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Saitamapsetta nomurai gen. et sp. nov., a Righteye Flounder from a Middle Miocene Bed in Saitama Prefecture, Japan

By

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Abstract A fossil of a righteye flounder was found from the Middle Miocene Tsuchishio Formation, Matsuyama Group, Saitama Prefecture, Japan. It is designated as the holotype for a new genus and species *Saitamapsetta nomurai* in the family Pleuronectidae of the order Pleuronectiformes on the basis of the following characters: mouth extremely large and about 1.7 upper jaw length of the blind side included in the head length, teeth arranged in a single row on the upper jaw of the blind side, and 28 caudal vertebrae.

Introduction

A fish fossil was collected at Kawamoto-cho, Saitama Prefecture, Japan. The fossil was discovered in the Middle Miocene rock belonging to the Tsuchishio Formation. It is identified to be a righteyed flatfish of the family Pleuronectidae, and described here as a new genus and species.

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

Locality and horizon

The specimen was collected by Messrs. Kiyoshi and Yukimasa NOMURA at the middle stream of the Arakawa River, Suganuma Kawamoto-cho, Osato-gun, Saitama Prefecture (Fig. 1). It was yielded from the T-3 tuff bed, T-2 sandstone and mudstone member, Tsuchishio Formation, Matsuyama Group of the Middle Miocene (HONMA, 1986).

Systematic Paleontology

Class Osteichthyes

Order Pleuronectiformes

Suborder Pleuronectoidei

Family Pleuronectidae

Subfamily Pleuronectinae

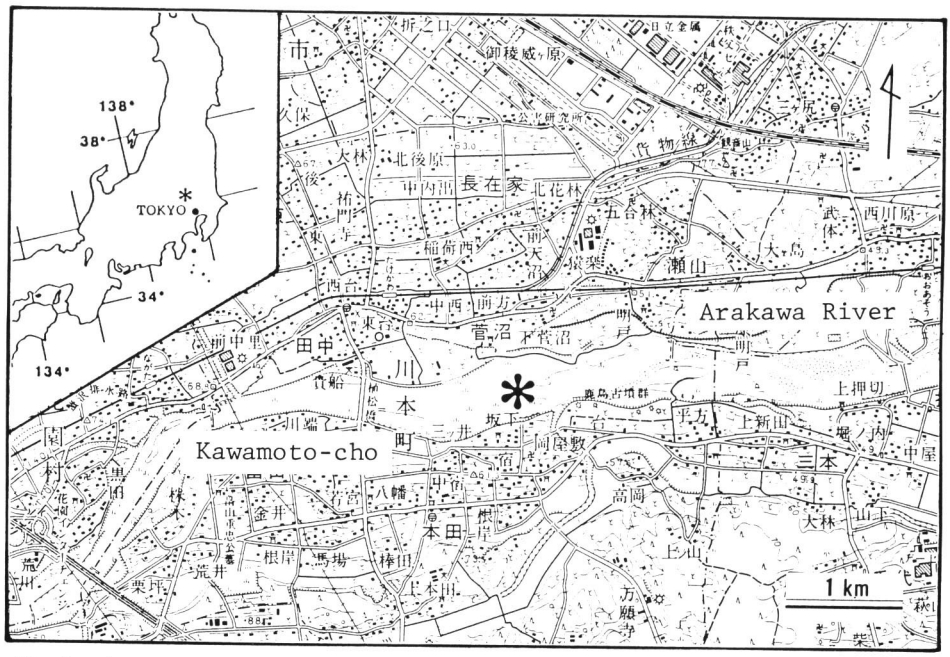

Fig. 1. A map of the locality yielded a new Miocene righteye flounder *Saitamapsetta nomurai* gen. et sp. nov.

Genus ***Saitamapsetta*** nov.

(New Japanese name: Saitama-garei-zoku)

Type species. *Saitamapsetta nomurai* sp. nov.

Diagnosis. This genus is characterized by the following combination of characters: mouth extremely large and about 1.7 upper jaw length of the blind side included in the head length, teeth arranged in a single row on the upper jaw of the blind side, and 28 caudal vertebrae.

Etymology. The generic name, *Saitamapsetta* consists of *Saitama*, the name of the prefecture where the fossil was discovered, and *psetta*, a Greek word meaning flat fish.

Saitamapsetta nomurai gen. et sp. nov.

(New Japanese name: Saitama-garei)

(Figs. 2–5)

Holotype. National Science Museum catalogue number NSM PV-19724. Standard length is about 115 mm.

Diagnosis. Same as the genus diagnosis.

Description. The specimen with slender body is almost complete; depth being

Fig. 2. A new Miocene righteye flounder, *Saitamapsetta nomurai* gen. et sp. nov., NSM PV-19724, from Miocene Tsuchishio Formation, Matsuyama Group, Kawamoto-cho, Osato-gun, Saitama Prefecture, Japan. About 115 mm in standard length.

Fig. 3. Head and caudal regions of *Saitamapsetta nomurai* gen. et sp. nov.

Fig. 4. Counterpart of Fig. 2 of *Saitamapsetta nomurai* gen. et sp. nov.

Fig. 5. Counterpart of Fig. 3 of *Saitamapsetta nomurai* gen. et sp. nov. Arrow indicates the frontal of the blind side.

highest at about two fifths from the anterior tip. Its highest depth is about 2.8 in the standard length and about 0.9 in the head length.

The head region is poorly preserved, but several bones are identifiable (Fig. 3). The head length of the blind side is about 38 mm. The mouth is large: the upper jaw length of the blind side is about 1.7 included in the head length. In the upper jaw preserved only on the blind side, the premaxillary and maxillary are observed. Several teeth observable on the premaxillary are arranged in a single row, though only their basal portions are preserved. In the lower jaw, the dentary and articular of the blind side are observable, but teeth are not preserved.

In the cranial elements poorly preserved, the parasphenoid and the frontal of the blind side are observable, though their total shapes are not recognizable. The frontal of the blind side preserved is slightly concave on the right side of the body (Fig. 5).

A part of the upper eye with well preserved melanophores is located on the ventrolateral surface of the frontal of the blind side on the right side of the body (Fig. 5).

In the suspensorial and opercular regions, several bones are recognizable, but it is difficult to identify each element due to its poor condition, excepting the subopercle.

Several pharyngeal teeth are observed under the suspensorial and opercular regions.

In the dorsal fin which begins on its dorsal margin of the frontal of the blind side, about 60 rays and about 40 proximal pterygiophores are countable (the total numbers cannot be estimated). Anterior rays well preserved are not prolonged. The first proximal pterygiophore bears first two rays. Two proximal pterygiophores are usually inserted between two adjacent neural spines.

In the anal fin, about 30 rays and about 30 proximal pterygiophores are countable (their total numbers cannot be estimated). Two proximal pterygiophores are usually located between two adjacent haemal spines excepting several anterior ones. The anteriormost proximal pterygiophore, which is enlarged and elongated, is attached to the anterior surface of the first haemal spine. Its anteroventral end curves forwardly.

Of the shoulder girdle, the cleithrum and nine incomplete fin rays (the total is not estimated) are observed. A part of the postcleithrum is preserved.

Centra of abdominal vertebrae are poorly preserved. The total number may be 12 at best. Some fragments of neural spines are observable. Parapophyses of last three abdominal vertebrae are remained.

The caudal vertebrae with well developed neural and haemal spines are 28 in number.

Nine incomplete segmented rays of the caudal fin are countable dorsally and the total is counted as more than 15. The parhypural, hypurals and epural are recognizable from the bones and their traces remained. Of hypurals, the first and second ones, and the third and fourth ones are fused with each other respectively (Figs. 3 and 5).

Scales are observable all over the body: ctenoid on the ocular side of the body, and cycloid on the blind side. Fragments of three incomplete scales without ctenii are observed on the dorsal margin of the melanophores of the upper eye.

Consideration

The concave frontal of the blind side on the right side of the body indicates that the present species is a member of righteyed pleuronectiform fishes, because that bone is generally concave to form the dorsal and medial wall of the orbit for the upper eye in flatfishes. The dexterity also is supported by the fact that the preserved melanophores of the upper eye is located on the ventro-lateral surface of the frontal of the blind side on the right side of the body. It belongs to the family Pleuronectidae, the Pleuronectoidei, in having the following characters: the postcleithrum is present, the first proximal pterygiophore of the anal fin is enlarged, and some hypurals are fused with one another (NORMAN, 1934; HUBBS, 1945; OCHIAI, 1966; AMAOKA, 1969, 1972; HENSLEY and AHLSTROM, 1984; SAKAMOTO, 1984). Further, it is included in the subfamily Pleuronectinae sensu SAKAMOTO (1984), because of the fact that in the present species the first and second hypurals, and the third and fourth ones are fused with each other respectively (SAKAMOTO, 1984).

Extremely large mouth of the present species is a distinctive character which is shared only with the two species of the genus *Atheresthes* within the Pleuronectinae (Figs. 6 and 7). The present species, however, differs from them in having a single tooth row on the upper jaw of the blind side (vs. 2 rows in the latter) and 28 caudal

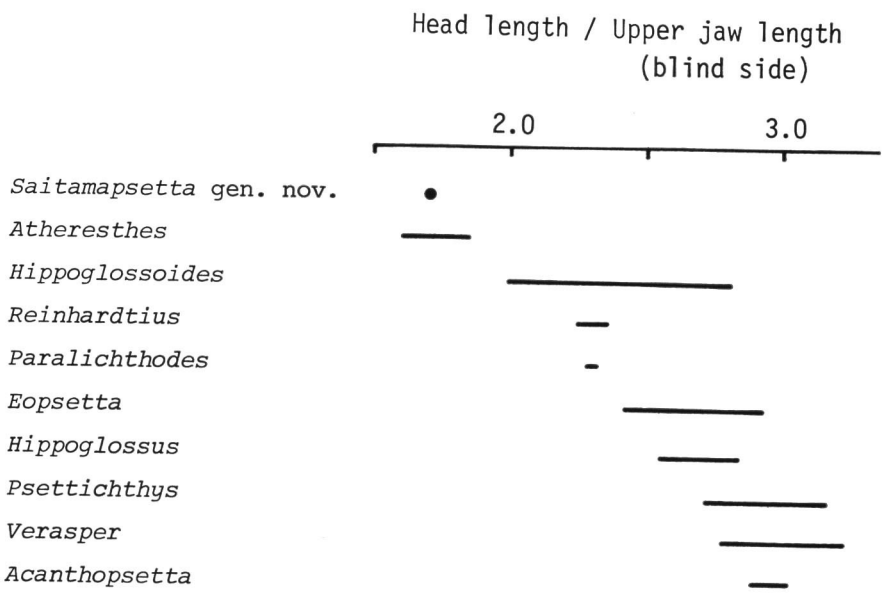

Fig. 6. Relationship of upper jaw length of blind side and head length in pleuronectine genera with relatively large mouth. Data from SAKAMOTO and UYENO (1989, 1991) and SAKAMOTO (unpublished). Data for *Hippoglossoides kumaishi* on that of ocular side.

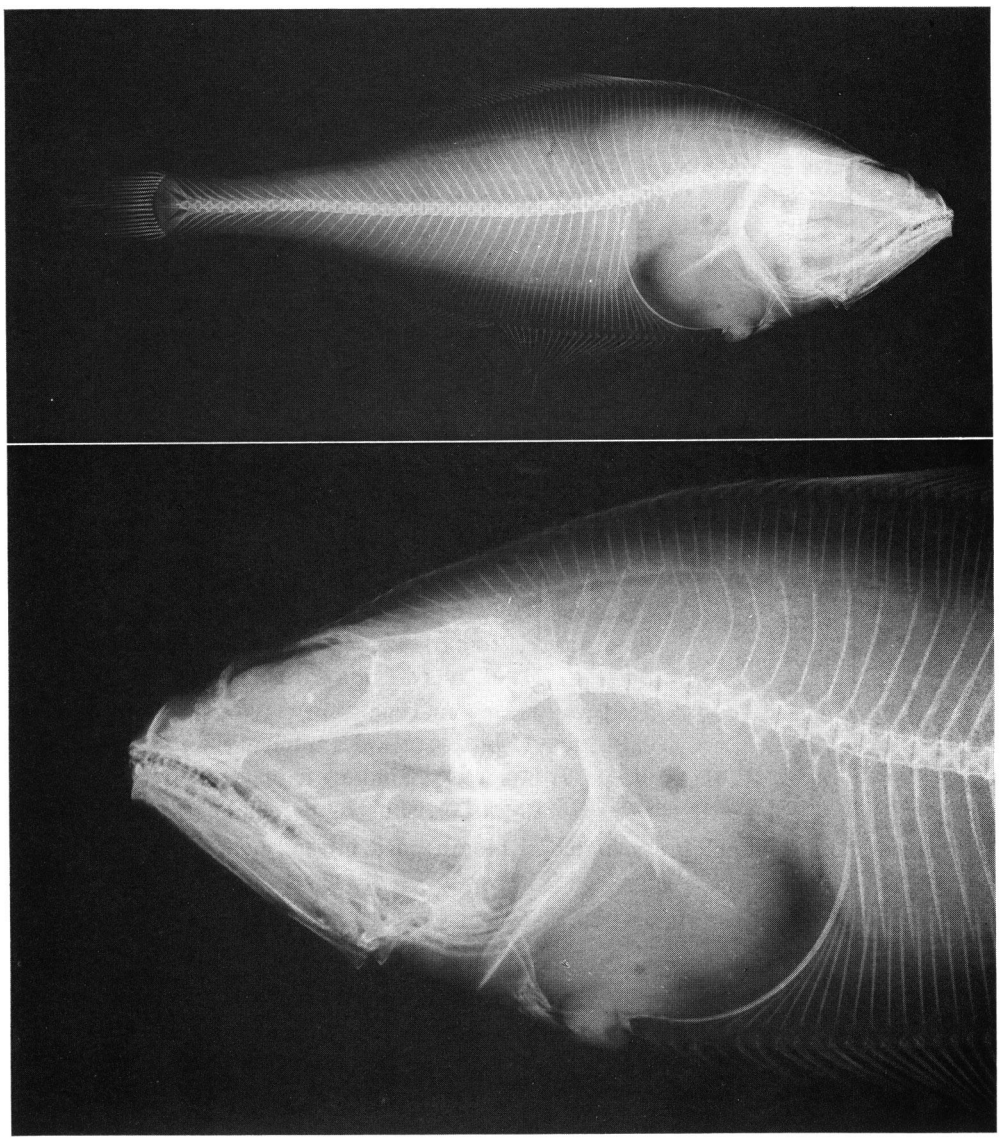

Fig. 7. X-rayed photograph of a Recent pleuronectine *Atheresthes evermanni* from Muroran, Pacific coast of Hokkaido, Japan, ZUMT 15686 (Department of Zoology, University Museum, University of Tokyo), 127 mm in standard length. The head region is X-rayed from the blind side of the body.

Table 1. Caudal vertebral counts and number of rows of teeth on upper jaw in pleuronectines with relatively large mouth. Data from NORMAN (1934), NIINO (1951), SAKAMOTO (1984) and SAKAMOTO and UYENO (1989, 1991). Caudal vertebral counts of *Hippoglossus hippoglossus* (known from Atlantic Ocean) were not available. According to NORMAN (1934), *H. hippoglossus* has two or more tooth rows in the upper jaw. †, fossil; *, =*Hippoglossoides*.

Species	Caudal vertebrae																								Tooth rows on upper jaw	Numbers of specimens
	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46		
†*Saitamapsetta nomurai* gen. et sp. nov.									1																			1	1
Atheresthes stomias																	1	14	5									2	20
A. evermanni																		1	5	16	4							2	26
Reinhardtius hippoglossoides																								1	9	10	3	2	23
Hippoglossus stenolepis															5	8	4											2 or more	17
Eopsetta exilis													4	8	2	2												2	16
E. jordani												1	3															2	4
E. grigorjewi												3	16	2														2	21
Verasper variegatus							1	12	1																			2	14
V. moseri								11																				2	11
Psettichthys melanosticus									2	8																		1	10
Hippoglossoides platessoides														4	6	1												1	11
H. elassodon													6	12	3													1	21
H. dubius												2	21	3														1	26
H. robustus												2	17	2														1	21
H. pinetorum									10	21	5																	1	36
†*H. naritai*																												1	1
†*H. kumaishi*																						1						1	1
†*Protopsetta* kubotai*												1																?	1
Acanthopsetta nadeshnyi										3	23	2																1	28
Paralichthodes algoensis	1	6																										2 or more	7

vertebrae (vs. 36–40) (SAKAMOTO, 1984; SAKAMOTO and UYENO, 1989). Except for the size of the mouth, it also resembles *Psettichthys melanosticus*, *Hippoglossoides pinetorum* and *Acanthopsetta nadeshnyi* within the pleuronectines with relatively large mouth in having 28 caudal vertebrae and a single tooth row on the upper jaw of the blind side (Table 1). However, it is distinguishable from *Psettichthys melanosticus* in having no prolonged rays anteriorly at the dorsal fin, from *Hippoglossoides pinetorum* in having the upper eye completely laterally-positioned, and from *Acanthopsetta nadeshnyi* in its slender body (body depth ca. 2.8 in standard length vs. 2.2–2.3 by SAKAMOTO (unpublished)).

As shown in Fig. 6 and Table 1, the combination of characters such as an extremely large mouth and a single tooth row on the upper jaw of the blind side in the present species is very unique within the Pleuronectinae. Therefore, we concluded to establish a new genus instead of assigning the present species to any of the known pleuronectine genera.

This locality has yielded other fish fossils such as the lamnoid shark *Carcharodon megalodon* (see UYENO *et al.*, 1989), a serranid fish, and a majid crab *Achaeus nomurai* TAKEDA and FUJIYAMA, 1984.

So far, from the Miocene beds in Japan, following species of the family Pleuronectidae have been described.

Saitamapsetta nomurai gen. et sp. nov.
Hippoglossoides naritai SAKAMOTO and UYENO, 1989
H. kumaishi SAKAMOTO and UYENO, 1991
Protopsetta (=*Hippoglossoides*) *kubotai* NIINO, 1951
Platichthys miostellatus SAKAMOTO and UYENO, 1989
Pleuronectidae gen. et sp. indet. (OHE and HAMAGUCHI, 1975)
Pleuronectidae gen. et sp. indet. (OHE, 1986)

All Miocene pleuronectid fishes found in Japan are different from Recent ones at genus and/or species levels.

Etymology. The species name, *nomurai*, is derived from Messrs. NOMURA who collected the present fossil.

Acknowledgments

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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.

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.

HONMA, T., 1986. Miocene series along the middle part of the River Ara-kawa, in the northeastern marginal area of the Kanto Mountains, Central Japan (Part 2). Sedimentary facies and stratigraphy of the Tsuchishio formation. *Bull. Saitama Mus. Nat. Hist.*, (4): 49–72. (In Japanese.)

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 comparative morphology and ecology of the Japanese soles. *Misaki mar. biol. Inst., Kyoto Univ., Spec. Rep.*, (3): 1–97, pls. 1–2. (In Japanese.)

OHE, F., 1986. Explanation of a photograph on the cover. KASEKI NO TOMO, (30): 1–3. (In Japanese.)

OHE, F. & T. HAMAGUCHI, 1975. A fossil flat fish from the Miocene Yukunoura Formation, Owase City, Mie Prefecture. Nagoya-chigaku, (31): 26–35, pl. 1. (In Japanese.)

SAKAMOTO, K., 1984. 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.

SAKAMOTO, K. & T. UYENO, 1989. *Platichthys miostellatus*, a new Miocene righteye flounder from Yaita City, Tochigi Prefecture, Japan. *Bull. Natn. Sci. Mus, Tokyo, Ser. C.*, **15** (4): 161–166.

SAKAMOTO, K. & T. UYENO, 1991. *Hippoglossoides kumaishi*, a new Miocene righteye flounder from Oshima Peninsula, Hokkaido, Japan. *Bull. Natn. Sci. Mus., Tokyo, Ser. C*, **17** (4): 165–172.

TAKEDA, T. & I. FUJIYAMA, 1984. A new majid crab from the Miocene Matsuyama Group, Saitama Prefecture, central Japan. *Bull. Natn. Sci. Mus., Tokyo, Ser. C*, **10** (2): 49–53.

UYENO, T., O. SAKAMOTO & H. SEKINE, 1989. Description of an almost complete tooth set of *Carcharodon megalodon* from a Middle Miocene bed in Saitama Prefecture, Japan. *Bull. Saitama Mus. Nat. Hist.*, (7): 73–85. (In Japanese.)