

SHORTER ARTICLES.

THE SMALLEST KNOWN VERTEBRATE.

THE United States has borne the distinction of having, in certain cyprinodont fishes of the Southern States, the smallest known fishes and at the same time the smallest known vertebrates. Thus, *Heterandria formosa* Agassiz, found from South Carolina to Florida, has an average length of 25 mm. for females and 18 to 19 mm. for males. *Lucania ommata* (Jordan), recorded only from Florida, probably never exceeds an inch in length; two males, the only ones thus far found,* measured 19.5 and 20 mm., and two females from the same locality were 20 and 22 mm. long, exclusive of caudal fin. Of this species Dr. O. P. Hay† remarked that 'it may contend with *Heterandria formosa* for the honor of being the smallest known vertebrate.' Another diminutive member of the cyprinodontids is the well-known viviparous *Gambusia affinis*, the adult males of which sometimes barely exceed 12.5 mm. in length, although the females reach a length of 50 mm. In this family are several other species that are scarcely larger than those before mentioned. The pigmy percoidean, *Elassoma evergladei* Jordan, of the swamps of Georgia and Florida, ranges from less than 20 mm. to a maximum of about 33 mm. in standard length, and several of the darters are no longer. Among the marine fishes, there are a number of gobies whose length is barely 25 mm. The smallest of the known marine vertebrates, however, is probably the lancelet, *Acymmetron lucayanum* Andrews, from the Bahamas; examples taken by the *Fish Hawk* in Porto Rico are about 19 mm. long, although Dr. Andrews' types in the National Museum are nearly a third smaller.

The United States Fish Commission has recently received from the Philippine Islands numerous specimens of a species of fish now to be described which has a maximum size less than the minimum adult size of most of the foregoing species, while the minimum and average sizes for mature individuals are thought to be less than those of any other

known fish or other vertebrate. The specimens were obtained, through the courtesy of the Surgeon-General of the army, by medical officers connected with the military hospital at Buhi, southern Luzon, in the department of Camarines Sur; and were collected in Lake Buhi, to which the species is said to be peculiar.

The fish is a member of the great cosmopolitan goby family, of which upwards of 600 species are known; and exhibits peculiar characters which necessitate the creation of a new genus for its reception. The diagnostic features of this genus, for which the name *Mistichthys* (*μειστος*, the smallest) is proposed, are coalescent ventral fins not adnate to the abdomen, two well-separated dorsal fins of which the anterior contains three weak spines, a single series of conical teeth in each jaw, body covered with large ctenoid scales, and an elongated genital papilla by the shape of which the sexes may readily be distinguished.

This species, to which the name *Mistichthys luzonensis* is given, and which will be more fully described in a forthcoming paper in the Fish Commission Bulletin, is apparently nearly transparent in life, with a black chin, a black median line behind the anal fin, and a few black spots on the back. It is probably viviparous or ovo-viviparous; but while many of the specimens contain ripe ovarian eggs (some of which have been discharged in the preserving medium), no eggs exhibiting evidences of development have been found. The females are slightly larger than the males and average 13.5 mm. in length; the maximum for egg-bearing fish is 15 mm. and the minimum less than 12 mm. The average length of males is about 12.5 mm., the maximum is 13.5 mm., and the minimum is under 10 mm. The average length of 50 specimens taken at random, both sexes about equally represented, was 12.9 mm.

A fact of more than ordinary interest in connection with this diminutive species is that it is a food-fish of considerable importance. Dr. George A. Zeller, acting assistant surgeon U. S. A., writing from the military hospital at Buhi, says:

"I enclose herewith samples of a strange

* Woolman, *Bulletin U. S. Fish Comm.*, 1890.

† *Proc. U. S. Nat. Mus.*, 1885.

article of diet greatly relished by the Bicol, among whom I have been stationed for the past eighteen months. Rice and fish are the staple articles of diet for most Filipinos and in the provinces of the Camarines there is little variation from these two. Fishes of every size and many varieties are prepared in every conceivable form, but the samples enclosed are unique in that they are found here and nowhere else. * * * Many varieties of fish abound in the lake, but by far the most numerous are these minute specimens. They are called in the native Bicol tongue *sinarapan*, and when dried in the sun on a leaf are called *badi*. They are caught by a large sheet of close web, which is dipped under wherever a school congregates. They are put into tightly woven baskets from which the water soon drains, leaving a compact mass of fish. They are not minnows or immature fish. They are adults and attain no greater size. The natives buy them eagerly; and when the little fleet of fishermen return from their morning's quest and place their baskets upon the ground on the market place, they are instantly surrounded by a crowd of waiting children who, armed with every sort of dish, are anxious to take home the family meal. They bring three or four potato tubers, a handful or two of rice, or a few copper pennies, and in exchange receive about a pint of fish. In the kitchen the fish are made up with peppers or other spiced herbs, and they do not taste bad. The soldiers have become quite fond of this food, and liberally patronize the little native restaurants where it is served."

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DINOSAURS IN THE FT. PIERRE SHALES AND
UNDERLYING BEDS IN MONTANA.

In the summer of 1900 I made a collection of Dinosaur and Mosasaur remains from the Ft. Pierre beds, near Fish Creek, in Sweet-grass County, in Montana. I have not noticed any account of the collecting of Dinosaurs from this horizon.

The beds are composed of dark-colored shales, with occasional very thin lenses or layers of sand. Sometimes the shales have no

grit, sometimes they contain much fine sand. There are many brown or grayish, rounded concretions or concretionary layers. These concretions are often very hard. In these are many of the fossils, both vertebrate and invertebrate. The mollusca are principally the well-known, characteristic Ft. Pierre forms such as Ammonites, Baculites, Scaphites, Nautali and many smaller forms.

In this locality the weathered surface of the beds forms a rolling, grass-clad prairie with occasional ravines cutting into the soft shales. The bones are sometimes found in these ravines and 'cut banks' and sometimes among the grass roots, some of the bones projecting above the short grass.

The harder sandstones in the formation above form a line of bluffs or 'rim-rock' which for many miles marks the southern boundary of the Ft. Pierre shales. There are also dark shales interbedded with these sandstones. This formation contains leaf impressions and many fragments of Dinosaur bones, but the fossils have not been studied and no characteristic ones were recognized.

Below the Ft. Pierre shales are hard, rather thin-bedded sandstones with interbedded shales. Still lower are hard and soft sandstones, the latter predominating. These contain plant impressions, fossil wood, a few apparently fresh-water or brackish-water shells and Turtle and Dinosaur bones. The latter, many of them, were in a beautiful state of preservation, but no nearly complete skeletons were found. In these beds are bands of peculiar black or very dark, hard nodules, that look something like basalt. These sometimes contain bones. The Dinosaur remains are of the *Claosaurus* type.

From the Ft. Pierre beds the greater part of the skeleton of one Dinosaur and a good number of bones of another were obtained, besides the skull and other parts of Mosasaurs. The more complete Dinosaur skeleton is in the museum of the University of Montana. It undoubtedly is a *Claosaurus*. The other portion of a skeleton is in my collection. It is much smaller and was undoubtedly quadrupedal in gait. The sacrum is nearly complete and is different from anything else that I have seen.