Could variation in the coloring of largemouth bass provide an example of natural selection?

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The largemouth bass is one of the most sought- after species of sport fish in the United States. The habitat for this active predator includes almost every lake, farm pond, river, bayou, or any other body of fresh water in North America where the climate is warm enough to be hospitable. The largemouth is a beautiful creature. The fish's coloration is a blend of dark umber on its back that makes a transition to green along its side. The green lightens to a white underbelly. The green on its side is broken up by a darker- colored lateral line marking that gives it a slightly mottled stripe. The lateral marking and coloration give the fish camouflage.

The bass feeds by positioning itself in an opportunistic position near structure. "Structure" is a term often used by fishermen. It indicates some variation in vegetation, fallen treetops, cypress roots, drop-offs, or any other location that could provide a hiding place for the fish. The bass simply hides and waits for some unsuspecting meal to come swimming by. With lightning-like quickness, the bass opens up its cavernous mouth, creating a vacuum that can cause up to several gallons of water to pass through its gills while it swims quickly towards its prey. In this manner, an unsuspecting crawfish, minnow, or other small creature becomes introduced to the bass's digestive system.

One day, several years ago, while fishing in an old gravel pit near Talisheek, I caught an unusual looking bass. The water in the pit was stained a very dark, almost black color. After I

brought the fish into the boat, I marveled at its unusual appearance. The fish was almost completely black with very little variation in its coloring. The fish blended perfectly with the color of the water. I found the fish visually unappealing in comparison to the bass that I was accustomed to seeing.

I had forgotten about catching the black- colored bass until I read *On The Origin of Species* by Charles Darwin. Darwin proposed "Natural Selection" or "Survival of the Fittest" as the means by which present-day plants and animals evolved into existence. As I read what Darwin had to say, I became reminded of the strange- looking fish. Darwin states that "variations, however slight and from whatever cause proceeding, if they be in any degree profitable to the individuals of the species will tend to the preservation of such individuals, and will generally be inherited by the offspring." (*Darwin a Norton Critical Edition*, ed. Philip Appleman, 1979, p.49) The variation in the case of the bass could be its unusually dark coloration.

How is the mutant coloration "profitable" to the fish? Each female bass lays thousands of eggs each spring. The eggs provide meals for lizards and small fish that are not fended off by the female bass guarding the nest. The thousands of hatchlings are immediately threatened by hungry birds and fish that venture into the shallows with the intent of dining on the young fish. The large number of eggs helps provide for the survival of the bass as a species. "The real importance of a large number of eggs or seeds is to make up for much destruction at some period of life; and this period in the great majority of cases is an early one" (53). The goal in early life for the young bass is to grow large enough to become the predator and not the prey. Some individuals may be born with features that give them some slight advantage over the others in their quest for survival. Darwin puts it this way:

> …can we doubt (remembering that many more individuals are born than can possibly survive) that individuals having any advantage, however slight, over others, would have the best chance of surviving and procreating their kind? This preservation of favorable individual differences and variations, and the destruction of those which are injurious, I have called Natural Selection, or Survival of the Finest (54).

In the darker water, the darker minnows are harder to spot by predators. The more visible lighter-colored hatchlings would be more easily detected and eaten. This would help develop a population of darker colored fish.

Another bonus resulting from the color mutation would be the fish's increased efficiency as a predator. The dark coloration, providing camouflage, would allow the bass to position itself to catch something to eat. The coloration would allow it to out-compete lighter-colored fellow bass that would have a harder time sneaking up on and eating wary minnows. An added factor is that the more highly adapted fish will more likely reproduce. Male bass have to fight others for the limited nesting areas. The water has to be shallow, and the bottom has to be sandy where the male can fan out the nest while moving its tail to and fro. The more well-fed and stronger dark-colored males might have the competitive edge. "Generally the most vigorous males, those which are best fitted for their places in nature, will have the most progeny" (60). The result of this would be inheriting the coloration by many of the offspring of the parent. It can be theorized that the bass colored to match its surroundings has inherited that survival tool through the process of natural selection. Generations of bass, more capable of surviving, inherited what was initially a mutation. The anomaly became the norm. The mutability of the fish helped to assure its survival in the pond.

The coloration of fish in a single pond is only a very small example of Darwin's observations and conclusions on evolution. The coloration is what Darwin referred to as a "variation." Many varieties of each species exist under domestication and in nature. Man develops varieties in animals and plants to suit his needs. Dogs, for example, consist of many different breeds, but they are still dogs. Darwin contends that all dogs are "descended from a single wild stock" (41). In nature the mutability of the various species provides for the development of characteristics that enhance survival. The bass is still a bass, and its mutated coloration does not make it a different species. The emergence of a new species would involve a much longer span of time and a change in conditions.

> Therefore during the modification of the descendants of any one species, and during the incessant struggle of all species to increase in numbers, the more diversified the descendants become, the better will be their success in the battle for life. Thus the small differences distinguishing the varieties of the same species steadily tend to increase, till they equal the greater differences between species of the same genus, or even of different genera. (86)

It can be hypothesized that the unusual color of the bass caught in the gravel pit is an example of the mutability of species enhancing its survival. The adaptation described in this paper is but a minuscule leaf on the "great tree" that Darwin uses to exemplify evolution. Species rise and are supplanted by others, and continuing varieties more well suited to existing conditions spring forth to replace those that become extinct (87).

Bryan Gowland is a graduate student in the History department. Dr. Barbara Forrest was his History professor.

Dr. Forrest's Comments: *Bryan Gowland's paper is an excellent example of how a student can use a short commentary to deal with a very specific question, using the text itself to help construct an answer to the question.*