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Charles Breder and the Mexican Blind Cave Characid

By Aldemaro Romero, Ph.D.

Louis Pasteur once said that "only a prepared mind makes discoveries." A half century ago, a cave fish from Mexico would go from hand to hand among people who thought that they had something extraordinary. This is the story of how a series of events led toward the discovery of one of the most useful subjects for biospeleological and ichthyological research and how a man, Charles M. Breder, Jr., used it to yield the foundations of most of the modern studies on cave fish.

The Discovery

In 1936, Salvador Coronado, a young Mexican in charge of the Fish Culture Station at Almoloya del Río, near Mexico City, sent 75 fish to C. Basil Jordan, a fish dealer from Dallas, Texas. Coronado thought those animals were particularly interesting; they were pinkish and...blind.

Jordan was also impressed, not only because of the uncommon morphological characteristics of the fish, but also because all of the fish had arrived alive in Texas, something particularly interesting for someone whose business largely depends upon the ability for a fish to survive transportation.

Not being able to determine the species, Jordan sent (at least some of) the fish to William Thornton Innes, a well-known aquarist and aquarium writer. Strongly suspecting that he had a new species in his hands, Innes remitted in November the specimens together with Jordan's notes on it to Carl Leavitt Hubbs, a respected ichthyologist who, by that time, had been studying surface and cave fish of the Yucatán Peninsula in Mexico.

It took Hubbs just a few weeks upon receiving the material to publish a joint article with Innes describing this fish from the characid family as a new genus and species: *Anoptichthys* (eyeless fish) *jordani* (honoring Jordan). As Hubbs himself put it, this was "most surprising, by far subterranean fish belonging to the family Characidae, of which no blind representative has ever been seen before."

The Background

Hubbs' surprise was manifold. First, it was most unusual to capture so many individuals of a cave fish species in a single locality; the North American Amblyopsidae, by the time the best known cave fish family thanks to the studies by Carl Eigenmann, were not so abundant.

Second, the fact that all 75 individuals had arrived in the U.S. alive and were easily kept in captivity, said something about the potential of this species as a research subject. As a matter of fact, Innes was publishing by February 1937 an article on how easy it was to keep this fish in aquaria.

Third, this cave characin did not grossly display the hyperdeveloped sensory organs quite common among other cave animals, particularly the amblyopsids. As a matter of fact, it only differed from its likely surface ancestor, *Astyanax fasciatus mexicanus*, in lacking eyes and pigmentation.

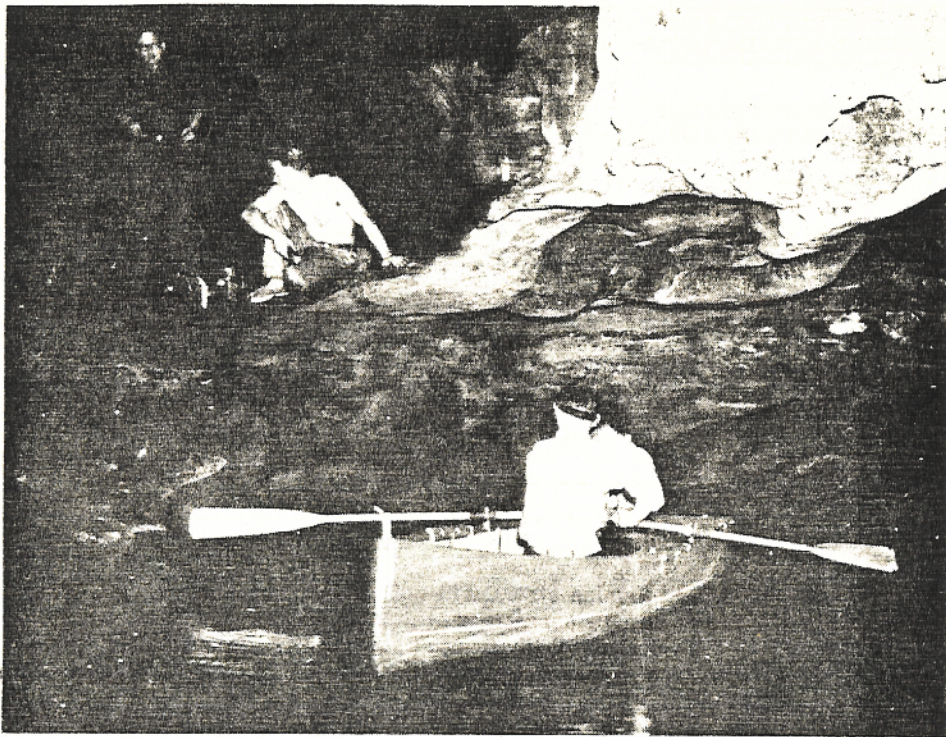
The Interest

This cave fish was so amusing that in both Mexico and the U.S. a great deal of interest arose. So, a group of the Mexican "Escuela Nacional de Ciencias Biológicas" composed, among others, by José Alvarez and Osorio Tafall, began the exploration of the whole cave system for the area which, as time went



Charles Breder (right) with Salvador Coronado at La Cueva Chica trying to hook the fish. Netting would prove to be a more efficient way to capture them. (© New York Zoological Society photo, courtesy of J.W. Atz).

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Charles Breder (standing) and other expedition members at one of the pools (© New York Zoological Society photo, courtesy of J.W. Atz).

by, would yield over 30 cave localities containing this fish.

The other center of interest was in New York City. Only three years after the publication of Hubbs' and Innes' paper, Myron Gordon, a geneticist on the staff of the New York Zoological Society, visited the cave in which the fish had been discovered in Mexico. There he collected more individuals which were brought back to New York. Gordon's interest in the fish resided in its lack of pigmentation; after all, fish pigmentation had been his subject of research since the beginning of his scientific career in the late 20s.

The lack of another structure, eyes, was to become the interest of another New York-based scientist: Edward Bellamy Gresser. Gresser was a practicing physician and a professor of ophthalmology at New York University. He would use the laboratories of the New York Aquarium beginning in 1936 when first Mexican blind cave fish arrived.

The Expedition

By 1939, the director of the New York Aquarium was an enthusiastic and prolific research author: Charles Marcus Breder, Jr., who after learning about the newly described cave fish and hearing Gordon's account of his recent trip to Mexico, took the initiative of organizing and leading an expedition to Mexico to perform field studies, obtain enough ecological information for a cave habitat display for the Aquarium, to shoot a documentary to be presented at the 1941 annual meeting of the New York Zoological Society and, more important, to bring back enough fish to conduct extensive laboratory research.

In January 1940 he held a meeting with other scientists in which the whole expedition, to be known as "The Aquarium Cave Expedition to Mexico," was organized. By March 11 of that year, the group was already in Ciudad Vallés, nearby "La Cueva Chica" (the little cave), the fish locality.

Besides Breder and Gresser, the other expeditionaries were Stanley Crittenden Ball, curator of Zoology at the Peabody Museum of Yale University; Marshall Bishop, assistant in Zoology also at Yale and an experienced fish collector; Ralph Friedman, an archeologist of the New York Zoological Society who expected to investigate any track of past human activity at the area; William Bridges, curator for publications for the Society since 1935; and Sam Dunton, a professional natural history photographer, then working for the Aquarium. In Mexico they would be joined by the discoverer of the fish, Coronado, and by Ramón Aguilar, an English-speaking native from that Mexican region who worked for the Mexican Department of Fisheries.

Besides the fact that most expeditioners suffered from "tropical fevers" (most possibly histoplasmosis) after the trip, the expedition was a complete success (the narrative of the expedition has been extensively told by Bridges in several long articles). The amount of knowledge produced after this and other contemporary field trips to that area has been really impressive.

The Product

Between 1940 and 1954, Breder alone (sometimes co-authoring with Gresser or an ichthyologist from the American Museum of Natural History, Priscilla Rasquin), published 17 papers (168 pages of dense scientific information) in which this fish was the major subject of research. Most of the work concentrated on its behavior, particu-



Breder years later working with a fish collection (photo by M.E. Braden, courtesy of Ms. P. Rasquin-Breder).

larly responses to light and chemicals, as well as social behavior (schooling and aggression). He also made most valuable contributions to our knowledge of this fish' sensory organs (eyes and pineal gland), metabolism, ecology, genetics, and evolution. Because the cave and the surface forms interbred, he was the first who strongly suspected that the blind depigmented cave fish was nothing more than a remarkably local-adapted population ("ecotype") of the surface species *Astyanax fasciatus mexicanus*, much before modern techniques such as electrophoreits and karyotypic analyses were fully developed.

Many of Breder's contributions are still frequently cited in the scientific literature; others have been either modified or expanded. But what is really important, he proved that this Mexican cave fish was one of the (if not the) easiest species to work with. Active research on it is still conducted in the U.S. and Europe, and what we have learned about it today represents the backbone of our knowledge on the biology of cave fish.

Breder died in 1983, but half a century after the discovery of the fish he used so

successfully, his idea of combining field and laboratory studies and to reach for general answers from a multidisciplinary viewpoint has enlightened many of us.

Acknowledgements

I thank James W. Atz for providing me with two of the photos. Ms. Priscilla Rasquin-Breder reviewed the manuscript and made valuable suggestions and also provided me with a photo of her late husband.

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Obituary

Harold Meloy

NSS 3916F

1913—1985

The dean of Mammoth Cave historians, Harold Meloy, died of cancer at his home in Shelbyville, Indiana, on November 11, 1985. An Army veteran of World War II and a member of the Disabled American Veterans, it was, perhaps, fitting that he died on Veteran's Day.

Born in Waldron, Indiana, Harold's parents first took him to the New Entrance to the Mammoth Cave in 1925. After the cave tour, they were taken to the cave office and shown the mummy, "Little Al." After the New Entrance was sold to the National Park Commission in 1931, the mummy became park property and was forgotten. In 1951, Harold saw Little Al on display in the Mammoth Cave Museum. The mummy was considered of little importance since the discovery of Lost John in Mammoth Cave in 1935. A naturalist told Harold that he was certain Little Al was phony, and had been brought in from the Southwest. This caught Meloy's attention, and led to the scholarship culminating in his writing the *Mummies of Mammoth Cave* in 1968.

Harold graduated from the Indiana University School of Law in 1939, and practiced law in Shelbyville, Indiana, for 46 years. His legal training, attention to detail, and interest in Mammoth Cave, resulted in

him compiling the definitive history of the cave. He focused his attention on the period from the cave's first documentation, to the death of John Croghan in 1849. He felt the history after this period should be left for younger historians to decipher. His extensive bibliography is the key to understanding the early history of the cave.

Harold Meloy was a member of the Cave Research Foundation, the Mammoth Cave National Park Association, and a Fellow of the National Speleological Society. A member of the American Spelean History

Association, Harold's most recent paper was published this fall in the *Journal of Spelean History*. He professed not to be a caver, yet he spent many hours in Mammoth Cave wearing his felt hat, bow tie, suit, and electric light, dutifully recording names and dates while explaining the cave's history—a well-dressed, neat, lawyer appearing to have just left the courtroom, and now working on the cave's history case. We, and his wife, Loretta, miss him greatly.

Stanley D. Sides, M.D.

40/25 Years Ago

By Dave Hughes, NSS 14550

25 Years Ago

The January 1961 *NSS News* contains a wonderful essay about the Mammoth Cave region by NSS President, Brother Nicholas. In this article, it is revealed that the National Park Service has very recently acquired Great Onyx Cave and Collins' Crystal Cave for inclusion into the park. A touching vignette of Floyd Collins is also given wherein highlights of his caving career are recalled. One is asked to imagine the courage that it took to enter such large caverns with just a few cans of beans, a kerosene lantern and a blanket. With these simple implements, Floyd spent days at a time moving along virgin corridors. Such explorations are, of course, legend and Jim

Dyer has revealed that some of the passages described by Collins years ago are yet to be rediscovered.

The same issue describes the Howe Cave Project in Schoharie County, New York. This effort is attempting to understand the hydrology and speleogenesis of the region. Caves under investigation include Howe Caverns, Secret Caverns, McFail's Hole, Dave Disappointment and Ack's Shack. A highlight of the project was the July 24th, 1960, descent of McFail's by Pete Van Note, Joe Homburger, Charlie Marr and Norm Olsen. Subsequent trips by these explorers surveyed more than 1400 feet in this cave and produced a nice map to accompany Norm's article for the *News*.