

# CPDSEQ

## The Search for Evidence Concerning the Origin of Fish

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### Abstract

A review of the fossil and taxonomic evidence for fish evolution is undertaken. No empirical evidence exists for their evolution from non-fish, even though 80% of all known fossils are marine animals, mostly various types of fish. Fully formed fish appeared very “early” in the fossil record, although numerous forms have become extinct. Many fish that are claimed to be multimillions of years old are identical to those species existing today. One common theory—that fish evolved from some wormlike life-form—is critiqued, documenting that the fossil gap between worms and fish is considerable and has never been bridged by fossil or taxonomic evidence. Additional theories, such as fish having evolved from a more complex invertebrate, are also evaluated and found to lack scientific evidence.

### Introduction

Over half of all known vertebrate species are fishes (Barton, 2007). The general category of fish usually includes lampreys, sharks, lungfishes, chimaeroids, and teleostomes. Unfortunately, fish do not have a unique set of features by which they can be precisely classified (e.g., Maisey, 1996, p. 10). Usually, though, “fish” is a general term referring to all gill-breathing, cold-blooded, backboned, finned, non-tetrapod (non-four-legged), aquatic animals. They all

have such effective balance in water that it enables them to swim in all six directions (up, down, front, back, left side, and right side) guided by complex undulations that are controlled by their fin system (Dean, 1987).

In this paper, I will focus only on what has traditionally been called *pisces*, a term no longer used in formal classification systems, but commonly used in lay literature. Although class *pisces* have many similarities, they are also enormously variable.

From an evolutionary standpoint, fishes have been “extravagantly successful” (Barton, 2007, p. 19). So far, 25,000 to 30,000 different species in the class *pisces* are known, and more are being discovered. Basic types of *pisces* include skates, stingrays, lampreys and hag fishes, sharks, sawfish, chimeras and rattfishes, catfishes, deep-sea lantern fish, eels, pike, flying fish, flat fishes, sailfish, swordfish, sculpins, and hundreds of other types. If macroevolution were true, then the evolution of most of these fish should be documented in the fossil record. As Darwin wrote, “If species have descended from other species by insensibly fine gradations, we should find ‘innumerable’ transitional forms in the fossil record” (Darwin, 1859,

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p. 171). He admitted that this is “the most obvious and gravest objection which can be urged against my theory” (1859, p. 280). Darwin concluded that he believed that the explanation lies in the extreme imperfection of the fossil record in 1859 (1859, p. 280). As we will document, though, the fossil record has not documented these “innumerable” transition fossils.

The variety of fish lifestyles is also enormous. Most lay eggs, while others (e.g., genus *Poeciliopsis*) give birth to their young live using a complex placenta (as do mammals) (Reznick, et al., 2002). Some fishlike animals, such as the axolotl, have gills like fish but also have arms and legs like tetrapods. Although axolotl looks very much like a fish, it is classified as an amphibian (Long, 1995).

The one trait that best defines fish is their excellent swimming ability, a design feature that reveals their entire body plan is specifically engineered for efficient swimming. The fish fin system is highly integrated into its streamlined body, which, combined with a tail that serves as a rudder, produces a well-designed, efficient swimming machine. Most fish also have an “air-bladder” that they use to regulate how deep in the water they travel, a system that evolutionists admit “we still do not entirely understand how it evolved” (Curtis, 1961, p. 123).

In terms of the large number of fossil varieties preserved, the fossil record is considered a good representation of fish that once lived back to the putative Early Silurian—and even extends into the Cambrian (e.g., see Janvier, 1999, p. 21). So many fossils exist that the Devonian period is called the age of fishes. The “extraordinary evolutionary history” (Barton, 2007, p. 19) of fish extends back to the early Cambrian, dated by evolutionists to be over 500 million years ago (Maisey, 1996, p. 9). Furthermore, “large numbers of complete specimens of soft bodied chordates from the lower Cambrian ... have been removed from

the rocks” (Chen et. al., 1999, p. 518). Although the earliest fish remains date back to the Cambrian, fish are often “preserved complete, and with a great deal of fine anatomical detail” from the Ordovician onwards, which Darwinists date from 490 mya to 443 mya (Benton, 2005, p. 39). This excellent fossil record allows us to make a valid evaluation of the claims of the evolutionists.

This “great deal of fine detail” would allow us to document their evolution in some detail—if, in fact, they evolved. As early as a half century ago, these anatomical details allowed us to document that “some fishes have survived till today with scarcely a change” (Zim and Shoemaker, 1956, p. 15). The common picture of the fish origins is that they began “as mud-sucking, armored creatures that wriggled like tadpoles across the bottom of the ancient waters” and that they

slowly evolved jaws and paired fins, which in some cases now function as legs and even wings, to become the most versatile animals of their environment. Today, existing alongside the modern species, there [exist]... holdovers from the past—fishes that are living fossils (Ommanney, 1971, p. 67).

This claim will be examined in the next section.

### **The Oldest Claimed Fish Ancestor**

The putative oldest fish ancestor, and the ancestor of all chordates, is considered by many paleontologists to be a small wormlike fossil animal called *Pikaia* (Long, 1995, p. 30). So far, around 60 fragments and whole specimens have been found, some in an excellent state of preservation. A major reason that *Pikaia* is considered to be the precursor of all chordates is that they may have possessed a notochord (Long, 1995, p. 30). The 5-cm-long animal is dated to the Middle Cambrian and was first discovered in 1911 by Charles Walcott.

First classified as a Polychaete worm, in 1979 it was reclassified as a chordate by Simon Conway Morris (1998). Resembling a living lancet, it is believed to have swum like an eel. The most straightforward explanation is that *Pikaia* is not a primitive evolutionary link but rather a bottom-dwelling marine chordate similar to an amphioxus. *Pikaia* had a distinct head, a caudal fin, a notochord, and myotomes, all characteristics of chordates. Bond (1996, p. 78) concluded that, although no evidence exists to support the view that fish evolved from a lancelet-like animal, it is “a reasonable model for what the forerunner of the fishlike vertebrates could have been like.”

Kyle (1926, p. 2) noted that “if fishes came from the worms, as many suppose, several important changes in structure had to be made before the new arrangement could be attained.” One example he discussed is that that the worm design is far too flabby to achieve the balance in water required to swim. In order to evolve into fish, worms had to evolve sufficient rigidity while retaining the required level of flexibility to swim, which is no easy achievement (Kyle, 1926). The enormous gap that exists between fish and worms is still an enigma today. Kyle (1926, p. 3) explained that for a muscular body to move through the water on its own accord, “the head and body must be somewhat compressed or flattened; otherwise it will roll and twist.”

### **The Origin of Fins**

Fins that extend out from the flattened sides of the fish are required to stabilize the animal to swim. Two basic types of fins exist: vertical fins on top of the fish (the dorsal and caudal fins) and paired fins located on each side. Jordan (1902, p. 536) wrote that the evolution of fins is one of the most important problems in evolution, a puzzle still with us over a century later. Concerning the lack of evidence for fin evolution in the fossil

record, Stanford University professor David Starr Jordan wrote that, although several theories exist, all are inadequate, inconclusive, or both. Jordan was hoping that paleontology would eventually provide the answer to the problem of fin evolution, but the fossil record has only presented more problems than solutions (Jordan, 1902, p. 547).

One proposed solution to this fin problem is that the paired horizontal fins evolved from what was once a continuous fold of skin along the lateral line, and the vertical fins from a median skin fold. This theory is still far from settled. Other theories include the idea that the paired fins derived from modified gill arches or septa between the gill openings. Some experts suggest that fins did not evolve from gill septa, but evolved from external gills. A major shortcoming largely ignored is the origin of the internal structure of fins, including the support system, cartilage, muscles, nerves, and bone. After extensive study of the evolution of fins in the fossil record, Ommanney (1971, pp 61–62) concluded:

When and how the paired fins originated is a matter of debate—the fossil record provides no clear answer. One theory, now largely discounted, held that they originally formed as extensions and elaborations of the gill flaps. A more likely explanation seemed for a long time to be that they are the final remnants of a longitudinal fold of skin, with an internal skeleton of parallel bars of bone or cartilage, which originally extended down along each side of the body. The answer now is believed by some to be ... paired fins first developed from folds of skin between the spines and the body—and, as they were refined still further in the fishes that followed, according to this theory, the spines from which they originally grew tended to disappear.

All of the aforementioned theories of fish evolution are based on the study of the morphology of known fish, and all

evolutionary scenarios of their origins are highly speculative.

### **Evolution from a Wormlike Life-Form to Fish**

The changes required to evolve small round worms like nematodes to fish were enormous, because the “worm” that became a fish

did not look much like a fish. It probably had no paired fins, no real head, brain or advanced sense organs, jaws or teeth. Most likely, its body was cylindrical, with simple digestive organs, a nerve cord running its length from front to back, and below that a sort of stiffening, supporting rod which was its only skeleton, made of a soft material surrounded by a tough sheath. This forerunner of a backbone, or vertebral column, is called a notochord and from it the animals that possessed it, including all the vertebrates, derived their name—the chordates (Ommanney, 1971, p. 60).

Furthermore, to evolve a fish from a worm, the worm nervous and vascular systems would need to be flipped over, because the fish main organs are upside-down when compared to the worm organs. Furthermore, although some worms “have tiny eye-spots, ear-stones, and tactile or taste organs,” these structures are all relatively simple and microscopic in contrast to the fish’s well-developed eyes, rostrum, and a large head with an advanced vertebrate brain (Kyle, 1926, p. 3).

Furthermore, most round and flat worms lack a heart, whereas fish have a very well-developed, powerful muscular pump that lies ventrally just behind the head. Each of the aforementioned unique fish features must have evolved, and one of the easiest to document should have been the evolution of fins because they show both “early” in the fossil record and with great clarity.

In fact, no evidence exists for any

of these speculative transitions. As paleontologist Janvier (1992, p. 22) admitted, “Lacking fossils, paleontologists and anatomists have often tried to imagine the earliest vertebrates,” but, he goes on to say, even imagination has not been very helpful in postulating fish evolution. Bond (1996, p. 78) described the “typical scenario of what could have occurred” to evolve fishlike vertebrates from the hypothesized precursor. In his model, a free-swimming invertebrate with a notochord, a ventral heart, and clefts in the pharynx evolved into fish. Bond hypothesized that radical changes in the environment must have occurred to evolve fish, but the specific changes required are not present in the fossil record.

Bond’s fish evolution scenario started, not with a worm, but with a creature already very much like a fish, and he speculated: “One can imagine that there could have been ascidians or related invertebrates that remained in the tadpole larval stage, reproduced, and formed the evolutionary basis for the more complex early vertebrates” (Bond, 1996, p. 78). Bond postulated that a lancelet-like animal is “a reasonable model for what the forerunner of the fishlike vertebrates could have been like,” but he cited no evidence, fossil or otherwise, for this admittedly hypothetical scenario (Bond, 1996, p. 78). Ommanney (1971, p. 60) provides a valuable conclusion about postulated fish ancestors:

Somewhere, either in the oceans or in some fresh-water pond or stream of that far-off Cambrian period, was a creature that would eventually give rise to the fishes....What this creature looked like, how it functioned and lived, we can only surmise.... Many theories have been advanced for its origin. Some held that it evolved from some form of segmented worm, others that it developed from an arthropod, a phylum that includes spiders, insects and crustaceans. Most likely, however, on the

basis of biochemical and structural evidence, is the hypothesis that this ancestral creature arose from a form similar to the larva of an echinoderm, a group known to us today through the starfishes and sea urchins.

Next, we will look at some examples of the evolution of specific kinds of fish.

## Conodonts and Calcichordates

Conodonts are extinct chordates classified in class Conodonta that date back to the late Cambrian. For decades they were known only from toothlike microfossils, now called conodont elements. Knowledge about their soft tissues still remains relatively sparse, but they are still considered primitive chordates, possessing many advanced features, including large eyes, fins with fin rays, chevron-shaped muscles, and a notochord. The fossil conodont imprints indicate they were eel-like creatures with 15 to 19 “teeth” that formed a bilaterally symmetrical head array that produced a feeding apparatus radically different from the jaws of modern animals.

The three known forms of specialized teeth are coniform cones, rami-form bars, and pectiniform platforms. The organisms ranged from around a centimeter to the 40-cm-long giant *Promissum*. The fossils indicate that conodonts are extinct chordates and do not provide evidence for evolution from invertebrates into vertebrates such as fish. Speculation that they were transitional forms based on teeth microfossils, without any other hard parts, is clearly extremely tentative. The South China examples of Cambrian conodonts appear to be very complex, fully developed fish, not primitive worm-fish transition forms (Shu et al., 1999).

Calcichordates are putative “primitive” fossils classified in phylum Chordata that have an echinoderm-type of calcite skeleton. They are found in Cambrian to Pennsylvanian marine rocks dated by

evolutionists at 530 to 300 million years old. Due to their skeletons, they have traditionally been placed in the phylum Echinodermata, but some experts argue they are chordates because of their many chordate anatomical features.

As Morris (2000, p. 4429), noted, the “highly controversial fossils known as the ‘calcichordates’... show a puzzling combination of echinoderm and chordate characters.” Their calcite skeletons are used to speculate that echinoderms and chordates are closely related. The calcichordate theory of the origin of chordates, though, is controversial. Lefebvre (2000, p. 359) concluded that a detailed analysis of numerous internal and external structures of stylophora calcichordates has shown that the basic assumptions of the calcichordate theory of fish evolution are invalid. Nielsen (2001, pp. 420) wrote that the calcichordate hypothesis has been rejected by a number of evolutionists based on various morphology traits.

## The Agnathans

The first bona fide vertebrates documented in the fossil record are agnathans (Class Agnatha, from the Greek “without Jaw”), usually small (15 cm or less) jawless fishes that have been discovered all the way back to the lower Cambrian (e.g., see Shu et al., 1999, p. 42; Colbert, et al., 2001, p. 23; Repetski, 1978, p. 529). The earliest examples of fish fossils are found almost at the beginning of the fossil record, specifically as far back as an alleged 545 million years ago, and these early fossils are very “lamprey-like” (Shu et al., 1999, p. 42). The agnathans, sometimes called pre-fish, are the earliest widely recognized direct putative fish ancestor (Bond, 1996). One proposed agnathan example that dates back to the Cambrian is a small (6-mm long) creature that resembles modern hagfishes (Bond, 1996, p. 78).

All known agnathans, both living and fossil, closely resemble the fish families

that began in the Cambrian, and all obtained food by “sucking or scooping up organic matter through their jawless mouths” (Bond, 1996, p. 78). Most of them are extinct, except for the lamprey. Although many fossils of lampreys exist—some dated by evolutionists back to the Devonian period—and although many were exquisitely preserved, “their evolutionary history is obscure” (Gess, et al., 2006, p. 981). The earliest known lampreys are anatomically modern. These fossils, claimed to be the first vertebrates, are in an extant class called *cyclostomes*, which fall into two groups—the hagfish and lampreys.

The cyclostome group has “been carefully researched and many different opinions have been brought forward about the origin and relationship of those animals” (Grzimek, 1973, p. 30). Because some of these Cambrian fish have “close similarities to modern lampreys” or hagfishes and many “bonelike fragments resembling agnathan dermal armor or scales have been reported from Upper Cambrian,” one could argue that they are extinct lampreys or hagfishes (Colbert, et al., 2001, p. 23).

Much more is known about a fish called *Sacabambaspis*, “one of the earliest known vertebrates,” of which we have “many complete and well-preserved specimens” (Colbert, et al., 2001, p. 23). As far as can be determined, this animal was a fully developed, jawless fish. Rather than being a transitional form, it was simply an extinct type of fish.

A major conundrum in fish evolution is that many examples of living fish can be found in the fossil record that date back to the Upper Cambrian, a problem explained by hypothesizing that their evolution was originally quite rapid (Repetski, 1978, p. 529). The earliest chordate we have comparatively good knowledge about are agnathous fish because they are well documented in the fossil record and many examples of their close relatives are still living (Colbert, et al., 2001). A major reason

for the commonality of agnathans in the fossil record is that agnathous heads and chests are covered with fused bony plates and for this reason are well preserved. Only about a foot or less in length, they were bottom-dwelling creatures that apparently used their muscular, jawless mouths to suck in small, slow-moving prey or organic matter.

The first evidence for the existence of agnathous fish includes a single plate found in the middle Ordovician strata, and many other later finds have enabled us to create an adequate understanding of them (Gregory, 1959). Gregory (1959, p. 76) speculated that “one or another of the ostracoderms gave rise to the modern class of cyclostomes, including the lampreys and hags,” but he admitted that “no known gnathostome fishes definitely connect them with the ostracoderms.” Romer (1966, p. 22) confessed, “The ostracoderms are primitive vertebrates; but if we seek among the known forms for the ancestors of higher vertebrate groups, we meet with disappointment.” For examples of ostracoderms see Figure

1. Romer (1966, p. 16) concluded that “major evolutionary events must have been occurring in vertebrate history during the Ordovician and Silurian, but we are still in almost complete ignorance regarding them,” agreeing with the findings in this paper.

### Other Proposed Fish Ancestors

Although ostracoderms are claimed to be a transitional fossil leading to modern jawed fish, they coexisted with jawed fish and flourished during the Silurian and Devonian periods (dated by evolutionists at 300 to 400 million years ago). They became extinct sometime at the end of the Devonian period, indicating that they are only an extinct fish type, not an evolutionary link connecting them to Pikaia or any other putative very early fish ancestor. They were evidently a separate fish type more closely related to modern lampreys than to jawed fish. Colbert et al. (2001, p. 50) concluded that many factors have contributed to the “disappear-

ance of the ostracoderms, acanthodians, and placoderms, but probably the rise and development of the bony fishes and sharks” was a major factor.

### The Jawed Fish

Jawed fish (Gnathostomes) consist of two monophyletic groups, the class chondrichthyes (cartilaginous fish) and class osteichthyans (bony fish) (Botella, et al, 2007). Both have fully developed functional jaws. The evolution of the vertebrate jaw is considered “one of the great evolutionary breakthroughs” in fish evolution (Prothero, 2007, p. 210). One reason it is thought to be an evolutionary breakthrough is that jawless fish are extremely limited in what they can eat—most are filter or deposit feeders or parasites, such as lampreys or hagfish. Jawed fish that are predators are able to consume a diet consisting of much larger prey than jawless fish.

The gnathostomes, which comprise chondrichthyans (cartilaginous fishes), lobe-finned fishes (coelacanths and lungfishes), tetrapods, and actinopterygians (ray-finned fishes), include a wide variety of fish, from the coelacanths to lungfish and include sharks, rays, and chimaeras. Classical theorists have maintained that cartilage evolved first and that cartilage is a more ancient construction material than bone. Conversely, the “paleontological data strongly suggest that bone was a primitive adult skeletal material, cartilage an essentially embryonic adaptation which is retained in the adult only as the result of degenerative processes” (Romer, 1966, p. 22). Several major jawed fish are discussed below. The evolutionary relationships of the gnathostomes “have been debated for almost a century” and are still being debated (Venkatesh et al, 2001, p. 11382).

### Acanthodii

Class *Gnathostomata*, Subclass acanthodii (spiny fishes), are small, extinct,

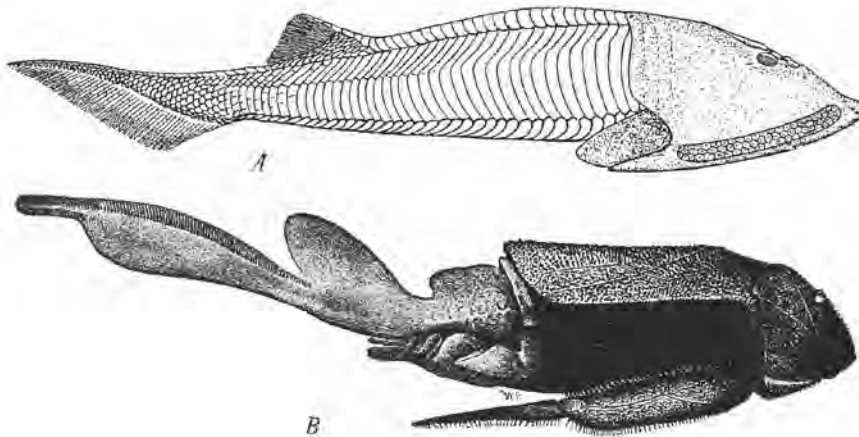


Figure 1. Devonian ostracoderms. Evolutionists call the Devonian the age of fishes because so many types appear in Devonian strata. Example A is *Cephalaspis Lyellii* and example B is *Bothriolepis*. Note how very different these fish are from familiar fish, such as perch, and yet how they do not show evidence for evolution. Instead they demonstrate the enormous variation found in the natural world (from Cleland, 1925, p. 462).

jawed fish covered with diamond-shaped scales. They possess both dorsal and pectoral fins and numerous irregular dermal bones. The bonelike material was located in various places on their epidermis, such as on the top of their head and over the lower shoulder girdle, and some even had a bony flap over their gill openings. Barton (2007, pp. 130–131) noted, “Widely divergent interpretations have been made of their affinities by paleoichthyologists.” Acanthodii were once believed to be transitional between the jawless and jawed fish because in many cases the interior skeletons were constructed out of cartilage. Extensive research, though, has now disproved this theory. Evidences of Acanthodii fossils are found from Lower Silurian to Lower Permian, indicating little change in the fossil record and no evidence of the transitional claim (Barton, 2007).

### Placoderms

The placoderms or armored fish, were gnathostomes that were so ugly they have often been called armored monsters. For representatives of armored fish, see Figure 2. They were similar to the acanthodii, except they were more heavily armored. Placoderms are now divided into six clades, including the arthodires, which are the oldest known jawed fish, containing almost 200 genera. They are relatively common in the fossil record because their armor plates preserved fairly well. The excellent placoderm fossil record has long caused such great difficulty for evolutionists that Romer’s conclusion is still valid today:

Where to place these curious creatures has been a vexing problem. One or the other of these types has at times been thought allied to the ostracoderms, to the sharks, to the lungfish, to the “ganoids;” but in each case the supposed likenesses have been more than outweighed by the obvious differences. There are few common features uniting

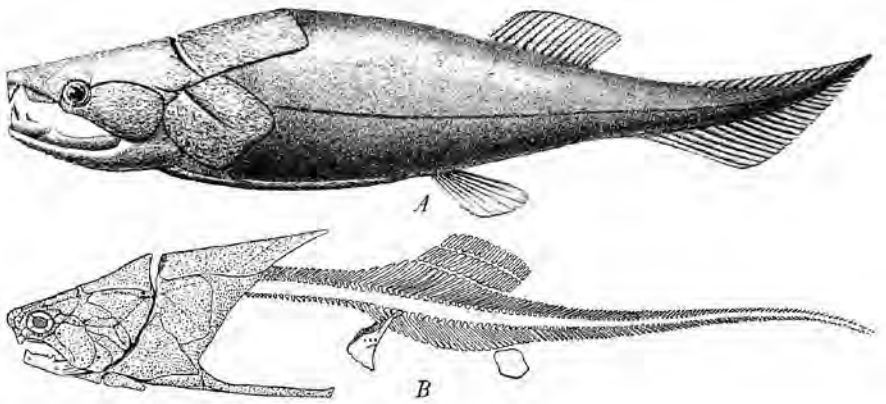


Figure 2. Two examples of armored lungfish from Devonian. A is *Dinichthys* and B is *Coccoosteus*. In some ways these fish were more advanced than many modern fish. One trait that makes them appear primitive is the fanglike shape of the incisor teeth. *Dinichthys* species could attain a length of over ten feet (from Cleland, 1925, p. 464).

these groups other than the fact that they are, without exception, peculiar. All, however, are characterized by the presence of bony skeletal tissues (Romer, 1966, p. 24).

### Chondrichthyes

The chondrichthyans (cartilaginous fishes) have a jaw and a skeleton composed of cartilage, along with paired appendages. (Consult Figure 3 for Devonian sharks.) The class includes about 60 families, 185 genera, and about 1,160 species, including sharks, skates, and rays (Barton, 2007, pp. 27–28). Not only is their phylogeny vexing, but they also pose serious problems for evolutionists in that they do not provide a linking transition at the Silurian-Devonian boundary. At that boundary evolutionists

would expect the appearance of proper ancestors for the sharks and higher bony fish groups. We would expect “generalized” forms that would fit neatly into our preconceived evolutionary picture. Do we get them in the placoderms? Not at

all. Instead, we find a series of wildly impossible types which do not fit into any proper [evolutionary] pattern (Romer, 1966, p. 33).

Romer concluded that chondrichthyans do not even appear to have evolved

from any possible source, or to be appropriate ancestors to any later or more advanced types. In fact, one tends to feel that the presence of these placoderms, making up such an important part of the Devonian fish story, is an incongruous episode; it would have simplified the situation [for evolution] if they had never existed (1966, p. 33).

He then reasoned that these linking forms must exist in the fossil record and we only need to keep looking for them and

attempt to fit them into the vertebrate evolutionary story. In our lack of knowledge of antecedent gnathostome types, we cannot even reasonably speculate as to their ancestry among hypothetical agnathous forms (Romer, 1966, p. 33).

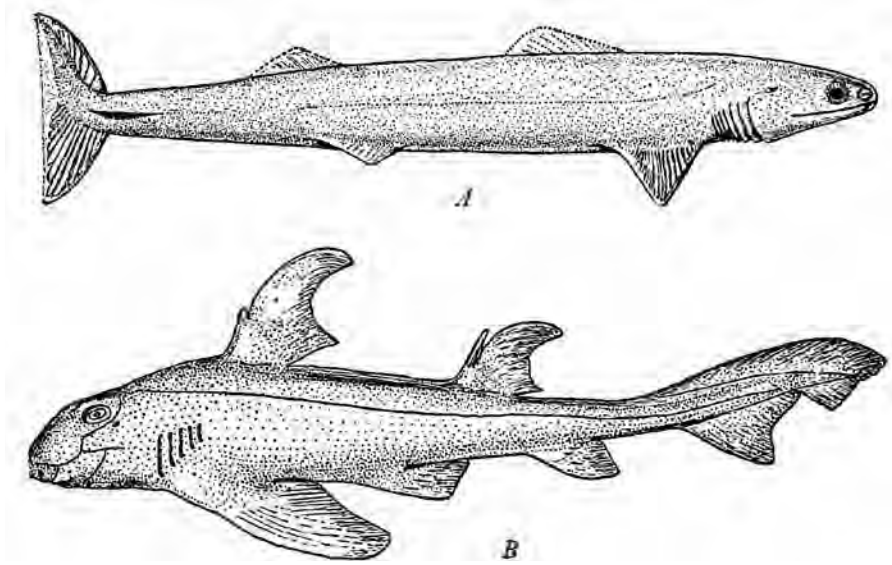


Figure 3. Two Devonian sharks. Shark A is *Cladoselache* and B is a Port Jackson or *Cestracion*, which has been called a “modern shark of ancient type.” This is because modern representatives are virtually identical to these so-called ancient examples. The shark family members are often called “living fossils” because of their similarity to putative ancient sharks (from Cleland, 1925, p. 463).

### Osteichthyans

The osteichthyes are the bony-jawed fishes that constitute the vast majority of modern fishes, including both fresh and marine water fishes (Barton, 2007). They are divided into the Actinopterygians (sturgeons, gars, teleosts, bichirs, “bowfins”) and the Sarcopterygians, or lobe-finned fish (lungfish, some tetrapods, and coelacanths). How these “two osteichthyan lineages evolved their different traits is unknown, as is how their common osteichthyan ancestor arose from non-osteichthyan gnathostome groups” (Zhu et al, 1999, p. 607). As a result, the elasmobranch (sharks, rays and skates, subclass Elasmobranchii class Chondrichthyes) ancestry for osteichthyans has now largely been abandoned.

### The *Psarolepis*

A putative morphological link, the *Psarolepis*, is dated by evolutionists as being about 400 million years old. It is

considered to be an evolutionary link because it has an unusual combination of osteichthyan and non-osteichthyan features (Zhu et al., 1999, p. 607). Thought to be one of the earliest osteichthyans known, it is a mosaic possessing fully developed traits of several fish types. It has a huge pectoral spine resembling some placoderms and also a median spine found in sharks.

The *Psarolepis*, which is claimed by evolutionists as a “probable missing link,” shows a mix of actinopterygian and sarcopterygian features. The problem with claiming the *Psarolepis* is a transitional form is that both bony fish clades Actinopterygii and Sarcopterygii first appeared about the same time as *Psarolepis* in late Silurian. This precludes *Psarolepis* from being the ancestor of bony fish (Benton, 2005).

*Psarolepis* is based on only one fossil and appears to be a chimeric fish with traits found in two other clades, and not

a transitional form (Barton, 2007). In fact, the case for it being any kind of a transitional form is very weak. Two possible positions of *Psarolepis* exist, and the conflicts between the two schemes remain unresolved and the exact position of *Psarolepis* remains uncertain. The uncertainty results partly from a lack of information available for *Psarolepis* and other important stem taxa ... and partly from the difficulty of selecting and polarizing characters when both osteichthyan and non-osteichthyan groups are used in the same analysis. However, whether *Psarolepis* turns out to be a stem-group sarcopterygian, its unique character combination will have a marked impact on present studies of osteichthyan evolution (Zhu et al, 1999, pp. 109–110).

This discovery has shaken previous conclusions made by evolutionists about *Psarolepis*:

Porolepiform-like features found in *Psarolepis* (a lower jaw with three infradentary foramina, well-developed internasal cavities and parasymphysial areas carrying tooth whorls) can no longer be used to define porolepiforms and/or dipnomorphs (porolepiforms and lungfishes). The polyplacodont folded teeth and quadrostian skull roof pattern of osteolepiforms should also be regarded as primitive because of their presence in *Psarolepis*. If *Psarolepis* turns out to be a basal osteichthyan, the presence of an intracranial joint and cosmine can no longer serve as defining characters (synapomorphs) for sarcopterygians (Zhu et al., 1999, p. 609–610).

The osteichthyans are considered to be the most advanced fish, but they have many features that are thought to be very primitive. Some members of the osteichthyans are considered to be very primitive, such as the soft-rayed fishes, confounding modern and primitive classification attempts (Barton, 2007,

p. 29). Some “highly evolved fish” are found very “early” in the fossil record, all the way back to the Silurian, dated by evolutionists at 423 to 416 mya (Botella, et al., 2007, p. 583).

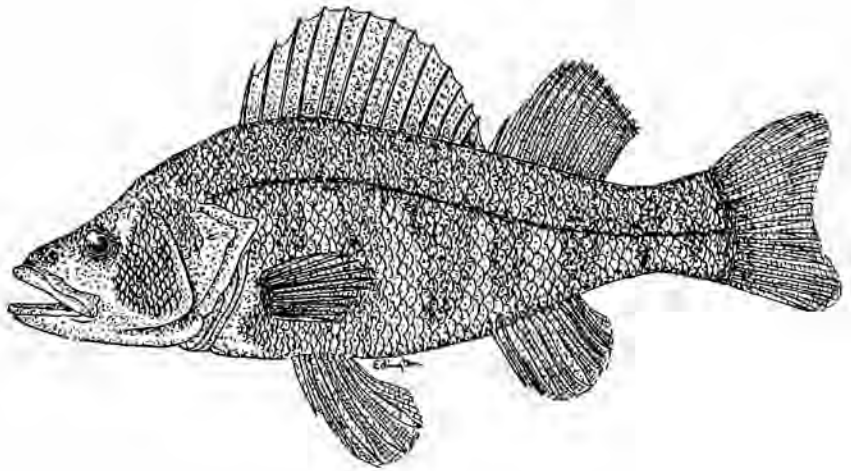
### True Fish

The so-called true fishes are in a super-class that contains an enormous number of species (Zim and Shoemaker, 1956). They are cold-blooded, jawed, aquatic vertebrates that breathe through gills. They have two-chambered hearts, fins, and streamlined bodies, and most have skin covered with scales. The theorized earliest known representation of “true” fish are the Sarcopterygii, the only living members of which are coelacanths and lungfishes (Maisey, 1996, p. 9). As far as can be determined from fossils, comparisons of their fossils with modern fish show that they are identical. Examples are herring, pipefish, sunfish, perch, mooneye fish, lungfish, salmon, garfish, trout, and sand fish, all of which have been dated by evolutionists from about 50 to over 100 million years old (Oktar, 2007). For an example typical of many so-called true fish, see Figure 4.

### Fish Phylogeny

Disagreement over phylogeny exists from the base of the proposed fish lineage. For example, “Depending on one’s perspective, the jawless fishes—the hagfishes and lampreys— constitute a single, monophyletic taxon or two taxa of disparate origins” (Barton, 2007, p. 19). One proposed fish ancestor is the craniate, a marine animal with a skull that largely encloses the brain. The craniates are theorized to have branched into multiple lineages of saurischians, including the lungfishes, coelacanths, ray-finned fishes, acanthodians, and placoderms—a theory that requires a large number of fossil transitions (Maisey, 1996, p. 10).

Fish phylogeny is very difficult to construct for several reasons. A major



**Figure 4. A modern perch. Note the smoother more aerodynamic, less fierce, design yet the strong resemblance to many putative ancient so-called primitive fish. Drawing by A. Edington (from Brown, 1880, p. 306).**

puzzle in determining their phylogeny is that fish are quite different both in anatomy and physiology from all potential fish ancestors. There exists so much variety compared to all other life-forms that it is concluded that fish must not represent a single “lineage of creatures that evolved from a common ancestor” (Maisey, 1996, p. 10) but several separate lineages, requiring more fossils to support separate lineages, evidence of which does not exist.

In contrast to evolutionary assumptions, the fossil record of all basic classes of fish, including Agnatha, Placodermi, Acanthodii, Osteichthyes, and Chondrichthyes, began at close to the same evolutionary time, mostly during the Devonian or before (Botella, et al., 2007, p. 585). Thus, they existed contemporaneously, or close, with no evidence of transition forms. For this reason only a very tentative phylogeny is possible. Nelson’s conclusion, now almost 40 years old, that the phylogenetic interrelationships of many animals, including

turtles, frogs, salamanders, lungfishes, and coelacanths, are “hardly established at all” is still valid today (Nelson, 1969, p. 18). He added that the perplexities in devising phylogenies for fish are serious:

There is little justification for selecting a particular recent fish, e.g., a minnow, herring or trout, and assuming that it is some primitive teleost from which another has evolved ... no recent species or higher taxonomic group ultimately can be said to have given rise to any other. It is probably true that in some ways a minnow is more primitive than a perch, but in others, it is more advanced. Such matters are worthy of investigation, but we don’t progress much by making a teleostean morphotype out of a minnow, or for that matter a vertebrate morphotype out of a lamprey or any other single, recent vertebrate or vertebrate group (Nelson, 1969, p. 27).

Another evolutionary difficulty is that the supposed ancestors of modern fish,



the teleostians, are not “more evolved” than most putative ancient primitive fish, just different: “Fishes did not become more complicated as they evolved; if anything, the tendency was for them to simplify themselves” (Ommanney, 1971, p. 61).

## The Fish Fossil Record and Evolution

As discussed earlier, fish are divided into two major divisions: jawless and jawed fish. Jawless fish comprise only sixty species compared to 51,000 species of jawed vertebrates (Janvier, 2006, p. 921). Some evolutionists hypothesize that jawless fish evolved into jawed fish, an idea that is greatly disputed among experts. There even exists a “lot of debate over the origins and diversity of the first fishes” (Long quoted in Werner, 2007, p. 98). Nor do we know how cartilaginous fish evolved, as even the “origin of sharks is still a mystery” (Long, 1995, p. 69).

This is true despite the excellent fossil record that exists for jawed fish, cartilaginous fish, bony fish, and sharks. It is not even clear “how much of early fish evolution took place in the sea, and how much in fresh waters,” and for this reason “one of the great mysteries and problems to be solved in vertebrate evolution” is the “origins and the interrelationships of these jawed fishes” (Long quoted in Werner, 2007, p. 98). Romer’s conclusion that the “common ancestor of the bony fish groups is unknown” is still true (1966, p. 53).

The fossil record also reveals that “evolution is usually slow, sometimes reversible, and highly dependent on ecological conditions” (Bond, 1996, p. 74). This is an indication that what the fossil record shows is not macroevolution but normal genetic fluctuation, such as recently documented to occur with the famous Darwin’s finches of the Galapagos Islands, and is likely the result of some epigenetic influence. Stahl (1974, p. 126) concluded that the

“higher fishes, when they appear in the Devonian period, have already acquired the characteristics that identify them as belonging to one of the major assemblages of bony or cartilaginous forms,” which illustrates the fact that fish, like other life-forms, abruptly appear in the fossil record.

Lancelet-like fish are commonly believed to be modern fish precursors, but no evidence of this lancelet-like precursor animal has been found in the fossil record, nor has any evidence been found of these species that is considered intermediate between the lancelets and the earliest known vertebrates (Bond, 1996, p. 78). The paucity of fossil evidence for fish evolution allows speculation about fish origins to abound. For example, Colbert et al. (2001, p. 53) wrote that the bony and cartilaginous fish

appeared in the late Silurian period, and it is possible that they may have originated at some earlier time, although there is no fossil evidence to prove this. Some paleontologists have proposed that different groups of sharklike fishes evolved from different placoderms, and that the Chondrichthyes are therefore polyphyletic. At present, there is insufficient evidence to resolve this issue.

The most common explanation for the total lack of fossil evidence for fish evolution is that few transitional fossils have been preserved. This is an incorrect conclusion because every major fish kind known today has been found in the fossil record, indicating the completeness of the existing known fossil record (Benton, 2005). New fossil finds are almost always more of the same, and occasionally new species are discovered that only create more gaps in the fossil record and do not fill in existing gaps. Most of the 34 orders and 418 fish families are known in the fish fossil record, as well as 29 orders of cartilaginous and bony fish (Grzimek, 1973, p. 45).

A detailed comparison of all known fossil examples shows they consist of ex-

tinct fish, fish once thought to be extinct such as the coelacanth, or fully modern fish that can easily be identified as such. All major groups of fish have appeared in strata labeled by evolutionists as far back as the Ordovician and Silurian eras (443–417 Myr) and are abundant during the Devonian (Benton, 2005, p. 39). (For examples of Devonian fish in which some appear very primitive yet others very advanced, see Figure 5, 6, and 7.)

This abundant fossil record provides little evidence for the evolution of fish, and for this reason, the “actual ancestral group of fishes has not yet been identified” (Grzimek, 1973, pp. 45–46). It is clear from the fossil record that “from the beginning of their evolutionary history,” sharks and bony fishes possessed the morphology required to effectively travel in water (Colbert et al., 2001, p. 50). Their “superior design for swimming” is mostly due to their fin design. Examples include the ostracoderms, acanthodians, and placoderms (Colbert et al., 2001, p. 50). Although microevolution has been observed in both living and fossil fish, “exactly how natural selection makes species is not well understood” (Bond, 1996, p. 66).

He concluded that in only a “few fortunate cases, we can actually study the *likely* ancestors and observe primitive characters and observe their descent and modification in their own ecological context” (Bond, 1996, p. 74, emphasis added). This review supports Ommanney’s conclusion penned over 36 years ago. He also wrote,

We do not know ... what stages of development it went through to eventually give rise to truly fishlike creatures....Between the Cambrian when it probably originated, and the Ordovician when the first fossils of animals with really fishlike characteristics appeared, there is a gap of perhaps 100 million years which we will probably never be able to fill (Bond, 1971, p. 60).

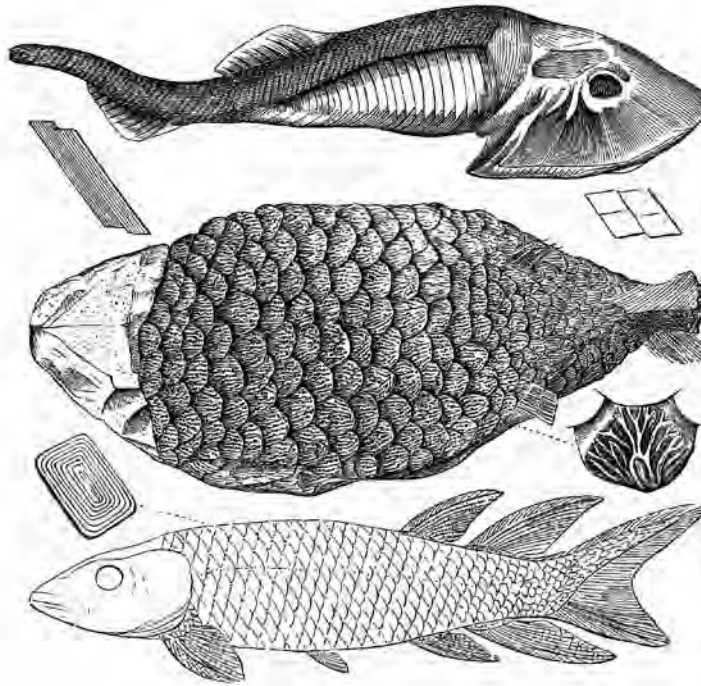


Figure 5. Devonian Ganoids. Note how primitive some appear, such as one at the top, and yet how modern others look, such as the one at the bottom in the illustration (from Dana, 1863, p. 112).



Figure 6. Another Devonian ganoid, the “modern gar pike,” illustrating that in the Devonian “age of fishes” both so-called primitive and modern fish existed (from Cleland, 1925, p. 465).

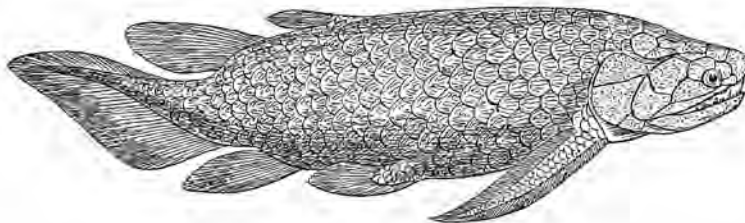


Figure 7. A Devonian ganoid *Holoptychius* resembling the coelacanth. Both fish could grow up to four feet long. They were considered by many to be the “missing link” between fish and the tetrapods until the first *Latimeria* specimen was found off the east coast of South Africa in 1938. It first appeared in the fossil record in the Middle Devonian and although known from fossils worldwide has since become extinct (from Cleland, 1925, p. 465).

## Implications of the Fish Fossil Record

The absence of fossil evidence for evolution is significant because fish are one of the most common fossil types, with close to one half-million specimens in museums alone. So many fossil fish have been found that the Devonian period, dated by evolutionists as 350 million years ago, is called “the Age of Fishes.” Many fossil fish have been exquisitely preserved, including their bones, fins, and even their scales. It is estimated that there could be more extinct than extant fish species, indicating that there should be no shortage of potential links if fish arose by evolution, yet “significant gaps in the fossil record” is the norm (Maisey, 1996, p. 10). Dean (1987, p. 10) wrote that fish are critically important evidence for evolution because

fish hold an important place in the history of back-boned animals: their group is the largest and most widely distributed; its fossil members are by far the earliest of known chordates; and among its living representatives are forms which are believed to closely resemble the ancestral vertebrate.

As a result of a lack of transitional forms, Long (1995, p. 30) concluded that the “transition from spineless invertebrates to the first backboned fishes is still shrouded in mystery, and many theories abound as to how the changes took place.” The weakness of fish evolution in the fossil record includes not only the absence of evidence for fish origins but also the absence of evidence for the evolution of the many fish types *within* all classes. This is why Long (1995, p. 64) wrote that the “remarkable permanence of the different types of fishes seems a striking proof of how unchanging” aquatic living conditions must have been. Dean (1987, p. 10) attempted to explain this fact as follows:

From as early as the Devonian times there have been living members of the four sub-classes of existing fish-

es—Sharks, Chimaeroids, Dipnoans, and Teleostomes. Even their ancient sub-groups (orders and sub-orders) usually present surviving members; while, on the other hand, there is but a single group of any structural importance that has been evolved during the lapse of ages—the sub-order of Bony Fishes. There are many instances in which even the very types of living fishes are known to be of remarkable antiquity: thus the genus of the Port Jackson Shark, *Cestracion*, is known to have been represented early in the Mesozoic; the Australian Lung-fish, *Ceratodus*, dates back to Jurassic times; the Frilled Shark, *Chlamydoselache*, though not of a Paleozoic genus, as formerly supposed (Cope), must at least be regarded as closely akin to the Sharks of the Silurian.

One characteristic that typifies the fossil record is stasis. For example, the lamprey, although a very “primitive” life-form, has not changed in the past 360 million years, except that it is now slightly longer (Gess et al., 2006). A problem with all fossils, as explained by Nelson (1969, p. 22) is the common mistake of believing that

even one fossil species or fossil “group” can be demonstrated to have been ancestral to another. The ancestor-descendant relationship may only be assumed to have existed in the absence of evidence indicating otherwise.

It is also of much interest to compare the speculation of paleontologists in the past with the far more complete knowledge today (see Figure 1 of William Gregory’s diagram, originally published in 1933 and reprinted in Gregory, 1959). Another difficulty is that new discoveries often overthrow old ideas, especially new fossils that date contemporaneously with a putative fossil ancestor. For example, it was once concluded

that lampreys evolved from armored jawless vertebrates. But a recently

discovered lamprey fossil dates from the twilight age of their supposed ancestors, and looks surprisingly modern (Janvier, 2006, p. 921).

Sometimes a single discovery can move the earliest known example of a vertebrate back by as much as 40 million years, forcing a major reevaluation of the fossil record (e.g., see Repetski, 1978, p. 529; Jablonski, et al., 2003). The problem for evolution is that new findings tend to push the origin of fish farther back in time. This makes it even harder to explain fish origins, because less time exists for them to evolve. It also creates a longer period of stasis with out evolutionary changes (Wieland, 2000; Brown, 1996).

## Conclusions

Much research has been completed on the microevolution of fish (e.g., see Echelle and Kornfield, 1984), but only speculation exists about their macroevolution from a common ancestor. Since paleontologists have no evidence of the evolution of fish from non-fish, nor any evidence of the evolution of the many basic kinds of fish, Long noted that there still exist “many different opinions as to which invertebrate group may have given rise to the vertebrates or first fishes” (quoted in Werner, 2007, p. 98).

Not only is the origin of cartilaginous fish unknown, but “the origin of bony fish is also shrouded in mystery” (Long, quoted in Werner, 2007, p. 98). We do know that many contemporary paleontologists admit that the earliest known fossil fish has all of the basic characteristics of modern fish. Many fish species have become extinct, but in spite of almost two centuries of searching, no evidence of gradual macroevolution has been found in the abundant fossil record so far uncovered. The fact is:

There is no ... justification for selecting even a particular fossil species or group, and assuming that it was some primitive animal from which

another has evolved. How, after all, can we hope to demonstrate that ostracoderms ever gave rise to anything else but other ostracoderms? This particular point cannot be overemphasized in view of past practices of vertebrate zoologists, who all too often have been willing to make facile assumptions about what is or is not primitive, and to derive one species or group from another...we have no ancestors alive today, that in all probability such ancestors have been dead for many tens or hundreds of millions of years, and that even in the fossil record they are not accessible to us (Nelson, 1969, p. 27).

One major current theory is that all bony fish evolved from spiny-finned acanthodian fishes, sharks, or placoderms. However, this controversial view is not supported by the fossil record. Thus, “the evolution of fish is still very much debated amongst paleontologists” (Long, quoted in Werner, 2007, p. 98). This scarcity of evidence not only includes the evolutionary origins of fish, but also the evolution of the many very different kinds of fish. The conclusion of fish biologist Kyle (1926, p. vii) that fishes “occupy a peculiar position in the hierarchy of animal life” and that we “cannot be sure whence they came” is still very true today from an evolutionary perspective. The claim made by Gregory (1959, p. 123) that “there are still many gaps” in the fossil record among fish, is also true today. Some of the references reviewed are 40 or more years old, but evidence that they are still largely current is Strahler’s evaluation of Duane Gish’s book on the fossil record. Strahler (1987, p. 408) summarized Gish’s conclusions as follows:

Mainstream paleontologists have found no fossil record of transitional chordates leading up to the appearance of the first class of fishes, the Agnatha, or of transitional forms between the primitive, jawless agnathans and the jaw-bearing class

Placodermi, or of transition from the placoderms (which were poorly structured for swimming) to the class Chondrichthyes, or from those cartilaginous-skeleton sharklike fishes to the class Osteichthyes, or bony fishes....Neither ... is there any record of transitional forms leading to the rise of the lungfishes and the crossopterygians from the lobe-finned bony fishes, an evolutionary step that is supposed to have led to the rise of amphibians and ultimately to the conquest of the lands by air-breathing vertebrates.

Strahler (1987, p. 408) concluded that “Gish finds all the confessions he needs” in the writings of paleontologists to support the conclusion that each of the fish classes “appears suddenly and with no trace of ancestors” in the fossil record. He then adds,

Absence of the transitional fossils in the gaps between each group of fishes and its ancestor is repeated in standard treatises on vertebrate evolution. Even Chris McGowan’s 1984 anticreationist work ... makes no mention of Gish’s four pages of text on the origin of the fish classes. Knowing that McGowan is an authority on vertebrate paleontology, keen on faulting the creationists at every opportunity, I must assume that I haven’t missed anything important in this area. This is one count in the creationists’ charge that can only evoke in unison from the paleontologists a plea of *nolo contendere* (Strahler, 1987, p. 408).

I have found the same, namely that an abundance of fossil evidence exists; and the results of this review, the conclusion that a complete lack of fossil evidence exists for fish evolution, is based on this abundant evidence that is widely available and has been so for years. Darwin’s claim has been falsified, thus supporting the creation account recorded in Genesis 1:21, which reads, “God created the great creatures of the

sea and every living and moving thing which the water teems according to their kinds” (NIV).

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