

The Lost Treasure of the Aztecs

by James K. Langhammer

History books tell us that in the early 1500's the Spanish Conquistadors destroyed, as a political entity at least, the great nation of the Aztecs in the central highlands of Mexico. In their relentless search for gold and other treasures, the Spaniards pillaged the American cultures until one by one most of them fell beneath Spanish domination. Yet, history also alludes to the fact that the New World's ultimate treasures as envisioned by the Spaniards were never found. Why? Where were they hidden -- and by whom?

Perhaps, the real treasures of the Aztecs were hidden to the Europeans by their own unconsummated greed, and have continued so to this very day! The Aztecs were originally an agrarian people possessed of great intelligence and a great appreciation of beauty -- both natural and man-made. Their gold and gemstone ornaments were probably more beautiful than valuable to these people whose artifacts reflect the great majesty of the natural world around them.

Part of the beautiful baubles of the everyday world of the Aztecs still shimmer in the hot sun of the Tropic of Cancer, vivaciously reflecting the Sun-god's radiance off their animate flanks in a brilliant blend of opalescence and pigmentation, and still are unknown and unappreciated by the modern world! -- the goodeids, a fascinating family of live-bearing fishes.

The family Goodeidae is restricted to the ancient Aztec domain of west-central Mexico. Using the state capitals of Durango, Colima, Morelia, Mexico City, Queretaro, and San Luis Potosi as boundary references, the total range of the family which consists of approximately 35 species in 20 genera can be roughly circumscribed.

Goodeids are wonderfully interesting fishes. I don't believe any amount of paraphrasing on my part could improve on what John Michael Fitzsimons (1972) says about the family:

"The Goodeidae comprise a wholly Mexican family of viviparous freshwater fishes represented by 35 or more species largely restricted to the highlands of the Mesa Central. Its focus of abundance is in the Rio Lerma basin where it is the dominant family of fishes (Miller and Fitzsimons, 1971).

"Goodeids are generally small; members of two genera, *Allophorus* Hubbs and Turner and *Goodea* Jordan, attain a length of 200 mm, but most grow no larger than 100 mm. They live in a variety of habitats, ranging from deep spring-fed pools to shallow riffles. Some are lake dwellers; others abound in irrigation ditches that may have only a few inches of water. Their body form often reflects habitat type. Certain river and stream fishes, as *Ilyodon* Eigenmann, are swift swimmers with slim, stream-lined bodies and large caudal fins. In ponds, lakes, or quiet stream pools, deep-bodied forms, such as *Spirogonus* Meek, are slow moving and maneuver easily in dense vegetation, sculling with the pectoral fins in a manner reminiscent of many resident coral-reef fishes. Members of the genus *Alloodontichthys* Hubbs and Turner look and behave like North American darters (Etheostomatinae), are long-bodied bottom dwellers, and are found only among the rocks and boulders in shallow riffles. Goodeids include all consumer types: carnivores with conic teeth and a short gut, *Allophorus*; herbivores with generalized bifid teeth and a long coiled gut, *Ameletus* Miller and Fitzsimons; or omnivores with variable teeth and gut form, *Xenotoca* Hubbs and Turner, the feeding habits of which range from nearly completely carnivorous to completely herbivorous at different localities.

"The unifying features of the family are related to mode of reproduction -- internal fertilization and live birth. The distinctive modification of the male anal fin, presence of an internal muscular organ of apparent reproductive function in the male, structure of the ovary, and the development of trophotaeniae in embryos distinguish the Goodeidae from all other cyprinodontoid fishes. The first six or seven rays of the male anal fin are crowded, shortened, and often separated from the rest of the fin by a distinct notch; they probably aid in insemination. The anterior anal rays of the male have been described as a "gonopodium" (Turner, Mendoza, and Reiter, 1962), a term first applied to the elongate male anal fin of poeciliids, but this term may be a misnomer for goodeids since the role of the anal fin in sperm intromission has not been demonstrated (Miller and Fitzsimons, 1971). Goodeid males also have a short, highly muscular tube connecting the sperm ducts to the genital opening; this structure has been termed a "pseudophallus" (Mohsen, 1961, 1965). It is said to expel semen forcibly or to become everted and applied to or placed into the female's genital opening, but, as with the "gonopodium," its function has only been surmised and not demonstrated. Females have a single median ovary formed by the union of lateral organ rudiments, the fused internal walls of which form the median septum. Yolk is resorbed early in embryogeny and its nutritive function is assumed by placenta-like trophotaeniae, rosette or ribbon-like growths which extend from the anal region of developing embryos in all but one species (Turner, 1933, 1937)."

My primary purpose in writing this account is to introduce to aquarists several species of goodeids and my impression as to their value as aquarium fishes.

The first species I'd like to mention is my unquestioned favorite -- the Rainbow Goodeid, *Characodon lateralis*. I know of few fish with more color in wild stock than the Rainbow Goodeid; with judicious selection I believe this species can afford aquarists with at least as many colorful strains as have the platies and swordtails. Males are primarily red with yellow, green, black, and brown markings. Rainbows are peaceful with other fishes -- occasionally as with all goodeids some fin-nipping of *Corydoras* cats seems to occur if the goodeids are not regularly fed. Generally goodeids do not cannibalize their own offspring unless the parents are starved; thus multiple generations are easily exhibited together. Species should be kept separately, however, since some interspecific hybridization has been documented (Fitzsimons, 1972).

Rainbows can grow to 60 mm total length. Like all goodeids, they are not fussy eaters; although morphological details indicate many goodeids are adapted to herbivorous diets, my experience has been that they all relish and even prefer living animal foods.

The Rainbows are the most northern known goodeid and occur in spring-fed streams near Durango. Perhaps, their occurrence in the clean artesian waters explains their extreme inability to tolerate "old" water -- they *must* have frequent water changes to offset the acidifying, polluting effect of metabolic wastes. In our Detroit water with pH of about 7.2 and 120 ppm of carbonate, a downward shift in pH can quickly become fatal to goodeids. I imagine hard, alkaline waters are much more to their well-being.

My partiality to the Rainbow, fortunately, doesn't diminish my opinion that the best of all aquarium goodeids is the Butterfly Goodeid, *Ameioblennius splenden*. Like a giant *Nothobranchius*, the Butterfly's beautiful colors and frenetic activity well endear it to most hobbyists. The female Butterfly is basically a black and brown variegated version of the male, which displays true elegance. I'm not a word-artist capable of literally portraying these fishes in a manner to do them justice. The males, though, have iridescent green flanks which are flashed like a spinning prism as the fish darts around the aquarium. The caudal fin is widespreading at all times, providing magnificent contrast between the broad black submarginal band and its wide border of canary yellow.

Butterflies are large fish growing to 100 mm with some of the largest babies I've ever seen among bony fishes -- 20 to 24 mm at birth! They are peaceful and seem more tolerant of old water than most goodeids are.

The Blue-tailed Goodeid, *Aztecobius toweri*, has little to recommend it in my opinion. It is a slender fish growing to 100 mm. On the flanks are two parallel, horizontal stripes and in the male the caudal fin is a beautiful pastel blue by reflected light. The Blue-tail is sensitive to water quality. It is the most easterly of all goodeids and it alone lacks the trophotaeniae so characteristic of goodeids; for this reason it is considered the most primitive member of the family. It is the only species in which I cannot see sexual dimorphism at birth among those I have kept; visible anal modification seems to occur at about 30 mm.

The Green Goodeid, *Xenophorus captivus*, is another that will never be popular. It was my first goodeid and I have maintained stock for over seven years and freely distributed the fish, but I know of no other hobby stocks at present. It simply will not tolerate old acidic water and dies quickly if neglected. The males have iridescent green bodies and a rather unremarkable cream border on the otherwise transparent caudal fin. It seems to be large at 60 mm.

An exciting species which I am currently gaining experience with is the Picotee Goodeid, which has a scientific name that is truly bigger than it is at 40 mm -- *Zoogoneticus quitzeensis*. This is an elegant species, very much like the Merry Widow, *Quintana atrizona* - Poeciliidae, in body shape and pattern. The dorsal and anal fins of males are picoted (or bordered) in orange which can be deepened to blood-red if enough carotenoids are fed to the fish. The body of both sexes is boldly marked by large black blotches. Behavior is spritely but peaceful.

The last genus I'd like to deal with is *Xenotoca*. Just as the Mozambique mouthbrooder gave all *Tilapia* (sensu lato) a "black eye" or undesirable status for most aquarists, so also I'm afraid the Red-tailed Goodeid, *Xenotoca eiseni*, may adversely affect aquarists toward the other goodeids. The Red-tail is a pugnacious, astonishingly fecund, hardy, and robust species which grows to 80 mm and seems to quickly wear out its welcome for most aquarists. Please, however, keep in mind that this fish is a rogue species and not at all typical of the family.

By contrast, the beautiful Jeweled Goodeid, *Xenotoca variata*, is highly desirable although I'm afraid it is foredestined to be overshadowed by the very similar Butterfly, *Ameo splendens*. The male Jeweled Goodeid has a "crazy-quilt" effect of opalescence on its sides -- pinks, greens, blues -- which can only be appreciated by light reflected to the viewer. The creamy yellow tail border loses effect by not having a contrasting submarginal band. Like the Red-tail, it grows to 80 mm but seems to be a much gentler and acceptable community fish.

With these not-so-brief and yet extremely superficial comments, I hope I have given you some insight into a relatively ignored and fascinating family of live-bearers. For additional reading I refer you to the bibliography below.

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