NUMBER 342 DECEMBER 17, 1936

OCCASIONAL PAPERS OF THE MUSEUM OF ZOOLOGY

UNIVERSITY OF MICHIGAN

ANN ARBOR, MICHIGAN UNIVERSITY OF MICHIGAN PRESS

THE FIRST KNOWN BLIND FISH OF THE FAMILY CHARACIDAE: A NEW GENUS FROM MEXICO

BY CARL L. HUBBS AND WILLIAM T. INNES

AMONG the interesting fish novelties being introduced from Mexico by Mr. C. Basil Jordan of the Texas Aquaria Fish Company, of Dallas, Texas, the most surprising by far is a blind, subterranean fish belonging to the family Characidae, of which no blind representative has ever been seen before. The new species is also the first blind fish of any group to be named from Middle America.

The source of this new blind fish is given by Mr. Jordan as a subterranean stream in the forested mountain region of southeastern San Luis Potosí, Mexico, in a region southwest of Valles drained by the Río Tampaón of the Río Panuco system. The Río Tampaón is the lower course of the Río Valles, and flows into the Río Coy, one of the main sources of the Panuco. Telling of his discovery, which was made about November 1, 1936, the collector wrote Mr. Jordan a vivid account, which we have translated freely as follows:

> It is difficult to imagine how imposing it is to enter those most magnificent natural grottos. One enters first through a transom-like opening just large enough for one man (there are many entrances, known only to wild animals). After walking for about a kilometer through a narrow gallery obstructed in places by enormous fallen rocks, one arrives at a chamber large enough to contain a cathedral, completely covered with stalactites and stalagmites which present a grand aspect when illuminated. To avoid the

possibility of becoming lost, we marked each passage with chalk as we passed by. At last we came to the zone of creeks and pools. The first pool which we encountered is so very deep that we could not estimate its depth, nor could we fish in it because of the low ceiling. After edging our way around this pool, by holding onto the fissures in the rock, we continued along a creek, walking knee-deep in the water, in a head-high passage, finally arriving at another large pool, also very deep, in which it was possible to see with the light the little fishes for which we had come. Strange sounds, splitting the silence, enormously alarmed the natives, and naturally me also. I trembled at the sight of the bones of deer and other animals in the caverns, especially when my companions, attributing the loss to the spirits, told me of Indians who had entered here, never to be seen again. Seeking an appropriate place, we began to catch the blind fish one by one. After making several trips into the cave, and after an infinite amount of tumbling and slipping, we succeeded in obtaining 100 specimens. After journeying by horse to the Río Tampaón, and on to Pujal by canoe, I send you 75, retaining 25 for the Department.

This is apparently a hardy cave fish, for the 75 individuals all arrived alive at Dallas, and have continued to live in warm tropical fish aquaria without showing any discomfort. The species will probably prove much more suited to aquarium culture than the blindfishes of the United States, for it doubtless came from rather warm water, while the northern fishes live in cave streams having a temperature of about 56° F. The blind characins "have ravenous appetites," Mr. Jordan writes, "and take dry food which they find quickly. Mosquito larvae are taken with much gusto, but they have some trouble catching these."

Our own experience (that of Innes) agrees with Mr. Jordan's. The fish are hardier than *Astyanax fasciatus mexicanus*. They sense the sides of the aquarium rather well, for when excited they only bump the sides occasionally and in a state of calm usually turn away about an inch from the glass. They were kept alone a few days to insure them getting food, but it was later found that they eat better in a community tank. Almost immediately they sense the placing of food in the aquarium, and learn quickly into which end of it the food is dropped. A little splashing at the surface has become the dinner bell to the blind fish, which at once become excited at the sound, dash about, come to the surface for a time to feed on particles still floating, then scour around on the bottom for the food that has sunk. They really get more to eat than the other fishes in the tank, for they stuff themselves as though they did not know when a new opportunity to feed would

present itself. They eat almost any kind of fish food, including the cereal preparations that most characins reject. These blind fish seem to be comfortable within the temperature range of 60° to 80° F., but like most "tropicals" are susceptible to ichthyophthiriasis at the lower temperatures. This disease, however, responds quickly to chemical treatment and to an increased temperature.

An examination of the characters of the new blind fish leaves no reason to doubt that it was derived from *Astyanax fasciatus mexicanus,* the only characin that has heretofore been known from the Panuco River system, in which the new species occurs, or elsewhere in northeastern Mexico or the United States. The discovery of this blind characin was most unexpected, for *Astyanax,* a free-swimming, midwater fish, does not possess the crevice-seeking habits nor the well-developed sensory organs that are ordinarily characteristic of the ancestors of blind, subterranean fishes. The ubiquitous and abundant occurrence of the "sardina" (*Astyanax*) through the fresh waters of Middle America is the only obvious reason why it has given rise there to a blind derivative.

We are very grateful to Mr. Jordan for the gift of the type specimens, and for the privilege of making his interesting discovery known to the scientific and the aquarium world. We take pleasure in naming the species for him.

Anoptichthys, new genus

Anoptichthys agrees with the genus and subgenus *Astyanax*[1] in all apparent characters other than those associated with blindness and subterranean life. The adipose fin is well developed. The dorsal fin is short; the anal of moderate length; the caudal strongly forked, with the lobes subequal or the lower somewhat the larger. The gill-membranes are free from the isthmus and scarcely conjoined. The setiform gill-rakers are in moderate number and rather short. The multicuspid teeth are well developed in both jaws; on each side there are 4 separated, tricuspid teeth with a strong, little-compressed median lobe, in the outer premaxillary row; 5 broad tricuspid to pentacuspid incisors with a triangular

[1] See Carl H. Eigenmann's monograph, *The American Characidae,* Mem. Mus. Comp. Zool., 43 (1917–21), Pts. 1–3.

base in the inner premaxillary row, of which teeth the median one is in contact with its fellow and bears 1 cusp on its inner edge and 2 on its outer margin, the fourth is reduced in size and the fifth is relatively small and located inside the front end of the single, long, knifelike, serrated maxillary tooth; also a single series of mandibular teeth, of which the anterior 3 are much enlarged, compressed, cupped incisors, decreasing in size backward but with the third and smallest one abruptly larger than the first and largest of the 6 lateral teeth; the mandibular teeth grade from pentacuspid anteriorly through tricuspid near the division between the 2 sizes of teeth to unicuspid at the dwindling posterior end of the series. The upper lip forms a thick gum overlapping and almost enveloping the premaxillary teeth. The upper jaw is rather short and is strongly angulated at one point, where the premaxillary and maxillary join. The suborbitals do not entirely cover the cheek. The abdomen, broadly rounded transversely and very gently convex in outline, is covered with ordinary scales, not specialized along the midline. The complete lateral line is gently decurved. The scales are rather large, strictly cycloid, nowhere notably specialized. A few scales extend on the extreme base of the caudal fin in 1 row of large scales near the middle rays and in 3 rows of smaller scales near the middle of each lobe of the fin; the dorsal fin is scaleless; the anal bears only 1 row of small scales, in a basal sheath. The nape is wholly scaled, except over the supraoccipital process. There is no procumbent predorsal spine.

The characters by which *Anoptichthys* differs from *Astyanax,* as already stated, are those associated with its subterranean habitat. The fish is obviously blind, for the eye is virtually structureless in external view. The eye socket is filled in with fatty tissue, though not greatly reduced in size (it is one-fourth as long as the head). This fatty tissue is divided by a subvertical fissure extending from near the middle of the eye socket to a point where the fissure divides to form a short crease forward and backward, most distinctly forward, along the lower margin of the orbit. There is also a crease along the anterodorsal margin of the orbit, just behind a narrow fleshy ridge that separates the orbit from the enlarged posterior nostril. The internarial flap, markedly elevated,

is half as high as the orbit, and becomes thickened into a large slightly bilobed mass ventrally. The olfactory lamellae extend across only about half instead of virtually the entire floor of the narial pouch, and do not bear flaps toward their distal point of attachment. The infraorbital canal is little modified; the pores on the preorbital are sessile, without side branches extending to the front edge of the bone. The fatty mass that fills the orbits extends over the broadened top of the head, and seems to contain sense organs. The snout as seen from above is much broadened and shortened, with a prominent angle before each nostril. The scales are very thin. The pigment of the body is obsolescent.

Anoptichthys, eyeless fish.

Orthotype.—*Anoptichthys jordani,* new species.

Anoptichthys jordani, n. sp.

(Plate I)

The following description is based, except as indicated, on the holotype, an apparently adult specimen 51 mm. in standard length, with data as already given. The paratypes are 2 individuals which remain alive in Mr. Innes' possession at the time of writing. The figure is taken from one of the live paratypes.

The body is rather sharply compressed; the greatest width, near the broadened head, is half the greatest depth, which is uniform from below origin of dorsal to a vertical half the length of the head farther forward; the greatest depth measures 3.15 times in standard length (about 2.8 times in the paratype figured); the least depth of the caudal peduncle is two-thirds the length of the peduncle and two-fifths the length of the head (slightly deeper in paratype). The anterodorsal contour is weakly convex before the eye, very slightly concave above the eye, and rather strongly convex between occiput and dorsal.

The head is not greatly widened posteriorly (the greatest width is slightly more than half the length of the head) but is so nearly oblong as seen from above that the width below the front of the eye socket is still almost half the head length. The mandible is somewhat oblique, very strong and projecting in the uninjured paratype that is figured; in the holotype the mandible is very steep, more nearly vertical than horizontal, and is much

shorter than the upper jaw, presumably because the right side of the jaw has been greatly injured or naturally atrophied, causing the dentition to be abnormally reduced on this side. The length of the head, including the broad opercular membrane, is contained 3.45 times in the standard length (about 3.6 times in paratype). Measurements into the head length are as follows: length of orbit, 4.0 (twice the horizontal projection of the snout); length of the nearly transverse snout, 4.3; width of head across the fatty eye-socket mass, 2.3; least preorbital width, 16.0; distance from orbit to angle of preopercular margin, 2.5; length of upper jaw, 2.6 (these measurements are about the same in the paratype figured). The suborbitals fail to cover the cheek by a space considerably wider than the least preorbital width. The suborbital chain is very irregular and asymmetrical, possibly as the result of injury; not counting the preorbital, the bones are in 2 series, numbering 5 + 2 on the left side, 3 + 1 on the right side.

The gill-rakers, on the first arch, numbering 5 + 12, are scarcely more than half as long as the gill-filaments.

The dorsal fin has 9 rays, not counting an anterior ray which is about half as long as the longest one; the anal, 18 principal rays (a paratype has 21); the caudal, 19 principal rays; the pectoral, 13 rays; the pelvic, 8 rays. The rather high, obtusely pointed, very slightly falcate dorsal fin is inserted approximately over the end of the pelvic base, just midway between base of caudal and tip (or middle) of snout; its length when depressed is twice the length of the fin base; and is contained 1.25 times in the distance to the short-based but flaring adipose fin, and 1.1 times in the head. The anal fin has a relatively short base, contained 1.2 times in length of head. The length of the upper lobe of the caudal enters the head 1.15 times; the pectoral fin, which extends very slightly beyond the pelvic insertion, 1.3 times; the pelvic, which reaches distinctly beyond the anal origin, 1.6 times (these fins are apparently smaller in the specimen figured).

The scales in the lateral line to caudal base number 35; from origin of dorsal downward and backward to, but not including the lateral line row, 7; between lateral line and anal origin, 6; between lateral line and short pelvic axillary process, 5.

In life the fish, as described by Mr. Jordan, is "clear pink to

flesh in color." The 2 live paratypes remotely resemble the new albino *Mollienisia latipinna;* they are silvery yellow with a faint flush of pink, with the abdomen more of a lemon yellow, and show no trace of dark markings. The yellow flesh in the anal region is visible through the transparent scales. Elsewhere a few scattered scales are transparent. A pink color shows through such scales, over the vertebral column. When viewed by transmitted light, the region of the spinal column is decidedly pink. There is a tendency toward translucency except on the head and the visceral regions. By reflected light, the fish is silvery, with a slight iridescent overtone.

The type in formalin shows little color, but has the main central portion of each caudal lobe a rather faint but distinct greenish orange. The other fins show no color. The sides are silvery with a slight rosy tinge. The silver is brightest in a diffuse lateral band, under which large, merely gray melanophores are discernible under a microscope. On the lower sides no pigment cells are to be found, and no trace is discernible of the shoulder bar or of the caudal stripe. On the upper sides the ghostlike melanophores also occur, chiefly toward the edge of the scale pockets, and most thickly near the middorsal line, especially around the base of the dorsal fin. Similar color cells occur on the top of the head, and a few very minute ones remain near the margins of the orbital mass of tissue, but none are apparent on the cheeks, opercles, or lower part of the head.

PLATE I

Anoptichthys jordani, the new blind characin from Mexico. Photograph by William T. Innes of a live paratype in his possession.

PLATE I