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BLIND CAVE FISH—PROOF OF EVOLUTION?

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Evolutionists often use as a proof of their theory the intriguing case of fish that live in deep-water caves and that have lost their sight permanently, yet still function quite well. Are blind cave fish a good example of organic evolution in action?

Found in the subterranean caverns of the world are rare, unique, and sometimes exotic creatures. Numerous varieties of bats, spiders, insects, and other curious creatures populate these damp, cool environments. Hidden from the Sun, weather, and intrusion of man, these caverns represent a truly intriguing habitat. Another animal also dwells in these cavernous environments—the cave fish. Restricted to the dark confines of the globe, cave fish possess unique qualities that differ from the surface varieties generally seen. The most remarkable distinction between cave fish and their surface counterparts is a loss of visionary processes. There are several other interesting differences, but this particular disparity is the most commonly referenced in support of evolutionary theory. How did this difference come into existence? And why has it continued? These are the underlying questions that need to be answered.

Lamarckianism (as it is known today) was the most prominent theory preceding Darwinian evolution. Jean-Baptiste Lamarck is remembered most notably for his theory of the "inheritance of acquired variations" (Ruse, 1979, p. 8). This theory holds that the acquired physiological traits of the parent are passed down to the offspring. This proposal, however, has been known to be false for more than a century. The classic evolutionary example of this theory is the giraffe. Supposedly, as the scarcity of food increased, the giraffe was forced to extend its neck higher and higher to reach diminishing food sources. Over the ensuing generations, the giraffe subsequently developed a longer neck, due to constant straining and stretching—a ridiculous idea, to be sure.

Yet some in the past attempted to apply this same type of "reasoning" to the cave fish situation in a Lamarckian scenario which suggested that through a natural event (such as a flood or terrain upheaval), a population of creatures, including fish, found itself geographically separated and isolated in a new environment—specifically, a cave. As they continued to live in this cave, the fish physically lost the use of their eyes, perhaps through injury or muscle atrophy. When the fish eventually spawned, the young possessed the same physical defects that the parents had acquired. Although such an explanation made for a good "just-so" story, the Lamarckian theory eventually was rejected by the scientists after Darwin's day because it did not fit the available facts.

A convenient and rather enlightening illustration to better relate the absurdity (if it is not already apparent) of Lamarck's theory can be made by comparing your father, your siblings, and you. If, for some unfortunate reason, your father were to lose an appendage (a finger or an arm, for instance), this loss would not be passed along to either your siblings or to you. While the accident would affect your father's life significantly, it would not have any bearing on the physical appearance of his future offspring. But the question then springs to mind, "Exactly **how do** children obtain their appearances?"

Certainly, children do possess both maternal and paternal characteristics. Why is this the case? Through the study of DNA and its genetic coding, the process of inheritance and expression of traits can be described scientifically. The physical appearance of a child is ultimately the result of his or her genetic makeup, which itself is the product of the combined genes received from the parents. An old saying correctly expresses the matter: "It's in your genes." Technically, a gene is defined as a "self-replicating unit of heredity; a portion of DNA (i.e., a sequence of nucleotide units) that encodes a protein" (Schwartz, 1999, p. 406, parenthetical item in orig.). As the definition states, genes are portions of the DNA strand. Deoxyribonucleic acid (DNA) contains the genetic coding that forms a sort of "blueprint" for the design of the organism. On a single strand of DNA, there can be numerous portions (known as genes), each of which assists in the design of the body plan. Gene expression is responsible for the visible attributes of an organism (known as the phenotype), which is the end result of the expression of one's DNA. Likewise, in cave fish, the resulting blindness among the populations is an effect of genetic mutations, and not a simple transference of an injury or organ loss.

The importance of understanding the role of genetics in this situation is obvious. First, we need to be accurate scientifically. Second, such accuracy lays the groundwork for understanding the true progression that is taking place in this example of cave fish. Any genetic mutation can be classified into one of three groups: good, bad, and neutral. Bad mutations, as the name plainly implies, are detrimental to the affected organism. As long ago as 1950, Hermann J. Muller, Nobel laureate in genetics, observed: "The great majority of mutations, certainly well over 99%, are harmful in some way" (1950, 38:35). Fifty years later, nothing much had changed. The renowned geneticist of Stanford University, Luigi Cavalli-Sforza, who is head of the International Human Genome Diversity Project, wrote: "Genetic mutations are spontaneous, chance changes, which are rarely beneficial, and **more often have no effect, or a deleterious one**" (2000, p. 176, emp. added).

Such harmful mutations affect their host, leading almost exclusively to its demise. For an epigean (surface-dwelling) organism, the loss of sight would be considered a bad mutation. But for a hypogean (underground) organism, this does not present the same problematic scenario. In complete darkness, eyesight is basically a moot point, and at worst would be considered simply a neutral mutation. Neutral mutations, however, are of no use to the evolutionist since they (to use Dr. Cavalli-Sforza's words) "have no effect." Occasionally, mutations do occur that are beneficial to survival. But those are rare indeed. Almost thirty-five years ago, Theodosius Dobzhansky, the famous evolutionary geneticist of the Rockefeller University, admitted that favorable mutations amount to less than 1% of all mutations that occur (as quoted in Davidheiser, 1969, p. 209). Once again, not much has changed. The man who is arguably the world's most eminent evolutionary taxonomist, Ernst Mayr (professor emeritus at Harvard), discussed this very point in his 2001 book, *What Evolution Is*, when he wrote (with a bit of understatement): "…[T]he occurrence of beneficial mutations is rather rare" (p. 98). Rare indeed!

Furthermore, the point must be stressed that although these mutations may be beneficial to the survival of the organism, they are still defects in the genetic code—a corruption that represents **loss of information**. Evolution does not require "just" mutations; it requires mutations that produce **new information**. As Dr. Cavalli-Sforza remarked: "Evolution also results from the accumulation of new information. In the case of a biological mutation, **new information is provided by an error of genetic transmission** (i.e., a change in the DNA during its transmission from parent to child)" [p. 176, emp. added, parenthetical comment in orig.]. **In theory**, beneficial mutations add "new information." But **in practice** that is not the case. As Jonathan Sarfati noted: "If evolution from goo to you were true, we should expect to find **countless** information-adding mutations. But we have not even found one" (2002, emp. in orig.).

To further establish the genetic mechanism by which cave fish lose their eyesight, it is interesting to point out that a similar result can be obtained experimentally. Through the manipulation of a group of genes known as the homeobox or Hox cluster, scientists can induce the mutation of ectopic (abnormally positioned) eyes. The eye structures have been found to grow in antenna, leg, and wing tissues. These eyes, like the eye structures of the cave fish, are non-functioning entities. These laboratory-induced structures are practically complete, and are "morphologically normal with normal photoreceptors, lens, cone and pigment cells," according to Walter Gehring, an evolutionary expert in Hox gene mutations (see Gould, 2002, pp. 1124-1125). Although the physical structures are constructed successfully, the eye fails to possess the necessary neural "wiring" to function properly (Gould, p. 1125). Yet, the mutational precedence for such an occurrence is well documented.

Two scientists, Yoshiyuki Yamamoto and William Jeffery, have been involved in specialized research on the eye formation of the cave fish specimen, *Astyanax mexicanus*. This particular species of teleost (bony fish) possesses both epigean and hypogean forms that enabled the team to perform experiments on the blind cave fish, using the surface form as the control specimen. Yamamoto and Jeffery have begun to establish some of the steps in the formation of the fish's eye, from the embryonic stage to the adult stage. "Although adult cave fish lack functional eyes, eye formation is initiated during embryogenesis. The lens vesicle is formed but later degenerates, and the cornea, iris, and other optic tissues are absent or rudimentary" (2000, 289: 631). The apoptosis (programmed death) of the lens cells occurs prior to the degeneration of any other tissue. Yamamoto and Jeffery observed:

> The optic cup and neural retina are formed in cave fish, but the retinal layers are disorganized, growth is retarded, and photoreceptor cells do not differentiate. The degenerate eye sinks into the orbit and is covered by a flap of skin (289:631).

As a result of their research, these two scientists have concluded that the lens plays a dominant role in the subsequent development of the eye's entire structure. To prove their hypothesis, a lens from the "eyed" variety was transplanted into the eye of the blind variety. After 8 days "a larger eye was detected on the transplant side," and after 2 months "a large eye (restored eye) with a distinct pupil was present.... Sections of the restored eye showed an anterior chamber, cornea, iris, and lens" (289:631, parenthetical item in orig.). In the final analysis, Yamamoto and Jeffery concluded: "[T]he results show that the cave fish lens has lost the ability to promote eye development" (289:632). In other words, the data show that the blindness found in cave fish is a product of a genetic mutation affecting the fish's lens. Peter Mathers, a developmental biologist, summed up the results well when he said: "It's possible you are looking at **a single gene defect** that has caused a drastic developmental change" (as quoted in Pennisi, 2000, 289:523, emp. added).

But that has not kept some evolutionists from claiming that the concept of blind cave fish supports their theory. As one news report stated: "**Millions of years ago it had eyes**; but now, soon after it starts growing in the egg, the eyes start to degenerate and the fish are born blind" (see "Blind Fish...," 2000, emp. added). However, nowhere in the scientific experiments is there evidence that lends itself to an ancient timeline of descent. The small genetic changes (microevolution) that **can** be observed are wrongly assumed to be the foundation from which macroevolution emanates.

First, notice that no new speciation has occurred due to this mutation: the species *Astyanax mexicanus* can be either the "eyed" form or the "eyeless" form. It is refreshing to note that even biological taxonomy plainly supports the fact that the fish with which we began is still a fish. Neither the genus nor the species has changed between the epigean and hypogean forms. Second, there is the principle of **progression** versus **regression**. Here, information is the key. Evolution demands **pro**gression, and with it there must accompany an increase of **new** information. **Re**gression can be described by the loss or corruption of genetic information. Harvard's Ernst Mayr defined macroevolution as the "evolution above the species level; the evolution of higher taxa and the production of evolutionary novelties, such as new structures" (2001, p. 287). He included in his definition the requirement for the "production of evolutionary novelties, such as new structures." The question then becomes, "What new structures has the cave fish evolved?" Here is where progression comes to a screeching halt. The cave fish actually falls into the category known as "devolution," which is a category of regression on a downhill slope, where information is being lost—not gained (Wieland, 2001, p. 47). Organic evolution cannot be sustained using examples of "downhill" change. The basic tenets needed by evolutionists are not met, and thus cave fish cannot be touted as an example of evolutionary hypotheses.

Organisms are affected greatly by the habitats in which they live. Within their specific environments, they perform all the functions of life—feeding, procreating, etc. Thus, environmental changes and fluctuations have the potential to affect every aspect of their lives. Above ground, the sense of sight is a widely used, extremely beneficial trait. Underground, however, sight takes on a completely different role. Whereas **above** ground the loss of sight very likely would spell doom for most creatures, **beneath** the earth it is far less detrimental. When viewing the hypogean populations, mutated eyes characterize the vast majority. How can the mutation spread (and spread quickly) if it is completely neutral? In this setting and environment, the loss of sight for the cave fish could be beneficial, presenting itself as a good mutation.

According to Yamamoto and Jeffery, *Astyanax* has undergone certain changes, "including enhanced lateral line [sense of touch—BM/BT] and gustatory systems [sense of taste—BM/BT]" (289:631). These enhancements are part of a well-documented occurrence known as plasticity. Plasticity refers to the brain's ability to change. For instance, take the example of the father who lost his limb. Emotionally, this would be an extremely tragic situation that would require some mental adjustment to overcome. Neurologically, there also would be some adjustments that would have to take place. To use a somewhat simplified explanation, the human brain contains "maps" of the body. When something is lost, like a limb or even a digit on the hand, the brain adjusts the neural network and the mental "map" accordingly. For the hand, the adjacent digits' representative image will expand to include the missing finger. This process works on varying timescales, but nowhere near an evolutionary timescale. According to the textbook, *Neurobiology,* "these changes take place over varying time scales; in some cases the shifts in representations are slow, developing over **weeks**, but in other cases they may be surprisingly rapid, beginning within a **day** or so, or even **a few hours**" (Shepherd, 1983, p. 290, emp. added). For amputee patients, this is an established fact, and provides an extraordinary example of the amazing adaptive nature (and incredible design!) of the human brain.

This neurological process applies to the cave fish, as evinced by Yamamoto and Jeffery's aforementioned conclusion regarding enhanced touch and taste. For a fish in complete darkness, the lateral line (which is the sensory network for touch) would be essential, since it would guide the fish through the cavern. The gustatory system (which is primarily responsible for taste) would aid in the location of food. As scientific studies have documented, there are "compensatory improvements of the sense of taste in the blind, cave-dwelling fish" (Boudriot and Reutter, 2001, p. 428). These enhancements, due to a mutation, would confer an advantage for the blind cave fish over the non-mutated variety. However, notice that this is an advantage only to this highly specific environment, and would become of ill effect outside of these parameters.

In conclusion, blind cave fish are just that—**blind** (by mutation) and isolated to a **cave** environment. As they have been from the beginning, they are still **just fish**. Genetic mutations and variations are found throughout nature, occurring in all populations. In many cases, they represent a defect—i.e., the corruption or loss of valuable genetic information that results in a "downhill" change or devolution, which is in direct opposition to the required demands of macroevolution. The incredible design and complexity of life is seen by its ability to survive. Whether changing behavior due to environmental strain, or re-networking a neural interface, life is dynamic, and is filled with remarkable intricacies. One cannot help but wonder: whence came such design?

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