

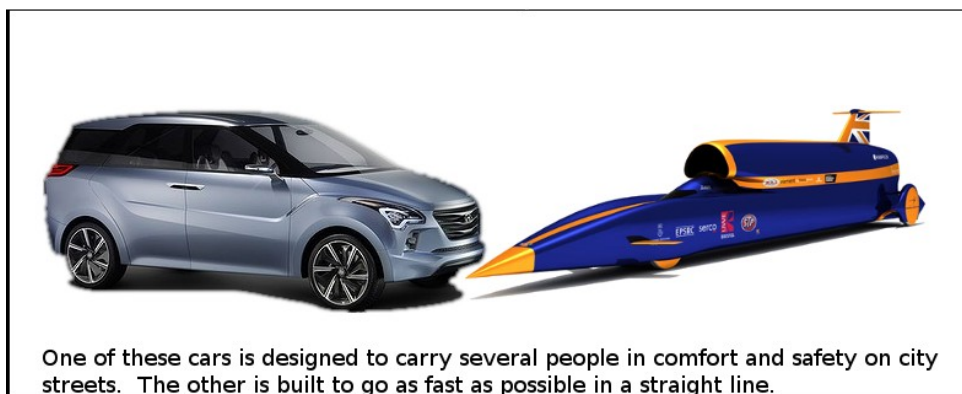
Reading Fish

How You Can Tell a Lot About a Fish From What it Looks Like

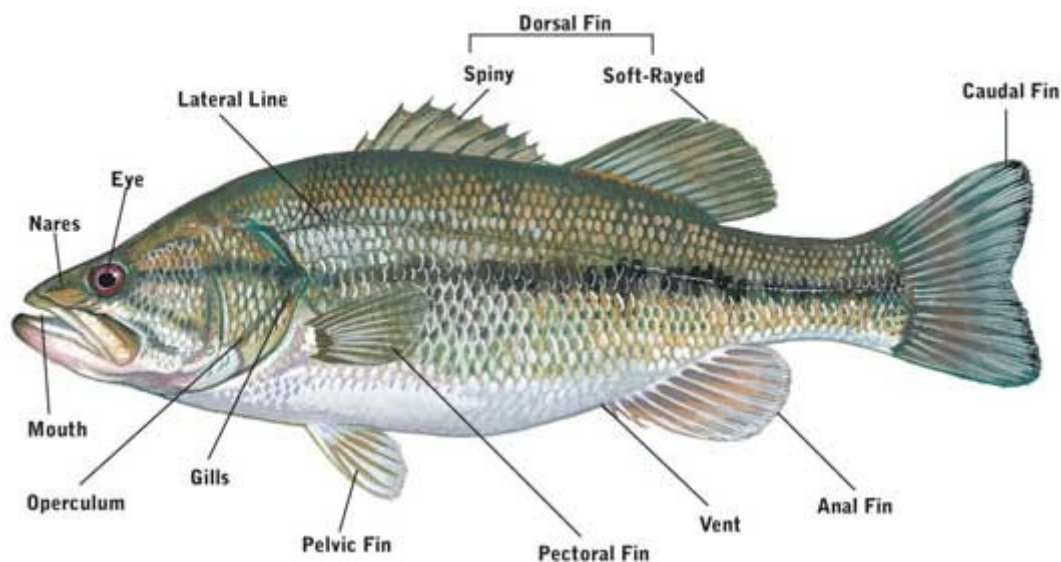
Have you ever watched a documentary where an expert is showing an animal's skeleton, or even just a piece of a squashed up fossil, and telling us what the animal ate, how fast it could move and all sorts of details about how it lived? Bones and other parts of animals, and the way they fit together, can tell experts a lot about a creature because different body parts have evolved in different ways to do different jobs.

The shape and arrangement of the external body parts of animals can also tell us a great deal about how an animal lives.

Good design – and that's what evolution delivers using the materials available – means that each part of something is “fit for purpose” and works as part of the whole. That's true of anything really – cars, clothes, televisions, and computers as well as animals and plants. With cars, for example the shape of the car body and its size and the type of wheels it has tell you a lot about how fast the car is designed to go and maybe even what type of roads it is best driven on. An F1 racing car looks very different from a family people mover – and for good design reasons.



With a fish, we can tell a lot about how it lives by looking at the shape and structure of its external body parts. We first need to know what those parts are called. Here's a diagram of a “typical” fish:



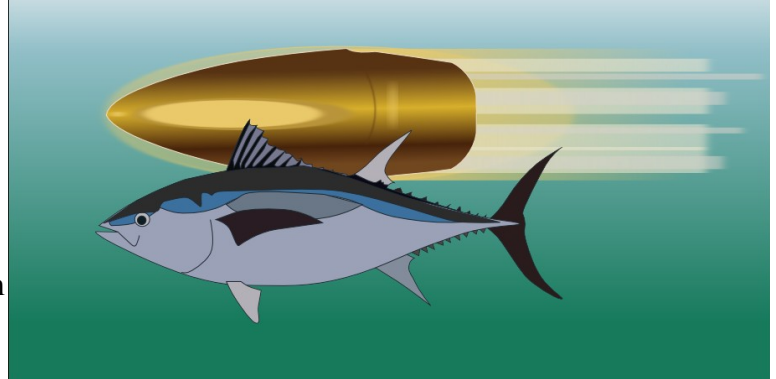
You will probably recognise a lot of the names for the fish's fins and other body parts if you have read our beginner's guide called “Know Your Fish's Bits”.

Even looking at a picture of a particular fish can tell you a lot about where and how it lives and how it feeds. Here's a detailed guide to reading fish anatomy. We'll look at body shape, the arrangement of fins and the type of mouth a fish has, as important clues about its habitat and lifestyle. Have a look and then see if you can “read” the pictures of fish at the end of the article.

1. **Body Shape:** Fish tend to have body shapes that are most suited for where they live and feed. Each shape is advantageous for a different lifestyle.

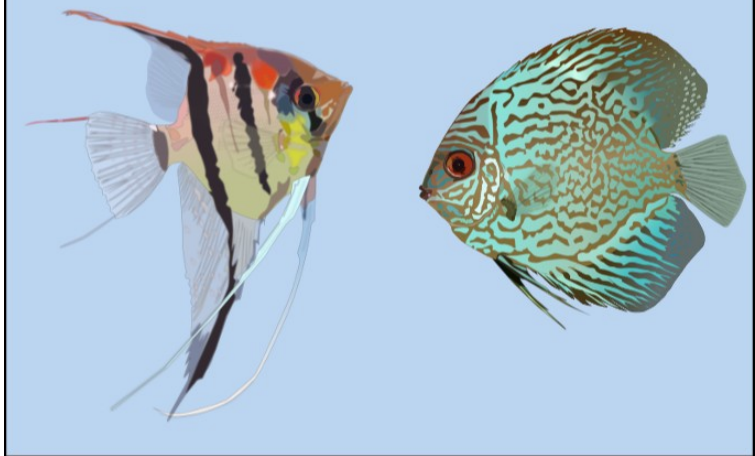
a. The **fusiform** body shape is rounded or bullet shaped and streamlined, which is an ideal shape for fast, continual swimming. Fish with this body shape are well adapted for feeding and survival in open water because the fusiform shape creates minimal drag as the fish swims through the water.

A streamlined bullet shape has the least resistance through water or air. It is no coincidence that the fastest swimming fish, like Tuna, have this body shape.



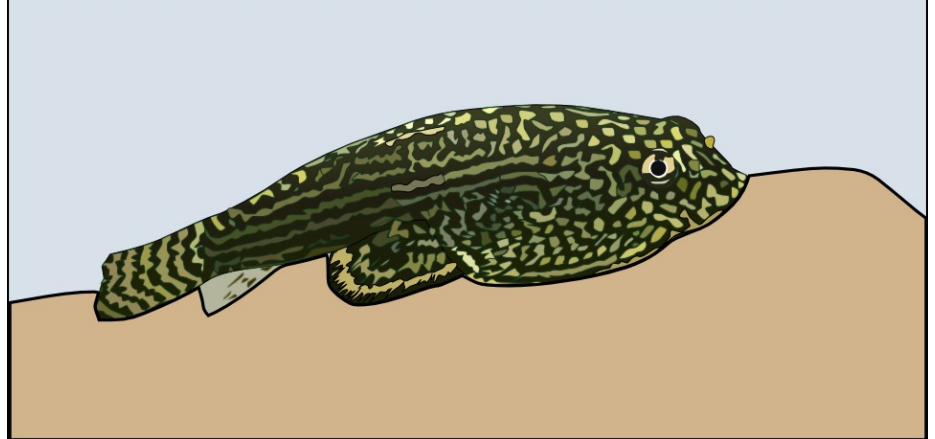
b. The **compressed** body is flattened from side to side, allowing the fish to turn easily and move quickly. Fish with a compressed body shape rely on quickness and agility rather than speed or camouflage to capture prey and avoid predators. This body shape is well suited for schooling, maneuvering around obstacles and reefs, and living around sunken branches and tree roots.

Both the Angelfish and the Discus come from slow-moving areas of rivers in South America and live amongst fallen timber and tree roots. Their compressed body shape is ideal for maneuvering in tight places.

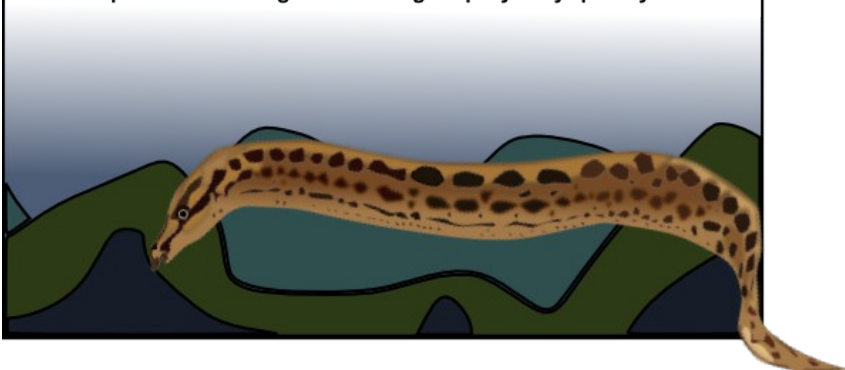


c. Fish with a **depressed** body shape are flattened from top to bottom. This body shape is good for living on the bottom. Stingrays and flounder have an extreme form of this body shape.

The Hillstream Loach from India lives amongst the stones on the bottom of fast flowing streams. They are not strong swimmers but the depressed body allows them to hold a position despite the current.



The Spiny Eel is a secretive fish that lives amongst rocky caves and is capable of stalking and striking its prey very quickly.



d. Fish that have an **elongate** or attenuated body shape are long and thin. This body shape allows fish to hide or stalk prey in caves and burrows, in plants and crevasses. Fish with elongate bodies are often quick-action, lie-in-wait predators.

e. Fish with a square or **truncate** body shape are slow swimmers. They rely on camouflage and other special adaptations to capture prey and avoid predators.

The square or truncate body shape of many cichlids, like this Convict Cichlid, means that they are slow swimmers but may have other ways to catch prey and avoid predators, like good camouflage or being able to change direction quickly.



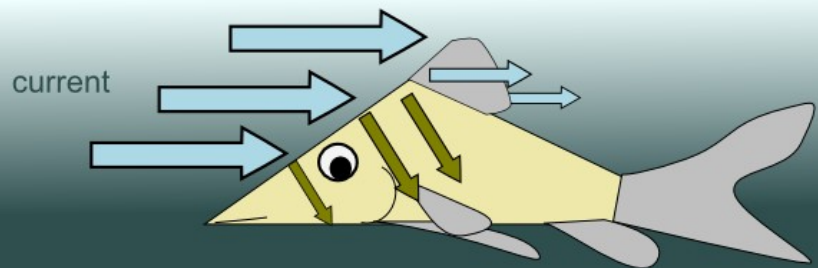
f. Fish with round bodies have a fat, **globiform** body shape. These fish are also slow, or almost non-, swimmers, relying on camouflage and other special adaptations to capture prey and avoid predators. Have a look at [This Fish](#) for a great example of a **globiform** body shape

g. Other: Some fish have body shapes don't fit the above descriptions: For example, fish such as seahorses, leafy sea-dragons and pipefish have unusual bodies (and fins) adapted to their life in seaweed beds.

Most fish use a combination of body and fin movements to propel them through the water. All mobility is the result of muscle movement. Fish are 80% muscle. The shape of the body from above is also important – thin or streamlined shapes move more easily through water. Think about streamlining by comparing the shape of the body from both above and the side to an airplane wing or a ship's hull. And it may not always be about forward movement –

remember that water has currents that the fish must deal with. Even staying still in a strong current requires streamlining or lots of swimming effort.

Bottom living fish from fast-flowing water are often streamlined. A sleek body shape means that strong currents help to keep them on the bottom of the stream.



2. Fins:

The Leafy Sea-Dragon is a marine fish of the seaweed beds. It has many strange adaptations, including a dorsal fin that can propel in both forwards and backwards.



Fins give fish mobility, stability and maneuverability. They are used in swimming, turning (steering), stopping (braking), and perching. Each fin is moved by a set of muscles. Some fish have developed special uses for fins. There are two types of fins: paired (one on each side) and unpaired, or median (single) fins.

- a. **Dorsal fins** are unpaired median fins that have spiny or soft rays. They act as keels and prevent the fish from spinning or rolling. They keep fish upright in water or stabilized so they can swim straight. Some fish use their dorsal fins to swim – for example the triggerfish, the Leafy Sea-Dragon and the seahorses. Some fish will have only one dorsal fin while others may have two or three. The front part of the dorsal fin is generally thicker than the rear part, which is

thinner and without spiny rays. The dorsal fin of the remora is modified into a suction disk for attachment to larger fish.

- b. The **Caudal fin**, or tail fin, is also an unpaired median fin. The caudal fin helps to propel and maneuver fish. It is most often used to generate swimming power and to assist in braking, turning, or stopping. Caudal fins appear in a variety of shapes, and the shape determines how fast a fish can swim. Caudal fins with lobes of equal size are **homocercal** and caudal fins with lobes of unequal size are called **heterocercal** and give lift to the fish. The **caudal peduncle** is where the tail is attached to the body. If the caudal peduncle is narrow and the caudal fin is forked, the fish is a fast swimmer. The shape of the caudal fin is a good indicator of the fish's speed and maneuvering ability.



A continuous tail, like an eel's, indicates a slow swimmer with very good maneuverability.



A strongly forked (or **lunate**) tail, like a Tuna's, means the fish is a fast and powerful swimmer but can't brake or maneuver quickly.



A forked tail indicates a strong and moderately fast swimmer with good endurance for long-distance swimming or for swimming against currents. Combined with a thick and strong caudal peduncle, the fish can use its tail to change direction quickly to dodge obstacles or capture prey.



A square-ended or **truncate** tail is typical of slow to moderate swimmers that have good maneuverability and acceleration



A rounded or **spathulate** tail is an indicator that the fish is a slow swimmer but with excellent control and able to quickly change direction and accelerate for short periods to catch prey or escape predators.

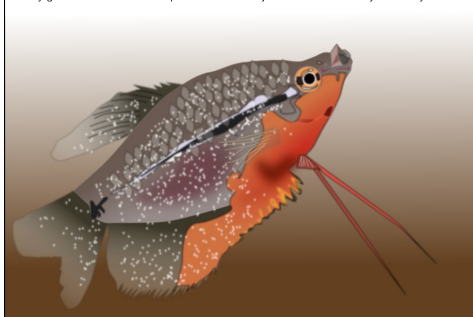
- c. The **anal fin** is an unpaired median fin that is located below the tail. The anal fin, like the dorsal fin, is mainly stabilizing fin, however a few fish species do use it for propulsion. The wavy action of the anal fin on the Black Ghost Knife Fish, for example, helps it move around in quite precise, if unusual, ways.

The Knife Fish is unusual in many ways. It uses its wavy anal fin to propel and manoeuvre itself



- d. **The pectoral fins** are paired fins. They work like arms and legs and are used for turning and braking.

Many gouramis have modified pelvic fins that they use to "feel their way" in murky water.



Some fish have unusual adaptations for their pectoral fins: sea robins use them to crawl, skates and rays use them to swim, and flying fish use them for gliding through the air. Flat, horizontal pectoral fins, like those of many sharks, give lift and help the fish glide through the water with little effort.

- e. **Pelvic fins** are also paired fins. They are used for stabilizing and braking. Some fish have special

adaptations for pelvic fins. Some fish use their pelvic fins for walking or perching and others have modified pelvic fins that act as sensors. Male skates use their modified pelvic fins for mating. The pelvic fin is absent from some fish, like eels, enabling them to swim through tight places.

3. **Mouth Position:** How and where a fish eats is determined by the position of the mouth.

- a. Fish with a **terminal** mouth position have a mouth in the middle, at the end of the head. These fish either chase their food or feed on what is ahead of them. They are usually aggressive, fast swimmers. If they are fast swimmers, they may be predators. Those that can maneuver quickly are probably grazers or pickers.



Tiger Barb

- b. The **superior** mouth position is when the mouth is upturned or near the top of the head. Fish with this mouth position feed on food that is above them and are either a predator or a strainer.



Clown Killifish

- c. If a fish's mouth is down-turned or on the bottom of the head, it is in the **inferior** position. These fish usually feed off the bottom and are either predators or bottom dwelling scavengers or grazers. Barbels around the mouth are used to sense food in the sand or gravel.



"YoYo" Loach

Some fish have highly developed fin extensions made of one or more rays. These are often used for "signalling" to potential mates or may be used as "probes" to check out obstructions when visibility is poor. The Gonopodium on male livebearers (like guppies and swordtails) is actually a modified pelvic fin that can deliver sperm to the female.

Other adaptations of a fish's external body parts include its scales, eyes, teeth, colouring and patterns and the arrangement of its lateral line. How variations in each of these equip different fish for different environments and feeding strategies is a good topic for further research.

Here are a few quizzes to test what you have learned about how body shape and fins fit different species to different environments and feeding strategies. Answers are at the end of this article

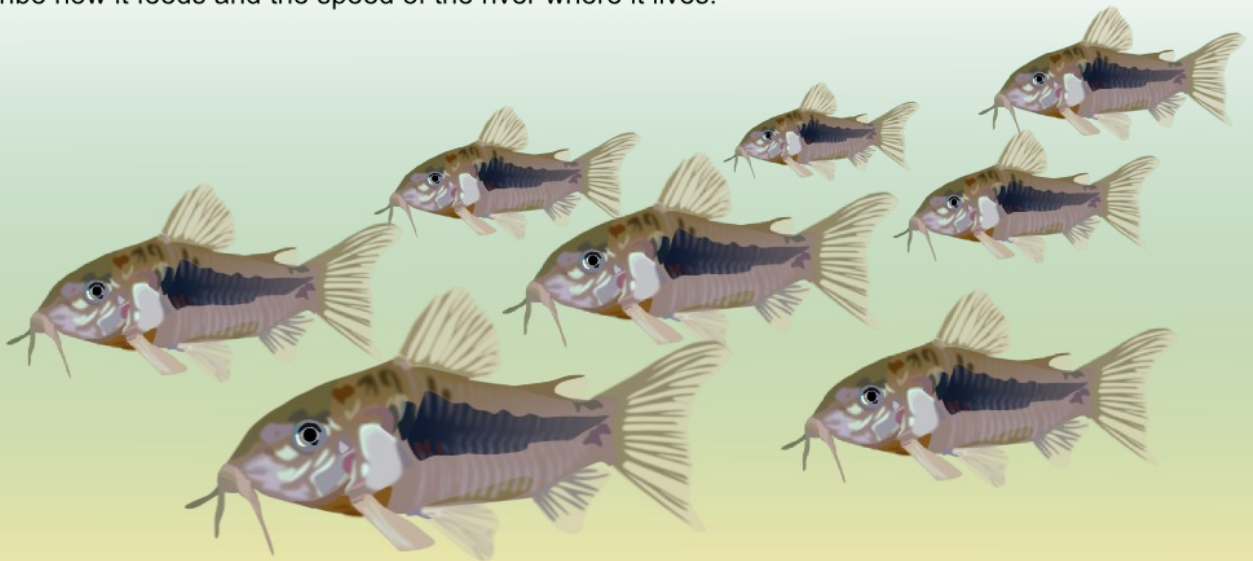
1.

The Blackmast (left) and the Empire Gudgeon both come from northern Australian rivers. Which do you think is a fast swimming schooling fish and which prefers hanging around in caves and sunken logs?



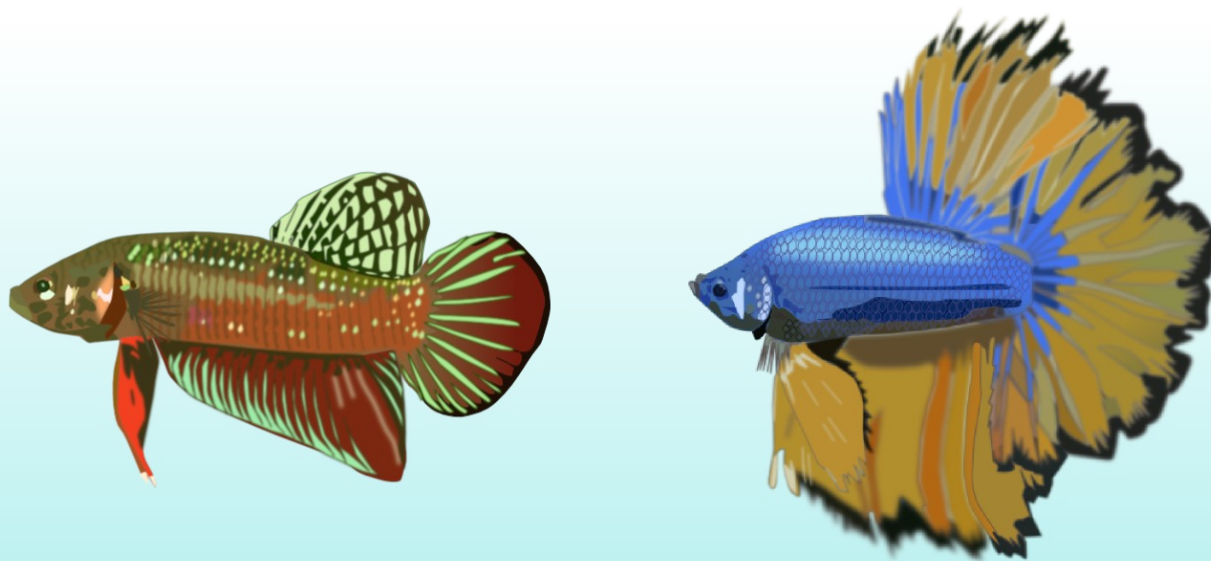
2.

The Bronze Cory Catfish comes from the Amazon River in South America where it lives in large schools. Describe how it feeds and the speed of the river where it lives.



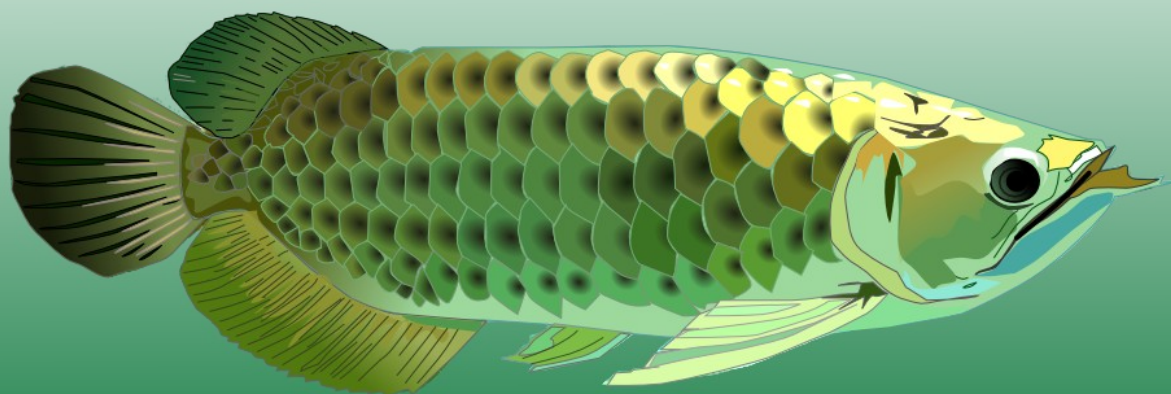
3.

Compare the fins on the wild form (left) and the fancy (right) Siamese Fighting Fish (*Betta splendens*). How do you think breeding the fish for this type of finnage has effected its swimming abilities? What problems might the Fancy fish encounter if was released into the natural habitat?



4.

The Sarratoga is a large and powerful river fish from northern Australia. Where do you think it mainly feeds?



Further Reading and Project Suggestions

Check out the great resources at the Monterey Bay Aquarium web site: <http://www.mbari.org/earth/> - lots of great ideas for activities and projects

The Western Australian “Marine Waters” web site also has posters and activity sheets on lots of fish-related subjects.

References:

Main Source: Adapted from www.mbari.org/earth/mar_tech/EITS/ob_deep/OD_Background.doc, itself adapted from “How to Read a Fish,” by Margaret Olsen for the Ocean Society Fish Curriculum.

With additional material from:

Hubbards Fish Anatomy : <http://fishanatomy.net/>

Fish Fiziks (poster): <http://marinewaters.fish.wa.gov.au/resources/fish-fiziks/>

Quiz Answers

Answer 1 : With its streamlined body and forked tail, the Blackmast is well suited to schooling in open, flowing water. The squarish body and paddle tail of the gudgeon means it is more sedentary but capable of maneuvering in tight places.

Answer 2 : The mouth of all Corydoras catfish is downwards pointing, indicating a strong preference for feeding on, or in, the substrate. Its streamlined body shape is well suited for swimming or holding position in fast water.

Answer 3: The paddle-shaped tail on the wild form of the Siamese Fighting Fish indicates it relied on quick maneuvers for feeding or escaping from predators. Its barrel shaped body may also be an adaptation to spending time in caves or crevices. The Fancy version would have a hard time doing either of these things and may not be able to feed effectively or escape predators if it made its way into the wild.

Answer 4: The Saratoga has an upward pointing mouth which tells us it gets a lot of its food from the surface or by approaching its prey from below. Its paddle tail tells us it can change direction quickly but is not a particularly fast swimmer.