

A New Cretaceous Ganopristoid Sawfish of the Genus *Ischyrrhiza* from Japan

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Abstract A rostral spine of a sawfish was discovered from Iwaki City, Fukushima Prefecture, Japan. The bed yielded the fossil remain belongs to the Tamayama Formation, Futaba Group in the Late Cretaceous. This fossil was found to represent a new species, *Ischyrrhiza iwakiensis*, belonging to the family Sclerorhynchidae of the order Rajiformes. This new species differs from other members of the genus having a robust and expanded root of the rostral spine; nearly straight crown; cutting edges round at the anterior surface and sharp and smooth at the posterior surface; articulating surface forming a shallow depression almost closed at the anterior and posterior ends. This fossil represents the first record of the ganopristoid sawfish from Japan.

Introduction

A rostral spine of the Cretaceous sawfish, *Ischyrrhiza iwakiensis* n. sp. was found in Iwaki City, Fukushima Prefecture, Japan. It was collected with remains of plesiosaurian reptiles, sea turtle, ammonites, and *Inoceramus*.

The saw fish was discovered in September, 1981, from the sandstone bed belonging to the Tamayama Formation which covers the Kasamatsu Formation and Ashizawa Formation in the Futaba Group (Santonian-Coniacian). The horizon of the bed yielded the fossils belonging to *Inoceramus amakusensis* Subzone of the Lower Santonian (Upper Urakawa Series) of the Upper Cretaceous (OBATA *et al.*, 1970). Numerous shark teeth and specimens of teleostean enchodontid fishes (Fig. 1, E–H) were yielded also together with the rostral spine.

TOKUNAGA and SHIMIZU (1926) reported on fossils of marine reptiles, *Plesiosaurus* and *Basilemys* from the Futaba Group of the eastern margin of Abukuma Mountain Range in the northern Honshu, but the specimens were destroyed by fire during the World War II. In 1968, T. SUZUKI found remains of a plesiosaurian reptile (OBATA *et al.*, 1970). Since the fossil of the reptile is the best preserved specimen of the group in Asia, the skeleton was reconstructed and exhibited in the National Science Museum, Tokyo.

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Description

Class Chondrichthyes

Subclass Elasmobranchii

Order Rajiformes

Family Sclerorhynchidae CAPPETTA, 1974

Genus *Ischyrrhiza* LEIDY, 1856

Ischyrrhiza iwakiensis n. sp.,

(Figs. 1–3)

Material. Iwaki City Museum of Coal and Fossils no. 116. A rostral spine, probably of the left side.

The dorsal profile is an elongated triangle with a round anterior cutting edge and a sharp blade-like posterior cutting edge which is single. The surface of the crown is covered with enameloid material. The two third of the crown is broken, but the root is complete. The distal tip of the crown is partially broken.

The root is surrounded by short grooves and ridges which run from the base toward the tip. The number of the ridges is 12 on the dorsal half, and 16 on the ventral half. The grooves are more deeply sculptured on the one side which appears to be the dorsal surface. The dorsal surface of the root is depressed at slightly anterior to the center. There are three strong and long ridges developed near the posterior surface. The posterior groove is deep and long reaching the base of the crown.

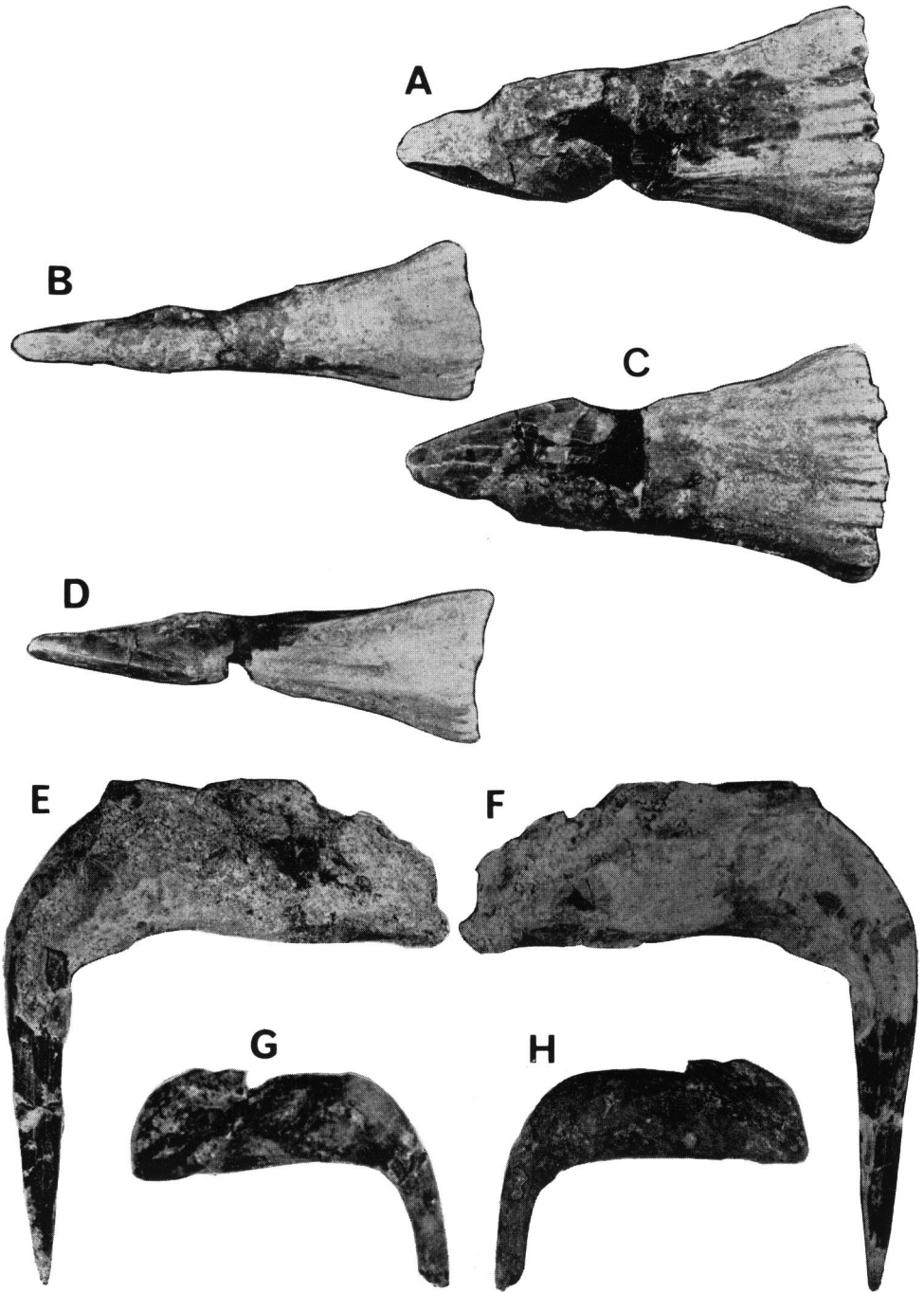
At the ventral surface of the root, the central part is slightly depressed. The posterior part is somewhat swollen and broad. The attaching surface of the root to the rostral process of the fish is depressed forming a broad depression, and surrounded by ends of ridges. The depression is closed at the anterior and posterior margins forming a basin.

The anterior half is narrower than the posterior half which is slightly expanded (Fig. 3). A portion of the basal part of the crown is missing.

The area of the root between the base of the crown and the area with ridges and grooves are relatively smooth. The ridges and grooves run slightly inclined backward from the basal end of the root to the posterior cutting edge. The antero-posterior direction of the rostral spine are identified on the basis of the direction of these ridges. The dorsal surface appear to have deeper grooves than the dorsal surface. The posterior edge of the root has a slightly acute curve around the ridged area, but the curve of the anterior surface is rather smooth and gentle.

Measurements. The length from the tip of the broken crown to the middle of the basal end of the root is 43 mm, and probably about 2 mm is missing beyond the end

Fig. 1. A–D, Rostral spine of *Ischyrrhiza iwakiensis* n. sp. from the Upper Cretaceous in Japan. A, dorsal view; B, anterior view; C, ventral view; D, posterior view. E–H, Palatine teeth of *Enchodus* spp. from the same locality. E, lateral view of a left tooth; F, mesial view of a left tooth; G, lateral view of a right tooth; H, mesial view of a right tooth.



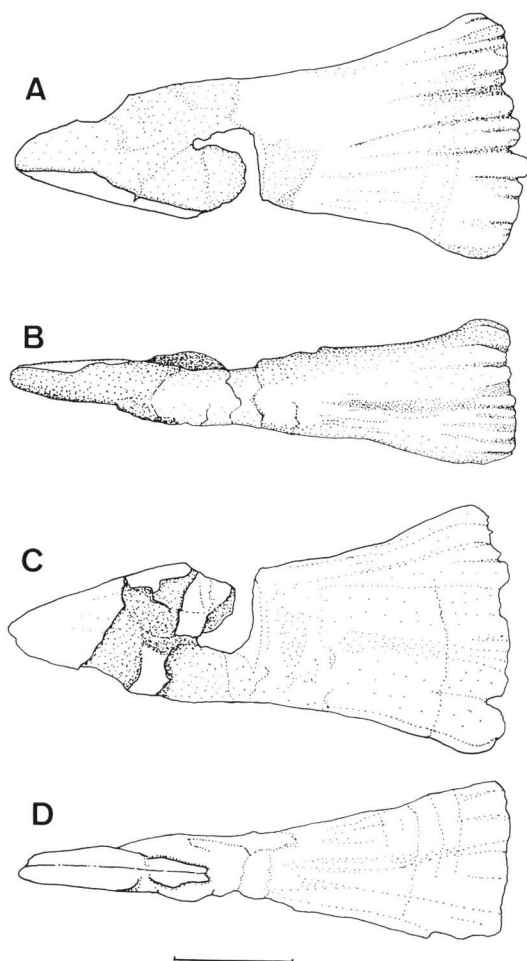


Fig. 2. Drawings of the rostral spine of *Ischyrrhiza iwakiensis* n. sp. from the Upper Cretaceous in Japan. A, dorsal view; B, anterior view; C, ventral view; D, posterior view. The scale indicates 10 mm.

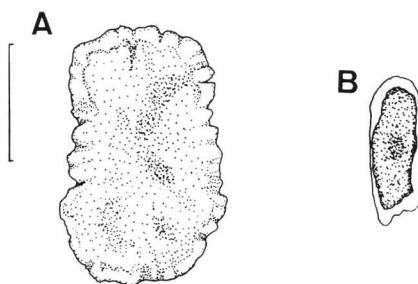


Fig. 3. Drawings of the attaching surface of the root of the rostral spine. A, *Ischyrrhiza iwakiensis*, n. sp.; B, *Pristis pectinatus*. The scale indicates 10 mm.

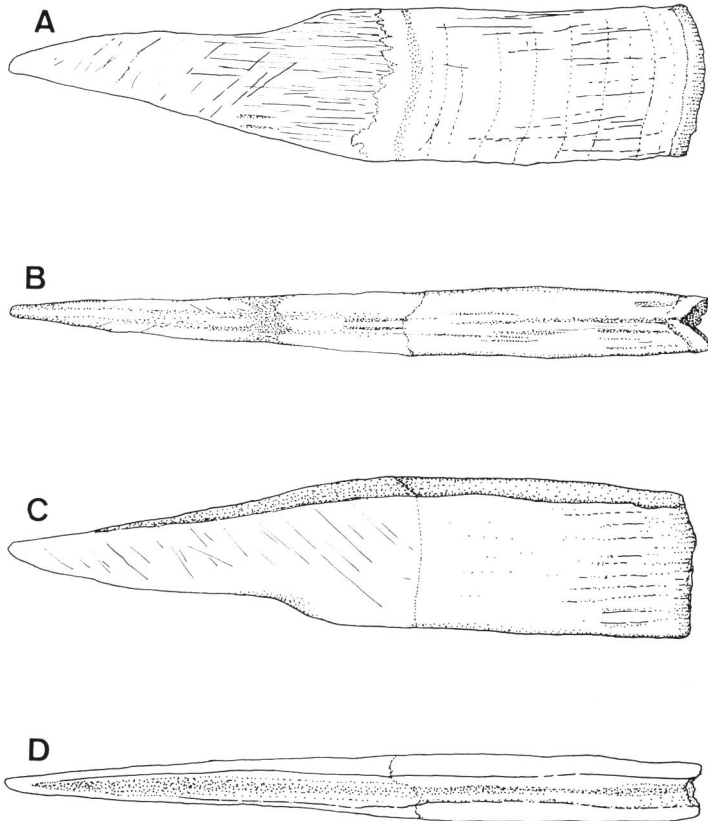


Fig. 4. Drawings of a rostral spine of *Pristis pectinatus*. A, dorsal view; B, anterior view; C, ventral view; D, posterior view. The length is 60 mm.

of the crown in this specimen. This means that the total length of the rostral spine was probably 45 mm. The distance between the anterior and posterior ends at the attaching surface is 21.5 mm. The width at the base of the crown is 11.1 mm.

Diagnosis. *Ischyrhiza iwakiensis* n. sp. differs from other members of the genus having a robust rostral spine with a large expanded root and a large nearly straight crown covered with enameloid material. At the attaching surface of the spine, the central depression is almost closed at the anterior and posterior ends forming a shallow basin.

Concluding Remarks

The rostral spine (often called as rostral tooth) here described resembles specimens figured and reported as *Ischyrhiza mira* LEIDY from North America (McNAULTY

and SLAUGHTER, 1954; CASE, 1973) and Africa (CAPETTA, 1972). However the attaching surface of the rostral spine of *I. mira* forms a deep groove which is open at the anterior and posterior ends (Case, 1973: 26), whereas this surface forms a shallow depression which is almost closed at the anterior and posterior ends in *I. iwakiensis*. The specimen from Iwaki differs from North American specimens in the strongly expanded and robust root, and straight crown.

Concerning the family placement of *Ischyrrhiza*, the present authors agree with the scheme proposed by CAPETTA (1972), which was constructed on the idea that the rostral spines of the Pristidae, Recent sawfish, and *Ischyrrhiza* and other members of the family Sclerorhynchidae are result of a parallel evolution. The attaching surface of the rostral spine of a Recent specimen of *Pristis pectinatus* (Figs. 3–4) is soft and not strongly formed as in *Ischyrrhiza*, suggesting the phyletic difference in the Pristidae and Sclerorhynchidae.

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