Hippoglossoides kumaishi, a New Miocene Righteye Flounder from Oshima Peninsula, Hokkaido, Japan

By

Kazuo SAKAMOTO¹ and Teruya UYENO²

¹Department of Zoology, University Museum, University of Tokyo ²Department of Geology, National Science Museum, Tokyo

Abstract A righteye flounder fossil was found in the Miocene Esashi Formation, Kumaishi, Oshima Peninsula, Hokkaido, Japan. It is designated as the holotype for a new species of the genus *Hippoglossoides* in the family Pleuronectidae of the order Pleuronectiformes on the basis of its 13 abdominal and 41 caudal vertebrae, and about 3.5 upper jaw length of the ocular side included in the head length.

Introduction

A righteye flounder fossil was found at Kumaishi, Oshima Peninsula, southern Hokkaido. The fossil was discovered in the Miocene rock belonging to the Esashi Formation. It is described as a new species of the genus *Hippoglossoides* in the family Pleuronectidae of the Pleuronectiformes.

In the present paper, the fossil is described in detail and compared with all species of the genus *Hippoglossoides* known to date.

Locality

The specimen was collected by Messrs. Tomoyuki Shibata and Kenji Kizaki at the upstream of the Seishido River, Kumaishi-cho in Oshima Peninsula, Hokkaido (Fig. 1). It was yielded from the bed belonging to the Esashi Formation of the Miocene (HATA, 1975).

Systematic Paleontology

Class Osteichthyes
Order Pleuronectiformes
Suborder Pleuronectoidei
Family Pleuronectidae
Subfamily Pleuronectinae
Genus Hippoglossoides Gottsche, 1835
Hippoglossoides kumaishi sp. nov.

(Figs. 2-6)

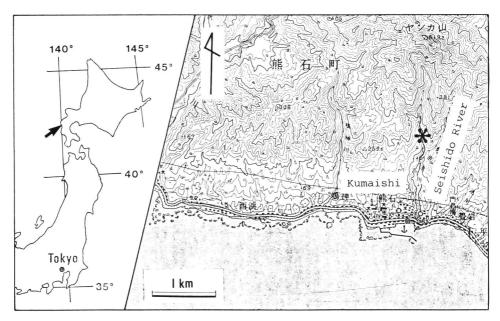


Fig. 1. A map of the locality yielded a new Miocene righteye flounder *Hippoglossoides kumaishi* sp. nov.

Holotype: National Science Museum catalogue number NSM PV-19654. Standard length is about 15 cm.

Diagnosis: A species of Hippoglossoides with 13 abdominal and 41 caudal vertebrae, and about 3.5 times of the upper jaw length of the ocular side included in the head length. Description: The specimen is well preserved, and consists of four blocks including its counterpart. The body is rather slender, and its depth is about 0.8 in the head length.

The head region is fairly well preserved and several bones are identifiable. The head length is about 4 cm. The mouth is rather large: the upper jaw length on the ocular side is about 3.5 in the head length. In the upper jaw, the premaxillary and maxillary on the ocular side are well preserved. The traces of the teeth arranged in a single row are observable on the premaxillary (Fig. 3). In the lower jaw, the dentary and articular of the ocular side are observed, and the traces of several teeth are recognizable on the dentary.

Both eyes with well preserved melanophores are located on the right side of body: the lower eye is in advance of the upper one.

Some elements of the cranium are preserved, but they are not identifiable because of the poor condition of the fossil.

Several bones in the suspensorial and opercular regions are observed, but it is difficult to identify each element due to its poor condition, excepting the quadrate and opercle.

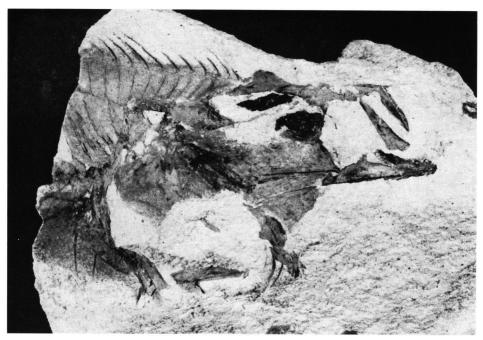


Fig. 2. A new Miocene righteye flounder, *Hippoglossoides kumaishi* sp. nov., NSM PV-19654, from the Miocene Esashi Formation, Kumaishi, Hokkaido, Japan. About 15 cm in standard length.

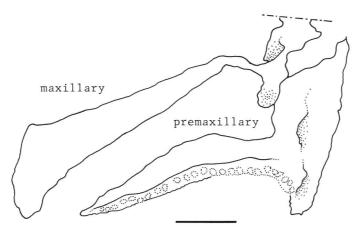


Fig. 3. Upper jaw of Hippoglossoides kumaishi sp. nov. Scale indicates 2 mm.

In the hyoid region, the hypohyal and the ceratohyal with three incomplete branchiostegal rays are observable, though their shapes are not clear.

The urohyal, which is fish-hook like in shape, is fairly well preserved. The angle between the main and sciatic parts is about 50 degree.

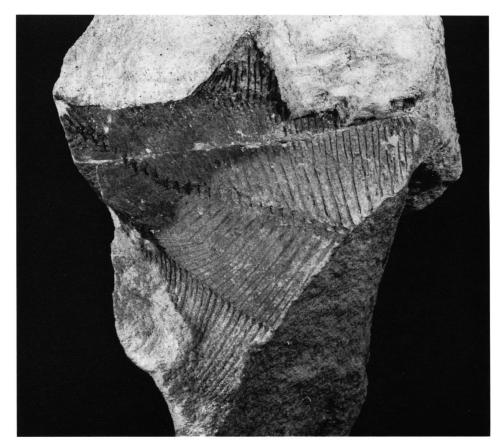


Fig. 4. Caudal region of Hippoglossoides kumaishi sp. nov.

Twenty-nine dorsal fin rays and 57 proximal pterygiophores are counted (their total numbers are not estimated). Two proximal pterygiophores are usually inserted between each of the adjacent neural spines excepting anterior eight. The first proximal pterygiophore bears two fin rays.

Sixty-three anal fin rays are countable, but the total number cannot be estimated. Of 58 proximal pterygiophores countable, the two are usually located between two adjacent haemal spines, excepting several anterior ones. The anteriormost anal proximal pterygiophore, which is enlarged and elongated, is attached to the anterior surface of the first haemal spine. Its anteroventral end curves forwardly.

In the shoulder girdle, the cleithrum and some pieces of fin rays are observed. Two incomplete postcleithra on both sides of body lacking their ventral ends are placed parallel in position.

Of the pelvic girdle, the incomplete basipterygiophore and two pieces of fin rays are observed.

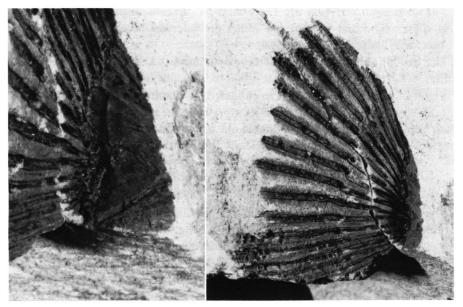


Fig. 5. Caudal skeleton and rays of *Hippoglossoides kumaishi* sp. nov. The left photograph shows that some hypurals are clearly fused with one another.

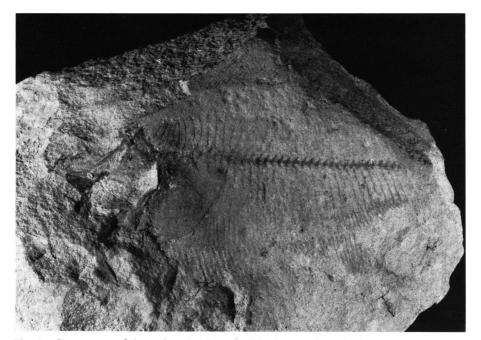


Fig. 6. Counterpart of the regions in Figs. 2 and 4 of Hippoglossoides kumaishi sp. nov.

The abdominal vertebrae are 13 in number. Each centrum has a well developed neural spine. The first four neural spines are laterally broad. Two pieces of ribs are observable under 5th and 6th centra.

The caudal vertebrae with well developed neural and haemal spines are 41 in number.

Eighteen segmented rays of the caudal fin without their posterior portions are countable. Almost all hypural elements supporting the fin are remained, but the shape of each element is not acurately definable due to the condition of the fossil. However, it is observed that some hypurals are clearly fused with one another (Fig. 5).

Consideration

The present species is included in the family Pleuronectidae of the suborder Pleuronectoidei, the Pleuronectiformes, in having the following characters: both eyes are on the right side of body, the postcleithrum is present, the first proximal pterygiophore of the anal fin ray is enlarged, and some hypurals are fused with one another (NORMAN, 1934; Hubbs, 1945; Ochiai, 1966; Amaoka, 1969, 1972; Hensley and Ahlstrom, 1984; Sakamoto, 1984b). Also, the presence of the well developed first neural spine indicates that it is a member of the subfamily Pleuronectinae defined by Sakamoto (1984b). Judging from its rather large mouth with a single tooth row on the upper jaw of the ocular side, it is clearly related to the members of the following genera (Sakamoto and Uyeno, 1989); *Psettichthys, Hippoglossoides* and *Acanthopsetta* (Table 1). According to Norman (1934) and Sakamoto (1984a, b), these three genera are morphologically distinguishable from one another in the following parts: lachrymal,

Table 1. Vertebral counts of pleuronectines with large mouth and a single row of teeth on upper jaw. *From Niino (1951: no data on tooth row), and others from Sakamoto (1984b) and Sakamoto and Uyeno (1989).

Species	Abdominal					Caudal														Number
	10	11	12	13	14	28	29	30	31	32	33	34	35	36	37	38	39	40	41	of specimens
Psettichthys			11000000																	
melanosticus		10				2	8													10
Hippoglossoides																				
platessoides				11							4	6	1							11
H. elassodon			3	17	1					6	12	3								21
H. dubius				26					2	21	3									26
H. robustus			2	19					2	17	2									21
H. naritai				1																1
H. kumaishi sp. nov.				1															1	1
*Protopsetta kubotai	1								1											1
H. pinetorum	2	32	2			10	21	5												36
Acanthopsetta																				
nadeshnyi	1	27					3	23	2											27

ceratohyal, anterior dorsal fin rays, scales on eyes and supratemporal branch of the lateral line. However, all these characters are not observable in the fossil. Therefore, we used the number of the abdominal vertebrae into consideration for the assignment of this species. The abdominal vertebral number, 13, agrees with those of 5 species of *Hippoglossoides* (Table 1). In addition to this fact, no other characters are available to be considered adequate to establish a new genus, so it is most reasonable to classify the present species into the genus *Hippoglossoides*. Although no discriminative characters within the genus, as shown in Norman (1934), SAKAMOTO (1984a) and SAKAMOTO and UYENO (1989), are observed in the present specimen, it is clearly separable from all Recent species in its large number of the caudal vertebrae (41 in this new species vs. 28–35 in other species) (Table 1).

Concerning the fossil records of the present genus, the present species is distinguished from *Protopsetta* (synonym of *Hippoglossoides*) *kubotai* Niino, 1951 reported from Gunma Prefecture, central Honshu, Japan in the Tertiary (Niino, 1951) in the vertebral counts (13 abdominal+41 caudal vs. 10+31 in that species) (Table 1). Also, it is different from *H. naritai* Sakamoto and Uyeno, 1989 from Tokoro, Okhotsk coast of Hokkaido, Japan in the Middle Miocene (Sakamoto and Uyeno, 1989) in the size of the mouth (upper jaw length of ocular side in head length ca. 3.5 vs. 2.8 in that species).

On the basis of these considerations, we recognized the present species as a new species in the genus *Hippoglossoides*.

Etymology: The species name, kumaishi, is derived from the name of the locality which yielded the fossil.

Acknowledgments

We are grateful to Messrs. Tomoyuki Shibata and Kenji Kizaki, students of Prof. Makoto Kato, Faculty of Sciences, Hokkaido University, who collected the present fossil specimen. Prof. Makoto Kato kindly provided us the specimen and the geological information of the fossil bed.

References

- AMAOKA, K., 1969. Studies on the sinistral flounders found in the waters around Japan. Taxonomy, anatomy and phylogeny. *J. Shimonoseki Univ. Fish.*, **18** (2): 65–340.
- Amaoka, K., 1972. Osteology and relationships of the citharid fish *Brachypleura novaezeelandiae*. *Japan. J. Ichthyol.*, **19** (4): 263–273.
- HATA, M., 1975. Geology of the Kumaishi district. Quadrangle Ser., Scale 1: 50,000, Geological Survey of Japan, 3+34+5 pp., 1 map.
- Hensley, D. A. & E. H. Ahlstrom, 1984. Pleuronectiformes: Relationships. Pages 670–687 in H. G. Moser *et al.* eds. Ontogeny and systematics in fishes. American Society of Ichthyologists and Herpetologists. Special publication number 1.
- Hubbs, C. L., 1945. Phylogenetic position of the Citharidae, a family of flatfishes. *Misc. Publ. Mus. Zool.*, *Univ. Michigan*, (63): 1–33.

- Niino, H., 1951. Description of some fossil fishes and prawns from Japan. *J. Tokyo Univ. Fish.*, **38** (1): 47–58, pls. 1–7.
- Norman, J. R., 1934. A systematic monograph of the flatfishes (Heterosomata). 1. Psettodidae, Bothidae, Pleuronectidae. viii+459 pp., London, Brit. Mus. Nat. Hist.
- OCHIAI, A., 1966. Studies on the comaparative morphology and ecology of the Japanese soles. *Misaki mar. biol. Inst., Kyoto Univ., Spec. Rep.*, (3): 1–97, pls. 1–2. (In Japanese.)
- SAKAMOTO, K., 1984a. Pleuronectidae. Pages 351–354, plates 314–318 *in* H. Masuda *et al.* eds. The fishes of Japanese Archipelago. Tokyo, Tokai Univ. Press.
- SAKAMOTO, K., 1984b. Interrelationships of the family Pleuronectidae (Pisces: Pleuronectiformes). *Mem. Fac. Fish.*, *Hokkaido Univ.*, **31** (1/2): 95–215.
- SAKAMOTO, K. & T. UYENO, 1989. A new Middle Miocene righteye flounder *Hippoglossoides naritai* from Tokoro, Hokkaido, Japan. *Bull. Natn. Sci. Mus., Tokyo, Ser. C*, **15** (2): 71–79.