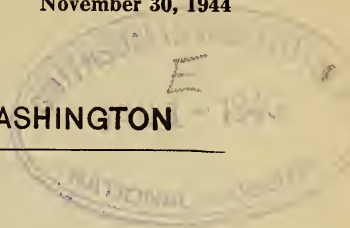


PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON



NOTES ON FISHES IN THE ZOOLOGICAL MUSEUM
OF STANFORD UNIVERSITY.

XV.—TWO NEW MINUTE GOBIES OF THE GENUS
MISTICHTHYS, FROM THE PHILIPPINES.

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From the Coromandel coast of India to the Philippines occur a number of translucent or practically transparent gobies. Some of them are the smallest living vertebrates, with adult males from 7.5 to 11 mm. in length, and adult females from 9.5 to 14 mm. Some of them occur in fresh water lakes, on the island of Luzon, while the rest are found in either brackish or salt water, or both, in lagoons, esteros, river mouths, and nipa and mangrove swamps. Because of their minute size and practical invisibility in life, most of them are little known, or are entirely overlooked by fishermen, collectors, and students.

The proper generic allocation of some of these gobies is very difficult. Aurich has lumped them all under the genus *Gobiopterus* Bleeker. This is the easiest way to dispose of them, but brings together divergent species, so that the genus becomes a heterogeneous assemblage of species with little in common but their size. Aurich is however perfectly correct in removing *Gobiopterus* from Kouman's subfamily Sicydiaphinae. Koumans recognizes *Mistichthys*, but says that my *Mirogobius stellatus* is the same as *Gobiopterus brachypterus* Bleeker. Since the last named has 25 scales, to select but one distinctive character, while the two species of *Mirogobius* described by me from Luzon are naked, Koumans seems to have a very elastic idea of a species. *Mirogobius lacustris* is entirely naked; *Mirogobius stellatus* is also naked, except that occasionally old males may have 2 to several scales at the caudal base. Sometimes specimens of *Mirogobius* seem to have scales, but examination with a compound microscope shows that none are present, the skin being merely striated. Koumans would not have lumped these species if he had made a careful examination of them. It is not enough to look at fishes,

without removing them from the bottle. With these tiny fishes the use of a compound microscope is essential.

KEY TO GENERA OF MINUTE GOBIES OF THE ORIENTAL TROPICS

A.—First dorsal very low, of three spines.....*MISTICHTHYS*

AA.—First dorsal higher, of 4 to 6 spines.

B.—, Anal I-8-13.

C.—25 to 27 scales in lateral series.....*GOBIOPTERUS*

CC.—Body naked, or at most with a very few scales at caudal base.....*MIROGOBIUS*

BB.—Anal I-5.....*PANAKA*

Mistichthys panayensis Herre, new species.

Dorsal III-I-6; anal I-9; pectoral 13. Scales in lateral series 24-26, usually 24; transverse series 6; no predorsal scales. Females have the tongue emarginate, but little or not at all emarginate in males.

Depth in adults 4.6 to 4.7, the head and caudal equal, 3.8 to 4 times in the length. Form thickset, the dorsal profile gently arched; gravid females much distended laterally, their depth scarcely more than in males. Head broad, blunt, the short snout about half an eye diameter. The large mouth is more nearly vertical than in the other minute oriental gobies, the posterior angle of the maxillary not reaching a vertical from the front margin of the eye; by exception old males may have it reaching that far. Chin broad, prominent, ending the dorsal profile; males with heavier lower jaw and more prominent chin than females. Adult males with a row of long pointed teeth in upper jaw; lower jaw with an anterior row of 6 or 8 widely spaced broad caniniform teeth, often curved or hooked; behind them a pair of post-symphysical canines and an inner row of long slender pointed teeth on each side, extending forward as far as the last teeth of the outer row. Females have a single row of small pointed teeth in the upper jaw, which become needle-like with age, the anterior ones slightly hooked; sometimes there are 2 irregular rows at the front of the jaw; the lower jaw is more or less irregularly two-rowed, the teeth becoming stouter than above, with a pair of very small post-symphysical canines.

The large eye is 2.8 to 3 times in the head; the distance from its hind margin to the snout tip is less than the postorbital region. The broad interorbital equals or is greater than the eye. The dorsals are well separated, the first dorsal low, about 2.5 times in the head, the 3 spines about equal in height; the second dorsal and anal are similar, their anterior rays longest; second dorsal height about 1.3, the anal height about 1.25 times in the head, both fins falling far short of the caudal when depressed. The elongate pointed pectoral extends to a point above the anus, rarely over the anal papilla; the small ventrals form a narrow funnel, almost tubular, and seldom, if ever, reach more than half way to the anus; the caudal is more or less rounded, the central rays longest. The female genital papilla is thick and bluntly rounded, the male one very slender and pointed; they scarcely equal, or are less than the

diameter of the pupil. The isthmus is rather broad; the gill openings do not extend forward, but the membranes are so easily torn that they sometimes seem to do so.

In life these little fish are transparent, the only coloring being the black eyes. In preservative the color of adult males is grayish white, with stellate melanophores more or less densely sprinkled on the chin, upper lip, interorbital space, sides of the head, and on the pectoral and ventral bases; a black line from the angle of the opercle to the caudal base; a double row of melanophores from the head along the back to the caudal; another row from the pectoral axil to the anal origin and along the anal base to the caudal; additional small melanophores sprinkled on the sides; the fins are colorless. Adult females are similar in coloration but with fewer and usually paler melanophores, except on the sides of the abdomen and along the dorsal origin.

Described from the types, a female 12 mm. long, and a male 11 mm. long, 103 female paratypes 8.5 to 12.5 mm. in length, and 73 male paratypes 9 to 11.5 mm. in length. I collected them from a salt water nipa swamp near Capiz, Capiz Province, Panay, Philippine Islands.

From the succeeding species this one differs markedly in form, physiognomy, and coloration.

Mistichthys mindanensis Herre, new species.

Dorsal III- I-6 or 7; anal I-9 to 12, usually 9 or 10; pectoral 14; scales in longitudinal series 24; scales from second dorsal origin to that of anal, 6; no predorsal scales. The second dorsal origin is behind that of the anal and opposite the base of the first or second branched anal ray. In all related species of this and other genera the second dorsal and anal origins are either opposite or the second dorsal is slightly in advance of the anal.

Males have the dorsal profile of the slender elongate body slightly convex, the ventral profile nearly straight; gravid females have the dorsal profile gently convex to more or less humped, the abdomen strongly distended laterally and downward. The head is large, blunt, broader than the trunk except in females about to spawn, usually 3.5 times in the length, but in females contained up to 3.9 times. The depth in males is 5 to 5.8 times, in spawning females 4 to 4.25 in the length. The rounded caudal is 3.5 to 4, the pointed pectoral 4.2 to 4.6 in the length. The large eye is in the anterior part of the head, in which it goes 2.7 to 3 times; the nearly flat interorbital equals the eye in females but is narrower in males; the very short snout is 2.5 times in the eye. The mouth is strongly oblique, the lower jaw prominent, its tip forming part of the dorsal profile; in females the angle of the maxillary may reach a vertical from the front margin of the eye, or be a little more or less than this; males have the mouth more nearly vertical, the maxillary angle usually not extending beneath the front margin of the eye, and never beyond it in the specimens examined.

Males have an outer row of 6 large caniniform teeth, three on each side, at the front of the lower jaw, the second tooth on each side largest;

behind these is a pair of very small symphyisial canines, and a long inner row of minute teeth clear around the jaw; in the upper jaw is an outer row of 6 or 7 moderately large teeth on each side (12 or 14 in all), with a long row of excessively fine teeth behind it. Females have a row of 16 to 20 small teeth in the upper jaw; in the lower jaw an outer row of 20 to 30 teeth and an inner row of very minute teeth extending from far back on the jaw almost to the symphysis. In both sexes the tip of the tongue varies from slightly rounded or nearly truncate to moderately bilobed.

The low first dorsal extends but little more than half way to the second dorsal when depressed, separated from it by 2 or 3 scales, its longest spine equal to or a trifle longer than the eye; the second dorsal height is 8 times in the length in females, 5.5 to 5.8 in males; the anal height is 6.6 to 7 times in the length; the second dorsal and anal fall far short of the caudal when depressed. The ventrals form a very narrow elongate tube, not like the ordinary goby ventrals, 8 to 8.75 in the length in females, but noticeably longer in males, 6.6 to 7 times in the length. The least depth of the caudal peduncle is twice in its own length. The length of the thick, bluntly rounded genital papilla of females scarcely equals the diameter of the pupil; the very slender pointed male papilla is less than a pupil diameter.

Gravid females contain about 50 large eggs which are polyhedral while in the ovaries, but become circular or nearly so when released, .3 to .4 mm. in diameter. On one side are many villi or short filaments, with a tuft of longer filaments at the micropyle. These filaments are much shorter than those shown by Dr. Lois TeWinkel in her paper on *Mistichthys luzonensis*, and are less than an egg diameter in length.

The color in alcohol is dull neutral gray, with a fine black line from beneath the pectoral to the middle of the caudal base; a row of brown dots on top of the head and along the median dorsal area, and a row of black dots from the under side of the head and beside the anal base to the caudal; the fins are all colorless. In life this fish is practically transparent, and in the paler preserved specimens the brain is perfectly visible.

Described from a type female 10.5 mm. long and 26 other females 9.5 to 13 mm. in length; all are about ready to spawn except several about 10 mm. long which have already spawned; a type male 10.5 mm. long, and 8 other males 9.5 to 10.5 mm. long, and one juvenile male of 8.5 mm., which is the only specimen not sexually mature. They were collected from salt water puddles around the base of nipa palms near the Fisheries Station at Zamboanga, Mindanao.

KEY TO THE SPECIES OF MISTICHTHYS

- A.—Confined to fresh water—Lake Buhi, Luzon. . . *M. LUZONENSIS*
 AA.—Living in salt water swamps
 B.—Anal not in advance of second dorsal; many stellate melanophores on head and body. *M. PANAYENSIS*
 BB.—Anal in advance of second dorsal; no black stellate melanophores; a few brown dots above and a row of black dots on under side. *M. MINDANENSIS*

Aurich gives *Gobiopterus luzonensis batonensis* Bunag, from Lake Bato. This is a large shallow lake, 250 or 300 feet lower than Lake Buhi, and receives the outlet of the latter lake. This stream is swift and full of rapids. Aurich gives no description, but from his figure *batonensis* seems to be an entirely different fish from *luzonensis*, not even a member of the same genus.

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