

The *Tilapia* of Lake Bermin, Cameroon

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Lake Bermin, of Cameroon in Western Africa, is one a series of crater lakes which were formed millions of years ago as the result of volcanic eruptions. These lakes cover a total area of 4200 square miles ~ approximately the size of the state of Connecticut. As the volcanic forces dwindled, the deep craters were left over time to fill in with water, forming small, cone-shaped lakes. Due to a lack of circulation on the bottom of the lakes, gases continue to build up within, and when disturbed by an earthquake or weather conditions, may be provoked to expel toxins which are deadly to humans, fish and other wildlife.

The crater lakes of Cameroon are extremely isolated, resulting in an exceptional situation of endemism. Most of the species of fish established here are to be found nowhere else on the earth. Therefore, it is critical that we pay close attention to the study of, and procreation of these fish within our tanks, and within our hobby, to ensure their positive future in the event of an environmental or ecological disaster that could wipe out the flora and fauna of an entire lake.

A tiny lake, with a surface area of only 144 acres, Lake Bermin has a rim that, at 150 feet, is high above the closest village, giving it moderate cause for distress of intrusion from human-induced environmental impairment. The water is slightly alkaline, with a pH of 7.5, fairly soft, and has a low conductivity at 80 microsiemens. Dense jungles rise up around the edges of the lake, and the bottom is a mixture of mud and silt, covered with the leaf litter, branches, and logs that fall from these trees. Rocks are also scattered amongst the substrate.

Lake Bermin is an exemplary study for scientists delving into sympatric speciation, the evolution of reproductive isolation that produces two or more descendant species (Barlow, 2000) in the same area, with no geographical barriers. Nine species of cichlids inhabit this lake, with genetic data demonstrating a close relationship, indicating that all nine species evolved within Lake Bermin and descendants were derived from one original species.

These nine species of cichlids are contained in the genus *Tilapia*, and have been discovered only in recent years. The *Tilapia* of Lake Bermin are a fascinating group of fishes, and with their manageable size, lovely, changeable colors, and intense parental behavior, make exceptional residents for our home aquariums. Many are so similar at first appearance that it takes a trained eye to differentiate the species.

Fortunately, we have such experts as Dr. Anton Lamboj and Dr. Melanie Stiassny, who have dedicated their lives to the study of these and other fishes, pioneering the way to availing us of a better understanding of our new aquarium residents.

Anton Lamboj has spent countless hours in the field, as well as in front of his own aquariums, observing these *Tilapia*. He presents an overview of the individual characteristics of *T. bakossiorum* (Stiassny et al., 1992), *T. bemini* (Thys van den Audenaerde, 1972), *T. bythobates* (Stiassny et al., 1992), *T. flava* (Stiassny et al., 1992), *T. gutturosa* (Stiassny et al., 1992), *T. imbriferina* (Stiassny et al., 1992), *T. snyderae* (Stiassny et al., 1992), *T. spongotropkis* (Stiassny et al., 1992), and *T. thysi* (Stiassny et al., 1992) in his extraordinary book, *The Cichlid Fishes of Western Africa*. The serious keeper of these fishes will want to have a copy of this exceptional book close at hand.

Each of the Lake Bermin *Tilapia* has its own attributes, but let us take a close look at *Tilapia snyderae* (Stiassny et al., 1992) as an example of what one can expect from an individual species. *T. snyderae* is apt to be the smallest of the genus, growing to 6 cm in nature, with a slender body and a pointed snout. Three color morphs have been observed in the field, a 'green,' a 'red,' and a 'pale.' However, it has been noted by Lamboj and other hobbyists that the changeable colors of one individual fish within an aquarium setting may cover the full range of described color morphs. The striking 'red color morph,' with black dorsal, snout, frontal, and fin regions, is exhibited exclusively by the most active and aggressive individuals, and during breeding.

In nature, the diet of *T. snyderae* is basically vegetable matter, algae in particular. However, detritus, diatoms, insects, and small bits of sponges are also consumed.

T. snyderae will begin to breed at a very small size, laying only 10 to 20 eggs on various substrates in shallow water. In the wild, they have been found in large colonies made up of many pairs. In the aquarium, the spawns are much larger, with reports of from 70 to well over 100 eggs, and laid in secluded areas, including caves. Observations have been made of one pair killing another and taking in the fry of the deceased pair to add to their own brood (Cardwell, 2004; Dickinson, 2005). The lives of other species of tankmates are under extreme risk while eggs or young are present, as the protective nature of *T. snyderae* parents is fierce.

This is a very active cichlid that establishes a strong pair bond and demonstrates emphatic brood care.

General Aquarium Maintenance of Lake Bermin *Tilapia*

Along with their many attributes, the *Tilapia* of Lake Bermin in general are relatively easy to maintain as long as sensible aquarium husbandry is practiced. They will flourish and procreate in a range of water parameters that remains within the bounds of the extreme, and appreciate a regular change of water.

A tank of 20 gallons will efficiently house a pair of some of the smaller Lake Bermin *Tilapia* for breeding. However, you (and they) will garner the most enjoyment from giving them the footprint of a 40 breeder (36L x 18W x 16H), or larger, aquarium. The more space they are allowed, the more natural their interactions will be for observation, and the less reason they will have for mounting irritable aggression.

As many of these *Tilapia* consume large amounts of algae and vegetative matter in nature, include ample spirulina in the diet of your home residents. Certainly do not hesitate to supplement this with brine shrimp and daphnia. I would hesitate to feed a regular, hugely rich diet of such food as blackworms or white worms. I do feed a high-quality commercial granule on a regular basis and the Lake Bermin *Tilapia* do very well on this. They are not picky eaters and will be certain to relish with gusto whatever foods you choose to place in their tank!

When courtship and spawning occurs, observe all tank inhabitants closely, and be prepared to remove other fish, aside from the blissful couple, to the safe quarters of another tank. Should you decide to raise the fry artificially, proceed just as you would any of the other West African cichlids. The fry are not difficult and will devour just about any fare. Baby brine shrimp and microworms are eagerly accepted as first foods, but if you do not have these available, finely crushed flake food and powdered granules will also be readily consumed. Naturally, regular water changes will encourage growth and help to ensure a healthy, robust adult in the year to come.

Common Characteristics and Questions Left Yet Unanswered

In assessing their overall characteristics, the *Tilapia* of Lake Bermin appear to share a noticeable thread of similarities that draws our awareness to their common ancestors. We find a small to medium cichlid, ranging from 6 to 18 cm. Most display dramatic, if not chameleon-like color changes during courtship, breeding and parental care. Most have thick lips with brightly painted colors. All are monogamous biparental substrate spawners (Barlow, 2000). Many will get along

relatively well with others in an aquarium setting until the time of pair formation. During courtship and spawning a pair will become tremendously aggressive and territorially defensive to the point of the demise of other inhabitants. The young are ferociously defended with utter dedication.

There are so many questions yet to be answered. Why do some colonize and some not? Why do they boast such striking, brilliant lips? Where did they come from? How did these distinctly separate, but oh so similar species evolve in a single tiny crater lake with no geographical impediments? Where are they going from here?

The *Tilapia* of Lake Bermin are on the IUCN Red List and on the C.A.R.E.S. Preservation Program Endangered Species List. New to the hobby, on the cutting-edge of discovery and scientific research, these captivating cichlids need our aquariums to call their homes, and scientists need our observations to continue to resolve the many questions left yet to be answered. A rare find in an aquarium shop, your best opportunity to locate specimens is through fellow hobbyists in an organization such as the Greater City Aquarium Society or the American Cichlid Association (ACA) at www.cichlid.org. Exquisite cichlids, the endemic *Tilapia* of Lake Bermin are filled with intrigue and personality, offer challenge and reward, and make the consummate addition to our aquariums and fishrooms.

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