New England Aquarium

Protecting the blue planet

This guide will help you to complete the Bony Fish Observation Worksheet.

Bony Fish Guide

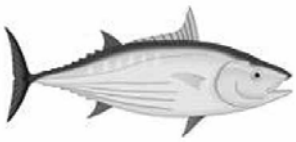
Fish (n.) An ectothermic *(cold-blooded)* vertebrate *(with a backbone)* aquatic *(lives in water)* animal that moves with the help of fins *(limbs with no fingers or toes)* and breathes with gills.

This definition might seem very broad, and that is because fish are one of the most diverse groups of animals on the planet—there are a lot of fish in the sea (not to mention rivers, lakes and ponds). In fact, scientists count at least 32,000 species of fish—more than any other type of vertebrate.

Fish are split into three broad classes:

Jawless Fish
(hagfish, lampreys, etc.)

Cartilaginous Fish
(sharks, rays, skates, etc.)

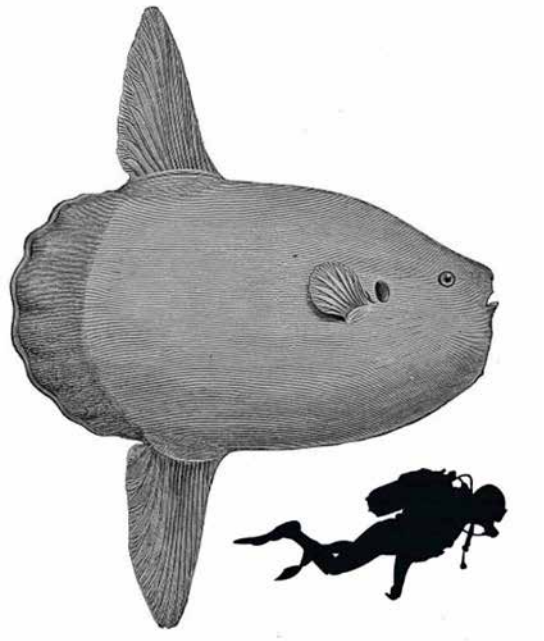


Bony Fish
(all other fish)

This guide will focus on the Bony Fish. There are at least 28,000 species of bony fish, and they are found in almost every naturally occurring body of water on the planet.
Bony fish range in size:

- Largest: ocean sunfish *(Mola mola)*, 11 feet, over 5,000 pounds
- Smallest: dwarf pygmy goby *(Pandaka pygmaea)*, ½ inch, a fraction of an ounce

(This image is life size.)



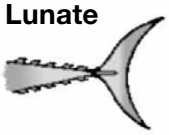
The following guide will help you learn more about the bony fish you can find throughout the New England Aquarium. Much of the guide is keyed to the Giant Ocean Tank, but can be applied to many kinds of fish.

Even if you know nothing about fish, you can quickly learn a few things: The shape of a fish's body, the position of its mouth and the shape of its tail can give you many clues as to its behavior and adaptations.

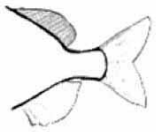
©2015 New England Aquarium

Caudal Fin (Tail) Shapes

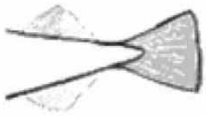
Lunate



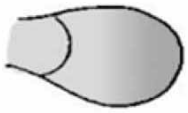
Forked



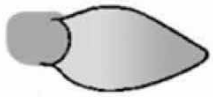
Truncate



Rounded



Pointed



Higher drag
(fish with high drag tire easily when swimming)

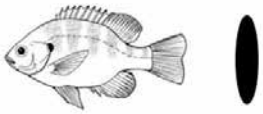
Greater acceleration
(fish with good acceleration can move quickly)

Greater maneuverability
(maneuverable fish can get around in tight spaces)

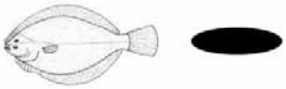
Body Shapes

Fusiform
Torpedo-shaped
A long body, tapered at both ends, gives these fish minimal drag.

Compressiform
Skinny side-to-side
A narrow body allows these fish to move easily between objects.



Depressiform
Skinny top-to-bottom
These fish are highly adapted to living on the sea floor and often bury themselves in sand.



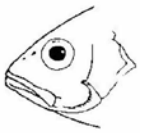
Anguilliform
Eel-shaped
Long and thin, these fish can slither into tight spots to hide or hunt.

Sagittiform
Arrow-shaped
These fish are good at quick strikes from a hiding place and ambush predators.

Mouth Position

Superior
Mouths that point up are well-adapted to feeding at the surface. Some of these animals are also hide-and-wait predators.

Terminal
Mouths that face forward are good for eating in the middle of the water column. These animals eat what is in front of them.



Inferior
Mouths on the bottom of the body are best for eating food off the bottom. These mouths are often accompanied by barbels.

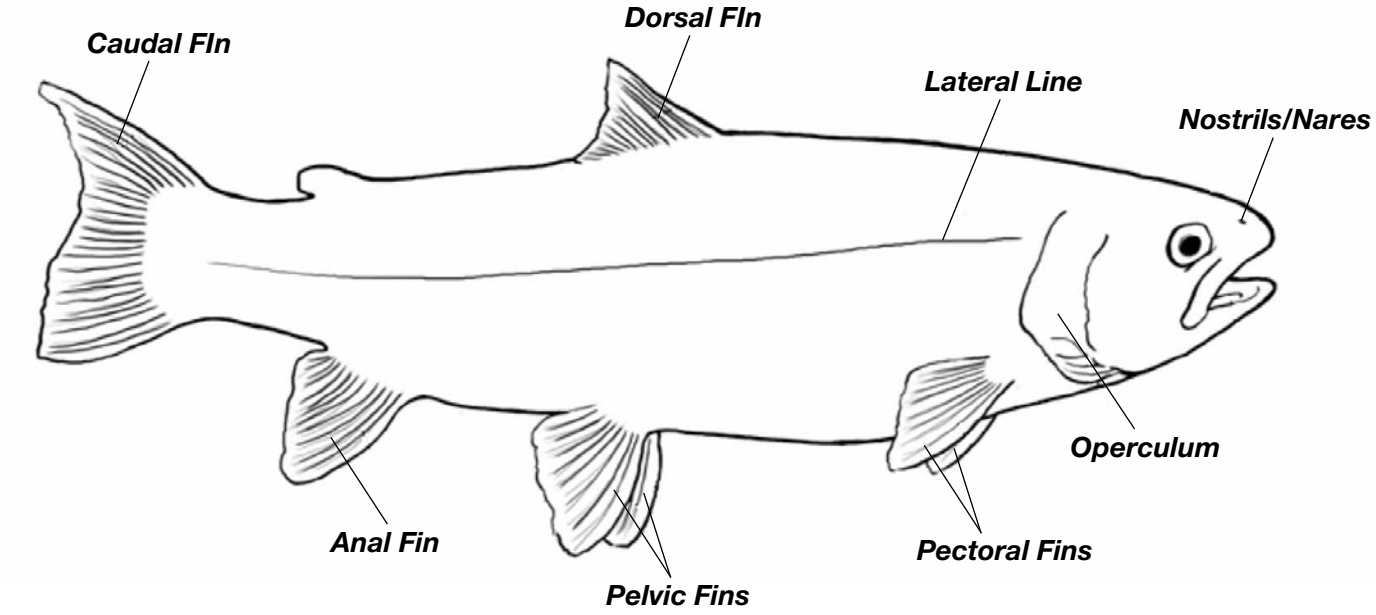
Distinctive Mouth Shapes

Small mouths, whether at the end of a long snout or not, help animals eat tiny food.
GOT Example: Filefishes, butterflyfishes

Beak-like mouths are good for grazing on hard corals.
GOT Example: Parrotfishes

Some fish have multi-hinged jaws, so their mouths can open very wide to eat large food.
GOT Example: Tarpon

©2015 New England Aquarium



Bony Fish Vocabulary

Sense Organs

Eye: Fish eyes are variable in their adaptation to seeing in different conditions.

Otolith: Fish have bony plates inside their heads that work like ears, receiving sound.

Nostril/Nares: Fish noses open to an olfactory pit. They are used for scent, not breathing.

Lateral Line: A series of small canals containing pressure sensitive receptors, they help the fish to navigate even when vision is greatly impaired. This is key in schooling behavior.

Barbel: A whisker-like organ located on the head of a fish that helps it to feel in the sand for food and movement.

Operculum (gill cover): A flap of bony plate and tissue that covers and protects the gills.

Fins

Caudal: It provides the main thrust used in swimming.

Pelvic: They help the fish to turn, balance and brake.

Dorsal and Anal: They are used to stabilize and steer, and prevent rolling over while turning at high speeds.

Pectoral: They help to keep balance and can help provide lift.

©2015 New England Aquarium

Camouflage

Forms of Camouflage

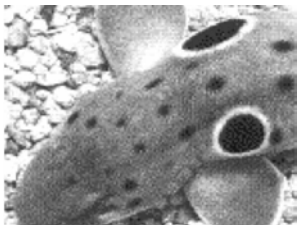
Countershading: Darkened top and whitened belly — dark helps fish to blend in with the dark bottom when viewed from above whereas the white belly helps them to blend with the sky or clearer waters above when viewed from below. Look at penguins, sea turtles and sharks.

Disruptive Coloration: Colors and patterns (i.e.. presence of color stripes or bars) that break up the outline of a fish making it harder to see. This is very common in schooling fishes. Look at schooling grunts in the Giant Ocean Tank.

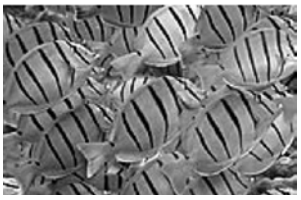
Cryptic Coloration: The most famous form of camouflage, where animals are colored and patterned to match background or surroundings, either by changing color or by remaining in the environment to which they are naturally camouflaged. Look for fish hiding in the sand at the bottom of a tank.

Camouflage in Fish

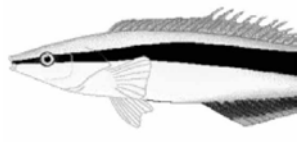
Spotty Characters
Patterns of spots can be great camouflage. Just as a baby deer has spots to help it hide in the dappled sunlight of the forest floor, many fish have patterns of blobs and spots that make them hard to see in the weeds and shadows. Speckles and spots also help fish blend in with the rocks or sandy bottom of the ocean floor.
Look very carefully to find some fish that hide in plain sight!



Spots that Lie
Some animals use spots to fool predators. Some fish have large eye-shaped spots at their tail end. An animal that wants to eat those fish might be tricked into attacking the wrong end, so the fish has a chance to get away. Large "false eye" spots, like those on epaulette sharks, can also make a fish look larger and scarier than it really is.
Do you see any extra eyes looking at you?



Striped Confusion
Like zebras traveling in a herd on the African plain, some striped fish swim in groups, or schools, for protection. All those stripes together make it difficult for predators to tell where one fish ends and another begins.
Can you find a school of striped fish? Are they easy to count at a glance?



Advertisement
Just like a spiral striped pole tells you where the barber shop is, some striped fish wear their patterns as an advertisement. Some patterns are a warning to other fish that they are dangerous. Some patterns are an offer to perform a helpful service, like cleaning skin.
Can you find a small, striped "cleaner fish" nibbling on a larger fish?