I DIDN'T KNOW THAT!
(Fishes)

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I DIDN'T KNOW THAT!!!
(Fishes)

Robert J. Boles

Fossil records show that fishes have been on Earth far longer than any other vertebrate. There are also many more kinds of fishes than there are other kinds of vertebrates. This issue of the Naturalist consists of bits of information concerning this great and interesting class of animals.

SHARKS AND THEIR RELATIVES

Fish appeared on Earth over 350,000,000 years ago — long before any other vertebrate.

Some sharks have internal fertilization. The fertilized egg develops inside the mother. She then gives birth to the baby sharks.

Sharks do not have swim bladders. Being heavier than water, they must swim constantly to maintain their position.

About 250 different kinds of sharks are known.

The giant deep-water six-gill sharks may sometimes weigh as much as 1700 pounds, and reach an estimated length of about seventeen feet.

There are no records of the fierce-looking sand sharks attacking humans on the American side of the Atlantic. However, in South Africa it is considered to be very dangerous and capable of unprovoked attack.

One biologist was bitten by an embryo when he was performing a shark Caesarean operation!

The mackerel shark family includes some of the world’s most dangerous fishes. The great white shark, Carcharodon carcharias, a member of this family, is commonly called “the maneater.”

The largest maneater ever caught measured 36½ feet in length. It was taken at Port Fairy, Australia, over 90 years ago. The jaws may be seen in the British Museum.

One 21-foot mackerel shark, taken near Cuba, weighed 7100 pounds. The liver alone weighed over 1000 pounds.

Mackerel sharks have been recorded to descend to a depth of 4200 feet in the ocean.
Man-eating sharks apparently sample anything that looks like food, including humans. They may attack rowboats, and stomach examinations have found the intact body of a hundred-pound seal, a fifty-pound seal, a Newfoundland dog, and sharks up to six or seven feet in length.

Sharks as large as 1329 pounds have been landed with angling tackle in as short a time as 53 minutes.

The Maoris of New Zealand used to prize the center teeth of the Mako shark as ear ornaments.

Whenever possible, a Mako shark takes it's food in one gulp.

The whip-like tail of a thresher shark is about equal to the length of the rest of the shark's body.

The ferocious-looking thresher shark is entirely harmless to man.

The giant basking shark, Catorhinus maximus, is the world's largest fish, sometimes reaching a length of 45 feet. It feeds on tiny aquatic organisms called plankton.

Six hundred gallons of oil were obtained from a single basking shark liver. The liver oil contains no vitamins, and is used chiefly in certain leather-tanning processes.

The giant whale shark (up to 45 feet) is so docile that one can swim around them with little to no danger.

Some sharks may have over 300 rows of teeth in each jaw.

Some swell sharks fill themselves with air when captured, swelling to at least twice their normal diameter. When thrown back into water, they float helplessly until they get rid of the air. This may require four or five days in some species.

Swell sharks lay rectangular-shaped eggs with long tentacles at each corner.

The tiger shark, Galeocerdo cuvieri, will eat anything available, including mammals, birds, fishes, garbage, coal, tin cans, and, finally people. If sea turtles are available, they are taken with great relish.

During World War II, the vitamin-rich livers of the American Pacific soupfin shark brought as much as $14 a pound. An unprocessed soupfin shark was worth up to $2500!

The black-tip shark is very inquisitive. A skin diver may find himself surrounded by several curious blacktips — a bit unnerving if he saw
the film "Jaws," and doesn’t know that they don’t attack humans.

Large hammerhead sharks are very aggressive and dangerous, especially to a swimmer.

The distance between the eyes of a 15-foot hammerhead shark, weighing 1500 pounds, may be as much as 36 inches.

One shark stomach contained a can of beer. The report didn’t state the brand of beer the shark preferred (it occurred before the introduction of "Billy Beer").

A dogfish shark, tagged on the American Pacific coast, was caught seven years later on the Japanese coast, after a journey of at least four thousand miles.

Skin divers should never attach speared fish to themselves in shark-infested waters. Blood from the fish may cause sharks to go into a feeding frenzy.

Any shark that is ten feet of more in length should be considered to be dangerous.

Never feed sharks when skin diving. Like bears in our National Parks, they do not understand where the food ends and your hand begins.

As many people may be injured by shark "bumps" as by shark bites. It isn’t known if the bump is to determine an object’s edibility, or the shark’s idea of "fun."

Most shark attacks take place in water of 70° F or more. Obviously most shark attacks in waters about the United States occur during the summer months.

Records show that man-eating sharks prefer men, twenty to one. It would appear that a woman would be wise to always have one or more men go swimming with her in shark-infested waters.

Some electric rays may produce more than 200 volts.

In Roman times the standard cure for gout was a shock from a torpedo or electric ray.

Sawfishes may weigh more than five thousand pounds and reach a length of more than thirty-five feet.

The sawfish uses its "saw" to dig up the sandy bottom, and to flail from side to side as it swims through a school of fishes, thus killing and wounding many of its victims. It can then eat its prey at its leisure.
The American Pacific big skate, *Raja binoculata*, may reach a length of eight feet.

Stingrays have a sharp, flattened and tapered spine, with many small, sharp teeth along the side, attached to the dorsal surface of the tail.

Large stingrays are capable of driving the venom spine through the planking of a wooden rowboat, or completely through an arm or leg.

If the spine with its venom gland intact is accidentally driven into the abdomen of a swimmer, death invariably results. In one case the victim lived less than two hours after the injury.

Natives in the Indo-Pacific region used the spines of stingrays as tips for their arrows. In the Congo, the tails have been used as whips and the skins as drum heads.

A person should never walk barefoot in a sandy or muddy area where stingrays might possibly occur.

The massive molar teeth of an eagle ray can easily crush the heaviest clam shell.

The largest-known devil ray, the *Manta*, measured twenty-two feet across the wing tips, and probably weighed more than 3000 pounds.

**FISHES OTHER THAN SHARKS**

Fossils indicate that the first fishes to appear on Earth had no jaws. Only the hagfishes and lampreys show this condition today.

There are some kinds of fishes that spend much of the time out of water.

Some fishes have no pectoral or pelvic fins (pectoral and pelvic fins correspond to the arms and legs of a human).

A fish heart has two chambers (amphibians and most reptiles have three chambers, while birds and mammals have four).

There are more than 25,000 different kinds (species) of fishes on Earth — more than any other kinds of vertebrate.

Some of the African mouth-breeder fishes (*Tilapia* spp.) can spawn in either salt, brackish, or fresh water.

The temperature of a fish’s body fluctuates with the temperature of the surrounding water.

Some fishes living in the muddy waters of Africa and South America have small electric organs that discharge impulses which bounce off of unseen objects and thus tell the fish about its surroundings.
Some catfishes (*Ictalurus spp.*) have taste buds covering most of the body. They can't drink through their finger like Mork on TV, but they can taste with their tails!

The air or swim bladder of fishes serves at least three functions: (1) to make the fish "lighter" in the water, (2) to function as a resonance chamber in sound production, and (3) as a respiratory (breathing) function.

Most fishes have external fertilization — that is, the eggs are first laid by the female, then fertilized by milt (sperm) of the males outside the body.

In seahorses, the female places her eggs in a special brood pouch on the male, and he "gives birth" to the young seahorses!

A hagfishes may "drill" into a fish with its rasplike teeth, where, working like a termite in a piece of wood, it consumes the internal organs and tissues, but leaving the exterior intact.

Hagfish may be serious pests in some areas, where they do great damage to valuable food fishes, such as haddock, cod, and flatfish.

Hagfishes have no eyes.

The parasitic lamprey reduced the yearly catch of fishes in the Great Lakes from 11,000,000 pounds to practically nothing in less than thirty years after it gained entrance into the Great Lakes.
An adult Pacific or Atlantic lamprey may grow to be about three feet in length. The Chestnut lamprey in Kansas only gets about a foot long.

A female lamprey may lay as many as 200,000 eggs.

Larval lampreys may be used as fish bait. They look something like large earthworms.

Some species of sturgeons do not become sexually mature until the female reaches the age of twenty or more years.

The nearest (and only) relative of the American paddlefish lives in the Yangtse River in China.

Young paddle fish have teeth, but the adults have none.

The American paddlefish has been known to reach a weight of 168 pounds and a length of over six feet.

The eggs of the paddlefish can be made into a good caviar.

Gar scales have been used in making ornaments and jewelry.

An alligator gar was recoreded as weighing 302 pounds and being almost ten feet in length. The largest Kansas gar caught weighed 31½ pounds.

Lake trout may sometimes be found in water as deep as four hundred feet. Golden trout are seldom found at elevations of less than eight thousand feet.

All of the Pacific salmon are anadromous—that is, they live in the oceans as adults, but return to the streams where they were hatched to spawn after which they die.

The ayu, a kind of small salmon, is fished for in Japan by the use of a fish-eating bird, the cormorant. A ring around the cormorant’s neck prevents it from swallowing the foot-long fish. The salmon is dumped from the cormorant’s mouth, and the bird rewarded with a smaller, and less valuable, fish.

The arapaima of South America may be the largest strictly fresh-water fish in the world. They are reported to reach a length of fifteen feet.

It has been estimated that an average of 700 man-hours are spent for each muskellunge caught by hook and line.

“Bombay duck” is really the dried flesh of a fish, Harpadon nehereus, which is served as an hors d’oeuvre.

Saber-tooth fishes can swallow fishes much larger than themselves. It is not a threat to humans, however, as it is six-and-a-half inches or less in length.

The largest of the four most dangerous species of piranhas may reach a length of two feet.
Piranhas are still dangerous when out of water, for they may snap their jaws when touched, slicing an unprotected finger or toe.

Such beautiful little aquarium fishes as the neon tetra are in the same fish family as the piranhas.

The flying characins, or flying hatchet fishes, are the only fishes that have true flight — that is, they actually propel themselves through the air with the aid of their pectoral fins (the well-known flying fishes merely glide; their "wings" do not move during flight).

A predator can bite off a large portion out of the tail of a knifefish without killing it because of the extremely rapid regeneration of that part of the body.

A large South American electric eel can generate up to six hundred volts of direct current. Only the fact that the amperage is low would prevent a full charge from killing a man.

Some members of the minnow family reach a huge size. The giant Indian mahseers reach a length of nine feet.

There are over 1200 known kinds of minnows in the world.

A commercial minnow raiser may produce up to 350,000 minnows per acre of water.

With proper fertilization, a pond may produce up to 1000 pounds of carp to the acre.

The common carp is native to the region of the Black and Caspian Seas to Turkestan.

Some varieties of carp have no scales on their bodies.

All of the many strains of goldfish belong to the same species, Carassius auratus.

Some highly aberrant varieties of goldfish (such as the lionheads) are difficult to raise, and perfect specimens may be worth several hundred dollars.

Minnows have teeth in their "throat" (pharyngeal teeth), instead of in their mouths.

The male arid marine catfish incubates the eggs in his mouth. Some eggs may be over three-fourths of an inch in diameter, and he may carry up to fifty eggs in his mouth for a month or so until they hatch, then the little catfish for up to another month — all this time going without eating.
The cleaned skull of an arid catfish, when viewed from the underside, often has the appearance of a cross, sometimes with the figure of a man superimposed. In the West Indies these are often sold to gullible tourists as native religious objects of sacred value.

One of the largest known catfishes is the European well. It is said to reach a length of almost thirteen feet, and a weight of about six hundred and fifty pounds.

The tiny parasitic catfish, the candiru, is thought to be only vertebrate parasitic on man (unless you include the vampire bat).

The American eels leave the United States and swim into the Sargasso Sea to spawn, after which they die.

The blood of the American eel contains a powerful neurotoxin that can cause a serious infection if it gets into a cut or wound when the eel is being dressed for eating.

Some moray eels may reach a length of up to ten feet.

A flying fish may glide as far as 150 feet, attain a speed of about 35 miles per hour, and remain in the air for as much as 13 seconds.

Several kinds of white (albinistic) and blind cave fishes are known.

All of the group of topminnows in Africa and South America known as annual fishes die when the dry season comes. Before they die, however, they lay eggs that are impervious to desiccation and thus allow the species to be carried over to the next wet season.

The guppy, Lebistes reticulatus, was named after a Reverend Robert John Lechmere Guppy, who discovered them on the island of Trinidad in 1866.

The Amazon molly, Mollienesia formosa, produces only female offspring.

The mosquito fish, Gambusia affinis, has been imported to many areas of the world where it would not normally be found for the control of mosquitoes and other aquatic insects.
When the spotted platy is crossed with a green swordtail, the offspring invariably develop lethal cancerous growths along the sides of the body just in front of the tail fin, the situation that has made them very valuable in medical research on this disease.

The largest American fresh-water fish is the Pacific coast white sturgeon, *Acipenser transmontanus*. A British Columbia specimen was reported to have weighed about 1800 pounds.

The shovel-nose sturgeon seldom reaches a weight of six pounds and a length of three feet. The Kansas record is four pounds and thirty and one-half inches.

The largest sturgeon of all is the giant beluga, *Huso huso*, from the Caspian sea and the Volga River. The world record is listed at a weight of 2860 pounds and a length of 28 feet.

A 75-year old sturgeon weighed 2200 pounds and was thirteen feet long.

A female sturgeon may lay up to five million eggs.

Caviar can be processed from the roe or eggs of many different kinds of fishes but the finest caviar is made from the eggs of the sturgeon.

A giant white sturgeon weighing 1760 pounds was caught in a net in the Caspian Sea by Soviet fishermen. That one fish yielded 245 pounds of black caviar. At the current world retail price of $5.38 an ounce, the catch was worth around $21,000.

Isinglass, which was once used to cover the windows of the rain curtains used on early-day cars, was made from the air bladders of sturgeons.

A female four-eyed fish in the Steinhart Aquarium, six inches long, gave birth to a two-and-one-half inch young.

Seahorses have long been credited with having alleged medicinal properties. They have been used as a love potion, to cure baldness and pains in the side, or, when a living sea horse has been dipped into oil of roses, for chills and fever.

A pigmy sea horse is only one-and-one-half inches long when full grown.

A 75-pound female codfish may lay as many as 9,000,000 eggs.

An 8-foot ribbon fish may have a body twelve inches deep and only two inches or less in width. It has been suggested that the origin of many stories of sea serpents may be traced to the occasional appearance of one of these ribbon fishes.

Lantern-eyed fishes can not only produce light, but have a shutter-like arrangement that enables them to turn the light on or off at will. The light is actually produced by a type of mutualist luminous bacteria that live in a series of tubes under the eyes of the fish.
Some species of sea basses mature at slightly more than one inch in length, while other species may reach a length of twelve feet and weigh as much as a thousand pounds.

The Queensland grouper, which may reach a weight of 800 pounds, may stalk a shell diver the way a cat does a mouse. Divers are often more wary of this fish than they are of sharks. This is probably the species involved in the many unproven stores of giant fishes swallowing skin divers.

Wreck fish get their name because they like to collect about old sunken ships. One trawler took five tons of this species from the area about a wreck in 360 feet of water.

The largest striped bass on record was a 125-pound one caught in North Carolina. The Kansas record is around 34 pounds.

The little six-inch belted sandfish is hermaphroditic. Each individual contains both eggs and sperm. In the laboratory they have fertilized the eggs of a fish with its own sperm. This presents a problem to the baby fish — do they call the parent "Mom" or "Dad"?

Young black sea bass are mostly females, producing normal eggs. By the time they have reached five years a number change sexes, becoming functional males — all this without a sex-change operation. Would they be called transexuals?

The dwarf sunfish of Central United States becomes sexually mature at one inch in length.

The white crappie is more tolerant of turbid water than the black crappie.

Only one centrarchid sunfish, the Sacramento perch, originally occurred in the western part of the United States.

For many years the yellow perch was considered useful only for fertilizer.

The eggs of the yellow perch are laid in long strings at night, where they are usually found stuck to shallow-water vegetation.

The blood-thirsty feeding habits of the bluefish, found along the American Atlantic coast, remind one of the South American piranha. Even after these fish have eaten their fill, they continue to slaughter others, apparently for the pure love of killing.

Old-time mariners claimed that the legendary pilot fish, *Naucrates ductor*, will lead lost swimmers, ships, and even whales to safety. Actually, they are probably around just for what scraps of food they can find.

The name dolphin is applied to both a spectacular offshore sports fish, and to a mammal, the air-breathing porpoise.
The fast-swimming dolphin may reach a speed of as much as 37 miles per hour. Imagine a 65-pound fish hitting your lure at this speed!

At least 300 species of tropical fishes in the West Indies and the South Central Pacific have at some time or other proved responsible for a peculiar type of fish poisoning called ciguatera.

Ciguatera may cause the hair and the toe and finger nails to be lost. It may also cause a reversal of sensations — cold feels hot, and hot feels cold. Complete recovery may take months or even years.

The sounds made by croakers sometimes confused the early submarine hydrophone operators, who thought they were the sound of enemy craft in the area. Submarine commanders learned to hide the operational noises of their submarines behind this natural sound camouflage.

Croakers make their noises by rubbing muscles against the swim bladder.

The fresh-water drum belongs to the croaker family. Most of the members of the family are marine.

Archer fish are said to be able to hit a lighted cigarette up to ten feet away with a squirt of water. The "squirt" is usually used to knock insects from the air or from vegetation hanging over the water.

The young of the popular aquarium fish called the discuss feed by nibbling the mucus from along the sides of the parents.

Some small fishes, such as the wrasses, set up "cleaning stations", where they remove the ectoparasites from the heads and gills of other larger carnivorous fishes capable of devouring them at a single gulp. Fish come regularly to these stations to have their parasites removed.

Electric stargazers can not only defend themselves with an electric shock, they also possess spines with a venom gland at their bases. The venom from these spines has been known to kill humans.

Some fishes have small worm-like "fishing-lures" attached to their heads or mouths. Small fishes attracted to these worm-like structures may be pounced upon and swallowed.

Some of the ice fishes of the Antarctic have no red blood cells.

Surgeon fishes have sharp "knives" on each side of the caudal peduncle just in front of the tail. The "blade" closes into a hidden groove, with the opened blade facing forward. The knives are very sharp and can inflict a serious cut on the hand of a careless fisherman.

The great bluefin tuna may reach a length of 14 feet and a weight of 1800 pounds. Such a fish would make a lot of tuna-fish sandwiches!
Surrounding a large school of tuna with the huge nets used by today's fishermen may result in a catch of as much as one hundred tons.

The Japanese may set baited "longlines" (resembling our trotlines) that are up to sixty-five miles in length.

Such "bill fishes" as the swordfish are fish eaters, and often use the bill as a club to maim their victims as they rush into a school of prey fishes.

Swordfish have been known to drive their sword through the planking of small boats.

The little blind goby of Southern California lives its entire life in the gravel holes that have been dug by the ghost shrimp. If the shrimp dies, the blind goby cannot survive unless it finds another host.

Mudskippers remain on the mud flats when the tide goes out. They are very difficult to catch, for they can skitter across the soft mud faster than a man can move.

A little, brightly-colored blenny around the Hawaiian Islands has very large fangs in its lower jaw. It sometimes causes some startled swimmers when it mistakes their hairy legs for food and starts nipping them.

Cucumber fishes live inside the body cavity of the sea cucumber.

The walking fish, *Anabas testudineus*, is known to "walk" for long distances overland in search of a new pond when its own is drying up, using its gill plates as "feet." It can travel as fast as ten feet per minute.

In Thailand contests are held where male bettas (Siamese fighting fish) are pitted against each other. Large sums of money may be bet on the outcome. Some gamblers get so carried away they may wager their homes, their possessions, and even their families.

Divers sometimes fear attack by giant carnivorous barracudas more than an attack by sharks. In most cases, however, the barracuda is just curious about the diver's presence.

Unlike a shark, a barracuda makes a single attack, and leaves a clean wound with no jagged edge.

There have been reports of barracudas ten to twelve feet in length.

Grunions time their spawning so that they lay their eggs on the beaches during the period of the highest tides. The eggs remain in the sand until the next series of high tides, when they hatch within three minutes after the water reaches them. Spawning usually occurs a day or two after each full moon.

A thirteen-inch mullet may have a digestive tract seven feet long.
The most deadly of all fish venoms is found in the ugly stonefish. A swimmer in South Africa who stepped on one of these fishes survived less than two hours after the accident.

The eggs of the gar are poisonous.

When a young flatfish hatches from its floating egg, it looks and swims like any other tiny fish. Within a few days, however, one eye starts to move to the opposite side of the head. The fish then sinks to the bottom and spends the rest of its life lying on the blind side, with the eyed side up.

Pacific halibut females may weigh 470 pounds by the time they are 35 years old, but the somewhat puny male may weigh only 40 pounds after 25 years.

The flesh of the sole makes excellent fillets, as the fish have no ribs, making the fillets boneless.

Remoras or suckerfish may attach to another fish so tightly that fishermen have actually used them by tying a line to their tails. When the remora attaches to a larger fish, both the remora and the fish are pulled in by the line.

The organs, and sometimes the flesh, of many puffers contains a deadly poison, tetrodotoxin, which has some important medical uses. Food poisoning from eating improperly prepared puffers however, is fatal in about sixty percent of the cases.

A full-grown common ocean sunfish, *Mola mola*, may measure eleven feet in length and weigh as much as 2000 pounds.

Clingfish have a large adhesive sucker on the forward part of their body. A hooked clingfish may hold onto a rock so tightly that the line will snap before the fish's hold is broken.

The tiny deep-sea angler fish becomes permanently attached to the much larger female, where he spends the rest of his life living as a parasite, serving as nothing but a sperm-producing appendage.

The first lobe-finned coelacanth was captured near South Africa in 1938. They look almost exactly like the fossils of coelacanths that lived on Earth some 320,000,000 years ago.

The African lungfishes are able to survive in the foulest mud imaginable. However, the New York Aquarium staff was unable to keep them alive in the New York City drinking water, even after it had been dechlorinated. They were able to live in the water after it had been distilled.
ESU SUMMER SESSION, 1979

The Division of Biology will offer a number of interesting and informative courses this summer. Several of these courses are listed below. Write or call the Division of Biology, Emporia State University, (316) 343-1200 Ext. 312 for further information.

Workshop in Environmental Biology, EB 736, will be offered for three hours credit during a three week period starting June 4. The class will meet from 8:00 to 11:00 weekdays and will be taught by two biology faculty members. The class will meet most of the time at a Federal Reservoir near Emporia and will emphasize both the aquatic and terrestrial aspects of biology. This will be a drive-in course and will be especially designed for elementary teachers.

Mountain Ecology, EB 459B and EB 859B, will be offered for four hours of credit during the three week period July 30-August 18. Two biology faculty members will conduct this field trip in the mountains in northeastern New Mexico. Wilderness camping, with backpacking, will be an integral part of the experience, as well as a general ecological assessment of the mountains.

Other Summer School offerings:
Aquatic Biology, GB 510, and Aquatic Biology Lab, GB 511
Plants Useful to Man, BO 459
Microbiology of Foods, MC 459 and MC 859
American Birds, ZO 459 and ZO 859

AUDUBON WILDLIFE FILM


Showing will start at 7:30 p.m. on the Emporia State University Campus. Single admission: Child—$0.50, Adult—$1.50. ESU Student ID admits. Call 343-1200, Ext. 443, for further information.