

A New Miocene Ponyfish of the Genus *Leiognathus* (Pisces, Leiognathidae) from Tottori Prefecture, Japan

By

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Abstract A fossil fish collected from the Middle Miocene bed at Miyanoshita in Tottori Prefecture, Japan is described here as a new species, *Leiognathus tottori* sp. nov. This new species is characterized by having a deep body (about two times contained in standard length), minute scales on cheek, the serrated anterior edge of the 2nd dorsal spine, and 3 canine-like teeth on the premaxilla.

Introduction

The fossil fish described here was collected by Mr. Toshiteru MARUO from a bed belonging to the Middle Miocene Iwami Formation of the Tottori Group (UEMURA *et al.*, 1979), at Miyanoshita, Kokufu-cho, Tottori Prefecture, Japan. Characters of the specimen were carefully compared with those of species belonging to three genera of the family Leiognathidae in the order Perciformes: *Leiognathus*, *Gazza*, and *Secutor*, for the fossil specimen has diagnostic characters of the family as described below.

The bed of the fossil locality at Miyanoshita has yielded many other fish remains including several species of clupeid fishes, the queen fish *Scomberoides maruoi* UYENO and SUDA (1991) of the family Carangidae, the lefteye flatfish *Paralichthys yamanai* SAKAMOTO and UYENO (1993) of the family Paralichthyidae, indicating that the bed was formed in a warm temperate, shallow marine environment.

As far as the present authors are aware, within this family, two other fossil species have been previously reported: *Leiognathus altapinnus* (WEILER, 1955) from the Middle Oligocene of northern Switzerland and the Caucasus, (DANIL'CHENKO, 1960), and *Leiognathus uinutsu* DANIL'CHENKO (1980) from the upper Oligocene of Azerbaidzhan.

Systematic Description

Class Osteichthyes

Order Perciformes

Family Leiognathidae

Genus *Leiognathus* LACEPÈDE, 1803

Leiognathus tottori sp. nov.

(New Japanese name: Tottori hiiragi)

(Figs. 1–2, 4, Pls. 1–2, 4)

Holotype: Museum of Nature and Human Activities, Hyogo, no. D1-002684.

Diagnosis: *Leiognathus tottori* is distinguished from all other species of the genus by the combination of the following characters: the body is very deep and contained about two times in the standard length, anterior edge of the 2nd dorsal spine is serrated, three canine-like teeth are present on the premaxilla, minute scales are present on the cheek region.

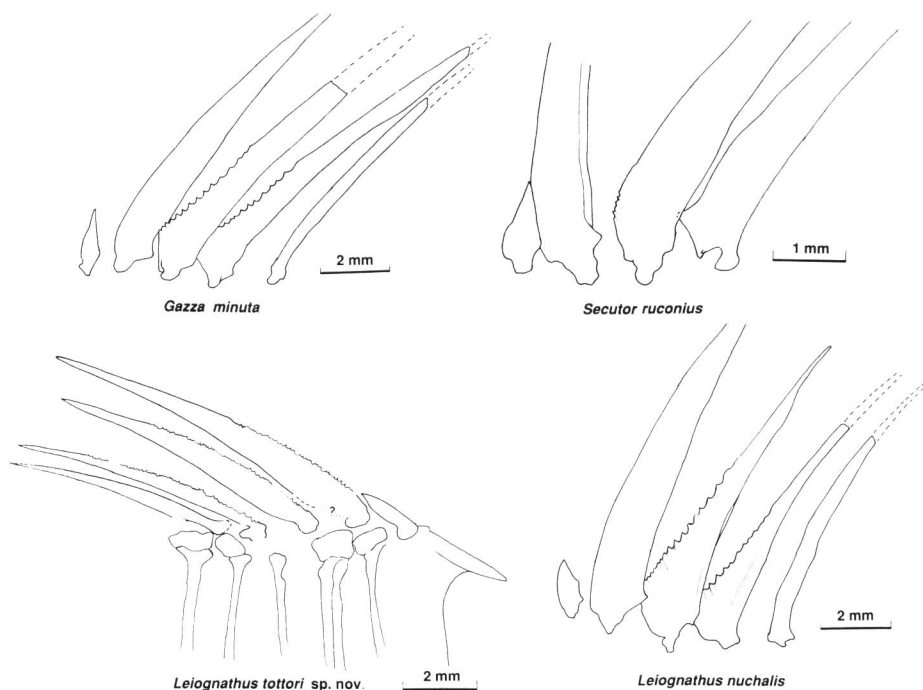


Fig. 1. Comparison of the dorsal spines of fossil and Recent leiognathids.

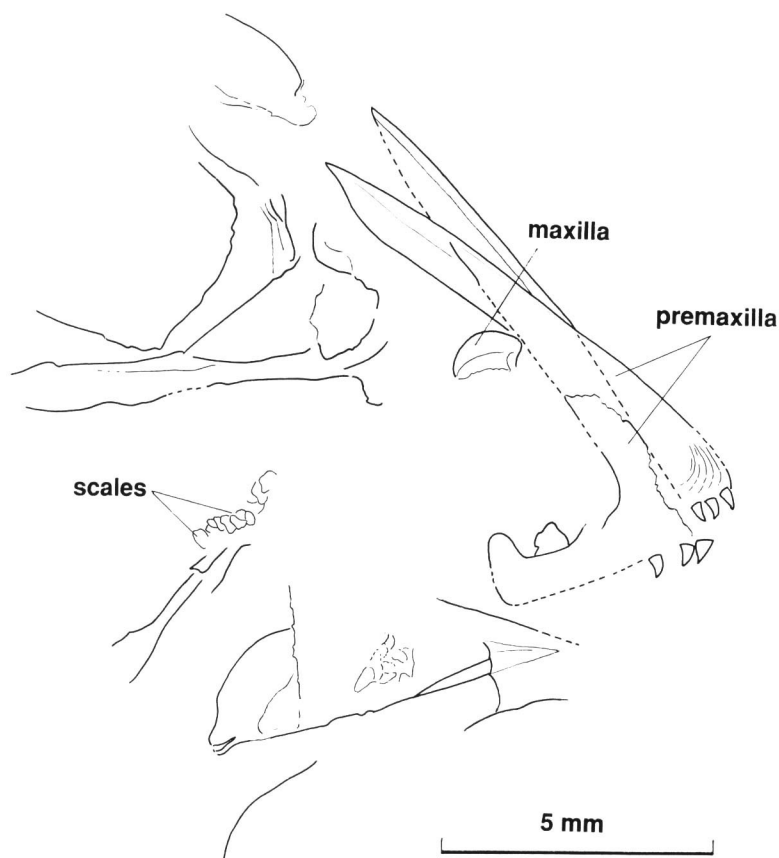


Fig. 2. The anterior part of the head region of *Leiognathus tottori* sp. nov.

Description: The body is deep, and the depth is 51% of the standard length. The head length is 34% of the standard length. There are scales on the cheek region below the orbit. The anterior dorsal spines are robust, and except for the upper end, the anterior edges of the 2nd to 4th spines have serrations (Fig. 1). The ascending process of the premaxilla is long and slightly curved (Fig. 2), and makes an acute angle with the dentigerous surface. The premaxilla has 3 canine-like teeth (Fig. 2). Whereas the upper region of the maxilla is observable, the lower jaw bones are not well preserved.

The eye is large; the distance between the anterior and posterior edges of the orbit is 32% of the length of the neurocranium. The supraoccipital crest is well developed and protrudes dorsoposteriorly (Fig. 3, Pls. 3, 4). The dorsal fin has 8 spinous rays and 16 soft rays. A single supraneural bone has the upper part bent slightly forward, and its lower end reaching to the first neural spine (Pls. 1, 4). The

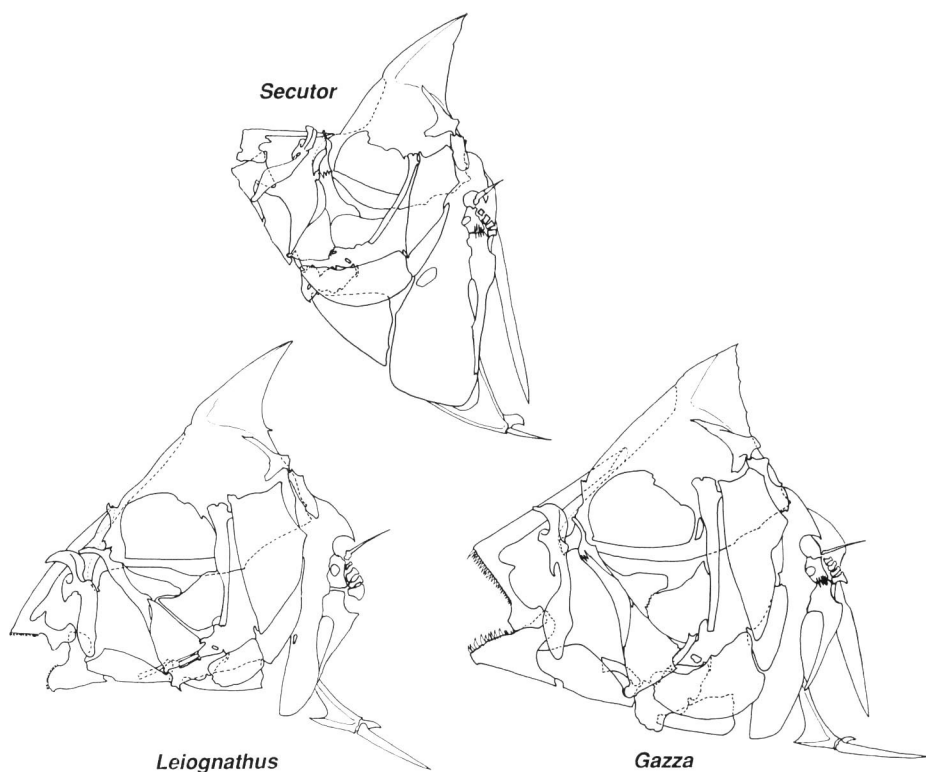


Fig. 3. Comparison of the skeletons of the head region within three genera of the family Leiognathidae. Preopercles are removed.

anal fin has 3 spines and 14 soft rays. These meristic characters are fairly constant among leiognathid fishes.

The number of the vertebrae is 24 with 10 abdominal and 14 caudal vertebrae. The caudal fin rays are 17 including 2 unbranched rays. It has 7 ribs (Pl. 1). Proximal pterygiophores of the dorsal and anal fins have a central ridge with broad thin wings both anteriorly and posteriorly. The first anal proximal pterygiophore is large and reaches close to the caudal vertebra, and its anterior end receives the lower ends of the 2nd to 5th ribs (Pls. 1, 4).

The lower rim of the cleithrum is narrow, and the lower end of the coracoid is attached to the cleithrum. The pelvic girdle is deep, and the anterior end is divided into two rims (Pls. 1, 4). A few branchiostegal rays are observable but obscure. The neural and hemal spines of the 4th preural vertebra are broadened in a shape of an oar, but the ones of 5th vertebra are not broadened (Fig. 4, Pl. 2). Three hypurals are present: hypural 1+2, 3+4 (fused to form large bony plates), and 5 (Fig. 4, Pl. 2). It appears that the lower edge of the hypural 1+2 is thickened. Hypural 5 is

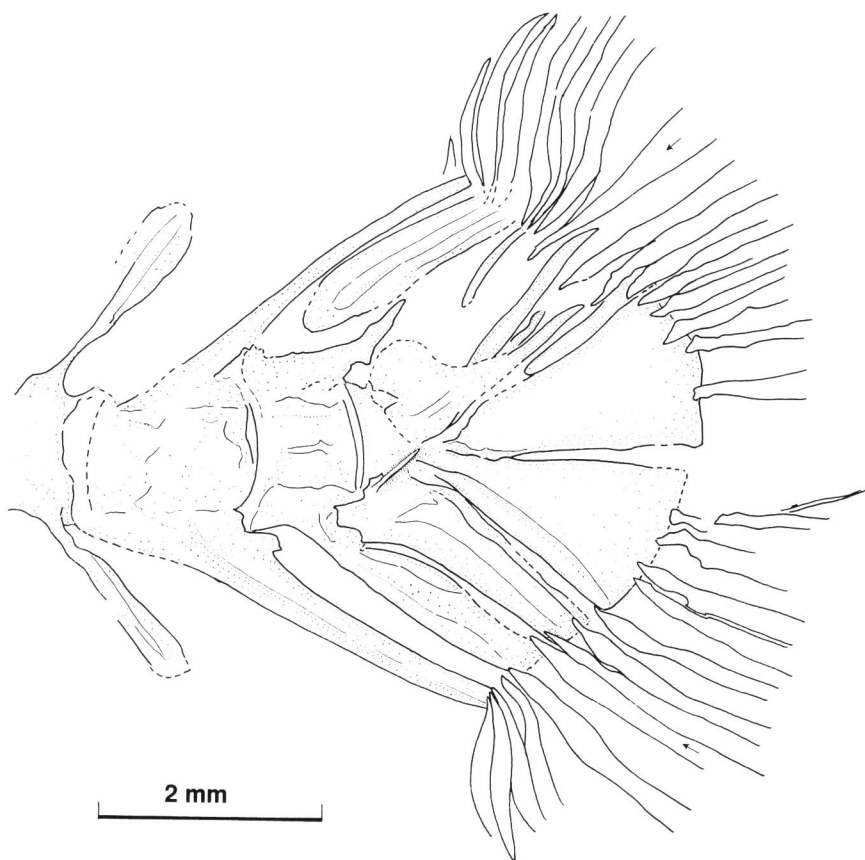


Fig. 4. The caudal skeleton of the holotype, *Leiognathus tottori* sp. nov.

rod-like. There are 3 epurals: the first, large with a central ridge (Fig. 4), 2 and 3 being obscure.

Etymology: The species name *tottori* is from Tottori Prefecture which yielded the holotype specimen.

Remarks

Ponyfishes of the percoid family Leiognathidae are small fish of about 15 cm, distributed in warm shallow waters of the Indo-West Pacific. Of the 21 species in 3 genera found throughout the world, 10 species have been found in the Japanese Archipelago.

The present fossil specimen is identified as a fish belonging to the family Leiognathidae on the basis of the following characters: 1) eight dorsal fin spines and 16 soft rays; 2) presence of the well developed supraoccipital crest; 3) 24 vertebrae,

10 abdominal and 14 caudal; 4) long ascending process of the premaxilla; 5) closeness of the proximal pterygiophores of the dorsal and anal fins respectively with the neural and hemal spines (Pls. 3, 4); 6) presence of a single supraneural bone; 7) neural spines and hemal spines of the 4th preural vertebra are broadened in a shape of an oar (YABUMOTO, 1980).

The present fossil specimen has the following osteological characters that place it in the genus *Leiognathus*: 1) the ascending process of the premaxilla is slightly curved, not being straight as in the genera *Gazza* and *Secutor* (Figs. 2–3, Pls. 1, 3–4); 2) the angle formed by the ascending process and the dentigerous surface is acute (Figs. 2–3); 3) the lower rim of the cleithrum is narrow; 4) the general shape of the neurocranium (Fig. 3, Pls. 1, 4) resembles that of other congeners.

The most distinct character of *Leiognathus tottori* sp. nov. among its congeners is the presence of the serration along the anterior edge of the 2nd dorsal spine and the basal three-fourths of the anterior edges of the 3rd and 4th spines (Fig. 1). In known species belonging to the genera *Leiognathus* and *Gazza*, the basal portion of the anterior edges of only the 3rd and 4th dorsal spines are serrated. In the species of the genus *Secutor*, only the basal portion of the 3rd dorsal spine is serrated (Fig. 1).

Presence of small scales on the cheek region has been considered as a primitive condition (YABUMOTO, 1981) in leiognathid fishes which have luminous organs with luminous bacteria around the esophagus (HANEDA, 1940, 1950; HANEDA and TSUJI, 1972, 1976) faintly illuminating the chest and abdominal region. Presence of scales makes the luminescent organ less efficient. There are only two other leiognathid species known to have scales on the cheek region: *Leiognathus elongatus* and *Secutor ruconius*.

Leiognathus tottori sp. nov. has 3 large canine-like teeth on the anterior portion of the premaxilla. Although there are some species in this genus with slightly enlarged teeth, *L. tottori* uniquely among species of *Leiognathus*, has this condition which is only known in the species of the genus *Gazza*.

Oligocene leiognathid fishes described under the genus *Leiognathus* are quite distinct from species from the Middle Miocene and Recent in general body forms, fin spines and the number of supraneural bones. It appears that there is a distinct morphological gap from the Oligocene forms to the forms that appeared after the Middle Miocene.

Acknowledgments

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Explanation of Plates

- Plate 1.** *Leiognathus tottori* sp. nov., holotype. Museum of Nature and Human Activities, Hyogo, no. D1-002684. From the Middle Miocene Iwami Formation, Tottori Prefecture, Japan. About 65 mm in standard length. Scale shows 10 mm.
- Plate 2.** Dorsal spines and the caudal skeleton of the holotype, *Leiognathus tottori* sp. nov.
- Plate 3.** X-ray photographs of three genera of the family Leiognathidae. Top, *Gazza minuta* from Taiwan, 88.9 mm SL; middle, *Leiognathus splendens* from Philippines, 64.7 mm SL; bottom, *Secutor ruconius* from Philippines, 62.5 mm SL. SL, standard length.
- Plate 4.** A drawing and reconstruction of *Leiognathus tottori* sp. nov., holotype.

