Anatomy and Go Fish! Background

Introduction

It is important to properly identify fish for many reasons: to follow the rules and regulations, for protection against sharp teeth or protruding spines, for the safety of the fish, and for consumption or eating purposes. When identifying fish, scientists and anglers use specific vocabulary to describe external or outside body parts. These body parts are common to most fish. The difference in the body parts is what helps distinguish one fish from another, while their similarities are used to classify them into groups. There are approximately 29,000 fish species in the world. In order to identify each type of fish, scientists have grouped them according to their outside body parts, specifically the number and location of fins, and body shape.

Classification

Using a system of classification, scientists arrange all organisms into groups based on their similarities. The first system of classification was proposed in 1753 by Carolus Linnaeus. Linnaeus believed that each organism should have a binomial name, genus and species, with species being the smallest organization unit of life. Using Linnaeus' system as a guide, scientists created a hierarchical system known as taxonomic classification, in which organisms are classified into groups based on their similarities. This hierarchical system moves from largest and most general to smallest and most specific: kingdom, phylum, class, order, family, genus, and species. {See Figure 1. Taxonomic Classification Pyramid}. For example, fish belong to the kingdom Animalia, the phylum Chordata, and from there are grouped more specifically into several classes, orders, families, and thousands of genus and species. A sample classification of the largemouth bass, *Micropterus salmoides* is shown below {See Figure 2: Classification of the Largemouth Bass}.

Figure 2: Classification of the Largemouth Bass

Taxon	Latin Name
Kingdom	Animalia
Phylum	Chordata
Class	Osteichthyes
Order	Perciformes
Family	Centrarchidae (Sunfish)
Genus	Micropterus
Species	Salmoides

External Anatomy Features

Common external anatomy features of fish include: dorsal fin, anal fin, caudal fin, pectoral fins, ventral fins, gills, lateral line, nares, mouth, scales, and body shape.

Fins

All fish have external appendages called fins. Like human limbs, fins provide fish with balance, steering, and protection. Fins are either single along the centerline of the fish; the dorsal fin, anal fin, and tail fin, or paired fins; the pectoral fins and ventral fins.[i] The tail fin, also called the caudal fin helps propels fish forward. In most fish the pectoral fins help fish balance and occasionally are used for swimming. The top fin or dorsal fin is also used in balance, but its main function is usually protection. The ventral fin and anal fin are located on the bottom or belly of fish and help with steering as well as balance.

Gills

Located on either side of fish, gills provide oxygen to fish from the water. The gills are covered by a flexible bony plate called the operculum. Some fish have spines located on the operculum as a defense mechanism to protect them from predators.[ii]

Lateral Line

Running down the length of a fish's body is the lateral line. This organ is used to feel low vibrations in the water. The lateral line is made up of a series of microscopic holes located just under the scales of a fish.[iii]

Nares

All fish possess a sense of smell. Paired holes, or nares, used for detecting odors in the water, are located on a fish's snout. Some fish, such as some shark varieties, catfish or eels, have a heightened sense of smell.

Scales and Slime

Most fish have scales covering the length of their body. Scales protect fish from injury, much like skin on the human body. On top of these scales is a mucus covering known as the slime layer. Slime protects fish from bacteria and parasites in the water. Anglers should be careful not to remove the slime layer when handling a fish.[iv]

Body Shape

A fish's body shape as well as the shape and size of certain external features can tell you a lot about that fish. For example, the body shape of a fish can indicate where that fish lives in the water, and what type of swimmer it is. In addition, tail fin shape also signifies a fish's swimming abilities. For instance, a sharp forked tail like that of tuna implies a fast swimmer, whereas a rounded tail like that of a blackfish indicates the fish is good at turning.

Mouth

The mouth parts of a fish will vary in size and may or may not contain teeth, depending on what the fish eats. The location of the mouth on a fish's body can also give us a clue as to what the fish's diet consists of. A fish with a superior mouth (i.e., a mouth pointing upward)

means the fish will usually eat food located above it, while a fish with an inferior mouth (i.e., a mouth pointing downward) will usually eat food located below it. fish will eat usually food located above it; whereas a fish with an inferior mouth, a mouth pointing downward, will usually eat food located below it.

Classification: Families

With over 29,000 different species, fish are one of the most diverse groups of vertebrates on Earth. In order to identify all of these species, fish with similar external anatomy features or traits are grouped into families. For example, fish in the pike family have a long and slender body and sharp teeth. Fish in the mackerel family have a strongly forked tail, are shaped like a bullet, and have finlets on both their dorsal and anal fins.

Examples of Fish in New York State: Freshwater and Saltwater[7]

Type of Water	Family Name	Characteristics	Picture
Freshwater	Catfish	Do not have scales; possess barbels or whiskers; dorsal and pectoral fins have spine	
Freshwater	Perch	2 separated dorsal fins, 1 spiny & 1 soft ray	 Yellow perch
Freshwater/Saltwater	Salmon	3 belly fins; 1 dorsal fin; adipose or short knobby fin close to tail fin	
Saltwater	Porgy	Sharp, continuous dorsal fin; oval body shape; forked tail	 

Saltwater	Jack	Bullet shaped body; forked tail; 2 connected dorsal fins	Crevalle jack

[i] "Fish Anatomy." Florida Fish and Wildlife. 2008. 5 December 2008 <http://floridafisheries.com/fishes/anatomy.html>.

[ii] "Fish Anatomy."

[iii] Maryland Department of Natural Resources (MD DNR). "Fisheries Biology and Management" 10 October 2008 <http://www.dnr.state.md.us/education/envirothon/FISH%20ANATOMY.pdf>.

[iv] "Fish Anatomy."

[v] Illustrations by Diane Rome Peebles (provided by the Florida Fish and Wildlife Conservation Commission, Division of Marine Fisheries Management) and Duane Raver (provided by the New York State Department of Environmental Conservation)