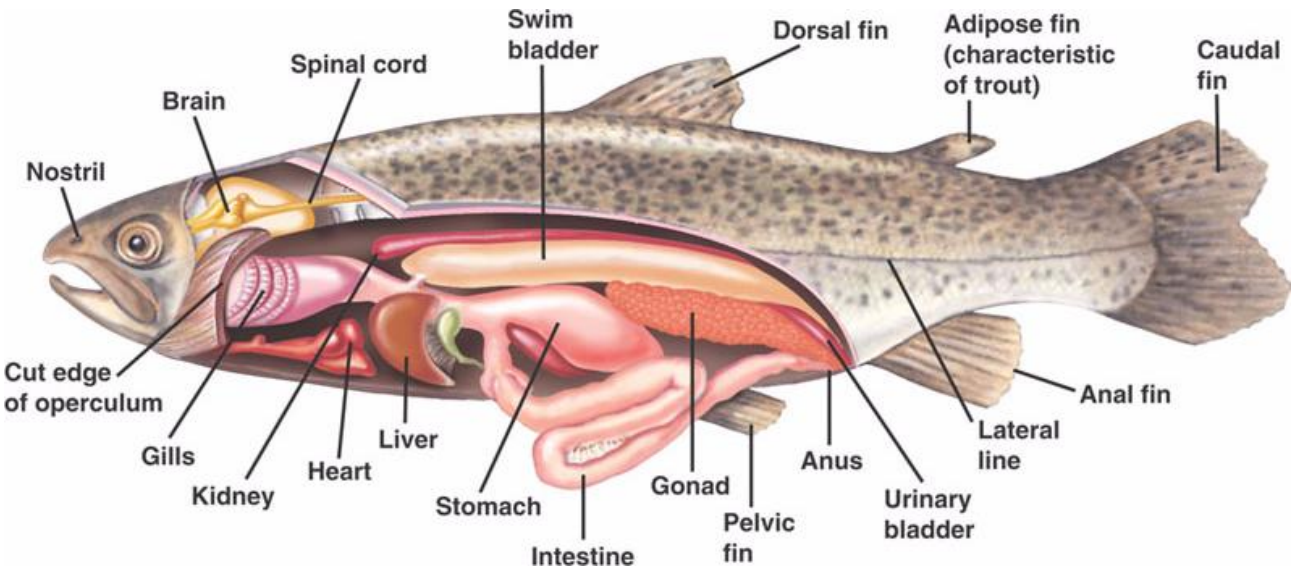
Most fish possess scales although type and size of the scales varies by species. Scales help protect fish from damage to their skin as they come in contact with rocks or sediment and act as a barrier for potentially harmful bacteria and parasites. Some scales can also help fish move more efficiently through the water, thus expending less energy.



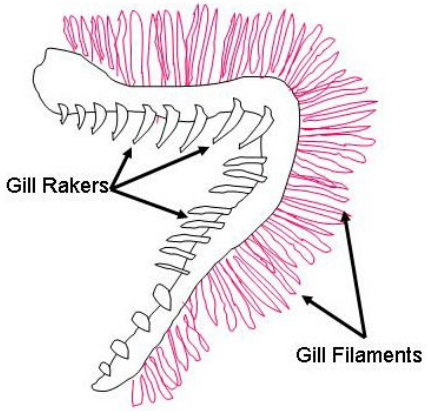
Fish also possess a lateral line, which runs the length of each side of their body and is sensitive to differences in water pressure caused by approaching objects. This sensory structure allows them to detect predators and prey as well as orient themselves in their environment. It is also the structure that allows schooling fish to move as a single unit and keeps fish in aquaria from running into the glass.

Fish have gills, which are respiratory organs, for the extraction of oxygen from water and for the excretion of carbon dioxide. Gills are protected in bony fish by the operculum, a hard external covering located on each side of the head. Numerous gill filaments, which are responsible for gas exchange, are attached to a bony gill arch. Most fish also possess gill rakers, bony, finger-like projections of the gill arch that keep food and other debris out of the gill filaments and also act like sieves to remove plankton from the water in filter-feeding fish.

Fish have a two-chambered heart (compared to our four-chambered heart) with one atrium and one ventricle that is located between the gills. Blood is pumped from the heart to the gills where it is oxygenated, then to the body and back to the heart again.



Gill Arch

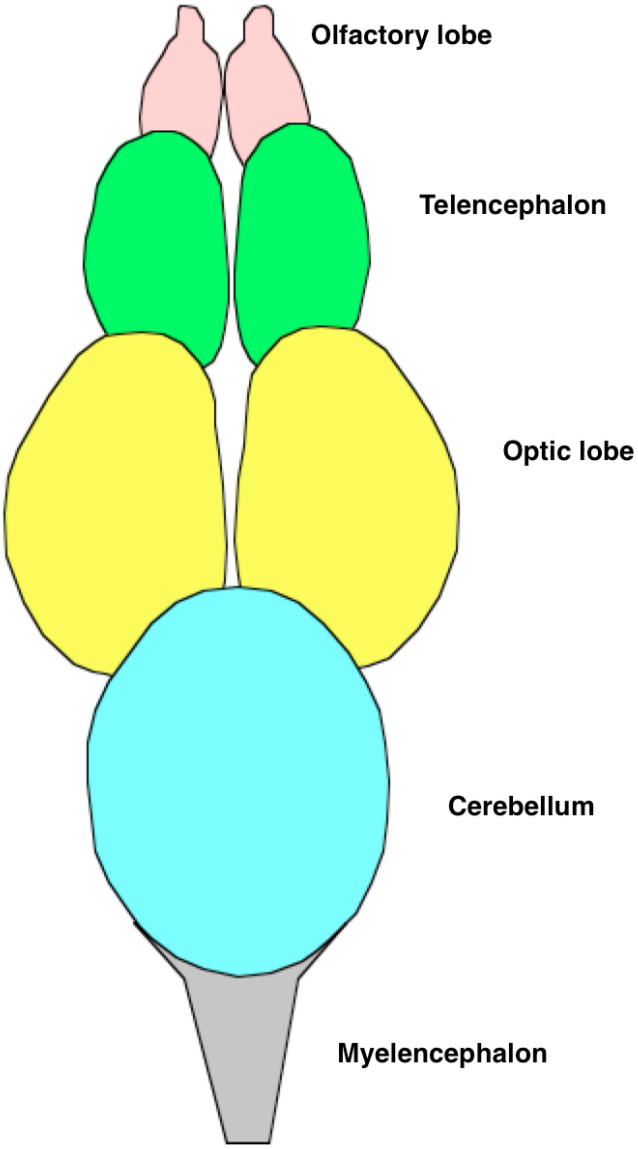


The gas bladder, or swim bladder, is an internal organ located along the backbone that allows a fish to control its buoyancy, and thus to stay at the current water depth, ascend or descend without having to expend energy swimming. It is often reduced or absent in flatfish and other bottom-dwelling species.

The digestive and excretory organs found in most fish are similar to those found in our own systems and include the stomach, intestines, kidneys, liver, and gall bladder. These organs function in similar ways to our own.

Although some fish have the ability to change sexes, fish are dioecious, with males possessing testes, which produce sperm, while the females have ovaries and produce eggs. Fertilization may be internal or external. With some species laying eggs while others give birth to live young.

Fish have multi-lobed brains with the cerebellum being the prominent structure. This part of the brain controls many important functions such as sensing pressure, maintaining balance, and regulating muscle movement.



Suggested Pre- or Post-Visit Activities and Resources

Have students make fish prints using real or rubber fish then label the external features. Directions can be found at: http://www.natureprintingsociety.info/gyotaku_dewees.pdf

Have students create a chart comparing human and fish organ systems, including the digestive, circulatory, excretory, reproductive, and nervous systems. How are they the same? How do they differ?

For additional lesson plans and activities focusing on fish visit:
www.statefishart.com/lesson.pdf

http://sanctuaries.noaa.gov/education/teachers/pdfs/sustain_seafood_lesson2.pdf

Correlation to Oregon Science Education Standards

Grade 4
4.2 Interaction and Change: **Living and non-living things undergo changes that involve force and energy.**
4.2L.1 Describe the interactions of organisms and the environment where they live.

Grade 5
5.1 Structure and Function: **Living and non-living things are composed of related parts that function together to form systems.**
5.1L.1 Explain that organisms are composed of parts that function together to form a living system.

Grade 6
6.1 Structure and Function: **Living and non-living systems are organized groups of related parts that function together and have characteristics and properties.**
6.1L.1 Describe the functions and relative complexity of cells, tissues, organs, and organ systems.
6.2 Interaction and Change: **The related parts within a system interact and change.**
6.2L.1 Describe the relationships and interactions between and among cells, tissues, organs, and organ systems.

Grade 8
8.1 Structure and Function: **Systems and their components function at various levels of complexity.**
8.1L.1 Explain how genetics and anatomical characteristics are used to classify organisms and to infer evolutionary relationships.