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In Search of the Elusive "Eyeless" Cave Fish of Trinidad, W.I.

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In 1926 a new genus and species, the "eyeless cave fish of Trinidad," was described. Few researchers have had the opportunity to study it in its natural habitat and its true nature has remained a mystery to many. In January, 2000 we decided to take a look at this fish and its cave. What we found was amazing.

A Little History

The first person who paid any attention to what has been called the "eyeless cave fish of Trinidad" was probably a naturalist of German descent, born on that island. Friederick William Urich (1872-1936) was known as *Jangoons* by his friends. Educated in Trinidad, France, and Germany, he worked for a short while in Trinidad's civil service as entomologist at the Imperial College of Tropical Agriculture (the forerunner of what is today the University of West Indies at Saint Augustine, east of Port of Spain).

Urich was one of the best-known naturalists of the West Indies in his time. He was a founding member of the Field Naturalists' Society of Trinidad, whose members first met officially in 1891. His home was a scientific lab. Because of his contacts with scientists in other countries to whom he sent specimens, many Trinidadian species are named after him.

When Theodore Roosevelt visited Trinidad in March of 1916, Urich, together with G.B. Rorer (a mycologist) and Archer Warner (the solicitor general of the island), took the former President to visit an extraordinary cave known for its large colony of oilbirds ("guacharos"). It is interesting that Roosevelt, who wrote an extensive article about this visit and the fauna of the cave, never mentioned any fish. Other explorers that had visited that cave before and after him also never mentioned any fish.

Then, in July 1924, the British Museum of Natural History received from Urich a specimen of a blind fish captured in the "Guacharo" cave. The fish was studied by one of the British Museum's rising stars of the time, John Richardson Norman (1899-1944), who had published a few papers on the fishes of the nearby island of Tobago. Fearing that the specimen could represent an accident of nature rather than a normal fish species, Norman requested two more specimens and Urich complied. In October of 1926 he published its report and named the fish *Caecorhamdia urichi*, (*caeco* = blind; *rhamdia* = the genus of a catfish to which this cave fish seemed most related to; *urichi* = honoring Urich, the collector). Since then, this fish species has consistently appeared in the lists of blind cave fishes of the world.

The Cave

The name Norman gave to the cave, "Guacharo cave," is confusing, because many caves that contain oilbirds are called "Guacharo" caves. There is a famous Venezuelan cave that has that same name. The actual name of the cave is Oropuche or Cumaca Cave. It is situated on the south side of Trinidad's Northern Range a few miles to the northeast of the town of Valencia. The precise location is available from the author. The cave is on private property and it is necessary to obtain written permission from the owner in order for the foreman of the property to let you in. Actually, that has worked well because thanks to that measure, all the fauna in the cave is protected *de facto*. In the past, the oilbird colony used to be exploited for oil and food. Eggs were dragged indiscriminately from the nests.

Roosevelt and companions in the cave

Oropoche is a linear, limestone cave with an emergent stream running the full length of it. There are not significant side passages (a good map can be found in Komisarcik 1979). You can find substantial piles of debris, including large pieces of trees, which indicates a large connection with an outside stream. Water level can rise rapidly after rains and it is not advisable to be there during or right after rainfall. At the end of the cave, about 70 meters from the entrance, there is a sump with a dangerous whirlpool. Two amateur SCUBA divers attempted to swim through the siphon on March 22, 1964, at the height of the dry season, and were drowned. A professional diver recovered one body 200 meters upstream of the siphon and saw the other pinned under fallen rock debris. According to our guide, the remains of the second diver were not recovered until his bones were flushed out, several months after the accident occurred.

Poisonous snakes represent other significant dangers. We were told that they were abundant at the entrance of the cave and we actually saw a fer-de-lance (*Bothrops atrox*) just few meters outside the cave.

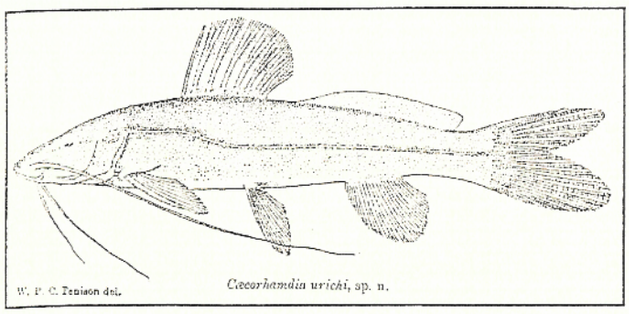
The oilbird or guacharo (*Steatornis caripensis*) population in the cave is about 200 individuals which nest on ledges up the wall. A stream covers the floor of the cave, which is littered with moist vegetable debris and guano dropped by the oilbirds. A smaller population of bats (probably of the genus *Carollia*) is found deeper in the cave. The bats do not roost in the same area as the oilbirds. The cave is inhabited by a great variety of fauna including centipedes, spiders, crustaceans, molluscs, and earth worms. Nine species of endemic (found only in that cave) animals from that cave have been described.

The Fish

After Urich, the first person known to have collected specimens of this fish for scientific purposes was Julian S. Kenny. Prof. Kenny, the foremost specialist on freshwater fishes of Trinidad, surveyed the cave in the mid-1950s. At the time the fish were quite visible and relatively easily caught by seining. He maintained six of them in aquaria at home and concluded that they were cave varieties of the common catfish *Rhamdia quelen*, a species of nocturnal habits. The six specimens ranged from a dark gray/charcoal form to a pale pinkish white form. While small eyes were visible in darker forms, the pale forms were apparently eyeless. Interestingly, paler fish darkened considerably to brown when exposed to light, a phenomenon that has been described for some other cavefish. They were all kept in a large aquarium and fed fish scraps. Sizes ranged from 15 to 20 cm. He kept these fish for about three or four months and they were then preserved at the Trinidad government's Grove Fish Farm, but later lost.

The next researcher who tried to collect this fish was the Dutch authority on catfishes, G. F. Mees. Dr. Mees actively tried to capture this fish in April of 1966 but only obtained

National Speleological Society News
58(10):282-283



three specimens. He wrote "Contrary to expectation we found that the white fishes, presumed to be eyeless, were by no means easy to catch. Our total catch during an hour's work consisted of two perfectly normal specimens of *R. quelen*, and only one individual listed above which lacks eyes, but is normally pigmented." Mees concurred with Kenny that the "eyeless" cavefish from Oropouche cave is nothing but a variation of the common catfish found in rivers throughout Trinidad. Norman himself, in his original description, wrote "Apart from the absence of eyes, this fish appears almost identical to *Rhamdia queleni*."

When we visited the cave, we were surprised by the fact that initially, we could not see any fish at all. Urich apparently did not have trouble capturing at least three to send to London; Kenny caught six, a sample showing extreme variability of eye development, pigmentation, and barbel length; Mees experienced more difficulty in capturing only blind forms.

Yet there we were, standing, looking for the fish over the entire length of the cavern. But where were the fish? After 20 minutes of wandering around, suddenly we saw a quick, but intense reflection from one of our headlamps. The shining disappeared quickly under a rock. We could not but notice the remarkable similarity of that eye shining with that of the oilbirds and many nocturnal mammals. That reflection is the product of a special structure in the eyes of these animals called *tapetum lucidum*, an internal eye layer that reflects light back to the interior of their eyes, so these creatures can see better in conditions of low illumination.

Since we had a video camera sensible to infrared light and equipped with an infrared lamp, we turned off our headlamps and flashlights and looked through the camera visor. To our amazement dozens of catfish started to come out from beneath the rocks. Their eyes still shined, reflecting the infrared illumination from our camera, but certainly its wavelength was out of the range of their visual sensitivity. When we turned the headlamps on, the fish quickly disappeared under the rocks; if we turned them off, they would come out again, and again, and again.

We could not see a single individual who appeared blind or depigmented; they all resembled the common catfish found elsewhere in Trinidad. Thus, all of them were not only fully eyed, but also had tapetum lucidum, something never described before.

These observations raise a number of questions. Probably the most important is: what happened to the actual "eyeless" cave fish? They did not seem to be difficult to find in the '20s and '50s; they seem to have become rarer in the '60s, and nowhere to be seen by January 2000. One possibity is that there once was a blind, depigmented population in that cave, and due to the incoming eyed, pigmented fish from the stream that invaded the cave, the blind population was wiped out through introgressive hybridization. The latter is a biological phenomenon though which genetic mixing eliminates many of the characteristics of the original population (in this case blindness and depigmentation). Actually, this phenomenon was documented in 1983 in the pages of the *National Speleological Society Bulletin* for a population of the Mexican cave tetra (*Astyanax fasciatus*). The senior author of this paper was able to collect information that showed how a blind, depigmented population of that cave fish was eliminated in less than 50 years by incoming eyed, pigmented fish from a nearby river. Furthermore, he observed that during the process, a lot of fish showed a great deal of variability in their eye size and pigmentation, just as Dr. Kenny observed for the Oropuche cave in the '50s.

More studies are needed, of course, to confirm or reject this hypothesis. At the present time we are working studying specimens and plan to go back to Trinidad next year in order to obtain data for population estimates and genetic analyses.

The cave population of this fish may no longer be blind, but that does not make it less interesting.

Acknowledgements

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