

Revision of a Miocene Flatfish *Pleuronectes sonei* (Shikama, 1964) of the Family Pleuronectidae, from Yamagata Prefecture, Japan

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Abstract *Pseudorhombus sonei* Shikama, 1964 is transferred to the genus *Pleuronectes* Linnaeus, 1758 (sensu Sakamoto, 1984a) based on the meristic counts of the holotype as well as it having a righteyed body and a well-developed postcleithrum on the blind side. A more complete description of the specimen is provided, and the erroneous citing of the locality from Sone's report is corrected.

Key words: Miocene, flatfish, Pleuronectiformes, Pleuronectidae, *Pleuronectes sonei* comb. nov.

Introduction

Sone (1944) originally reported and briefly described a specimen as a “flatfish (probably new genus and species)” along with another fossil fish in an abstract (in Japanese) of his paper read at the 50th anniversary meeting of the Geological Society of Japan. Some twenty years later, Shikama (1964) gave this almost perfectly preserved fossil specimen the scientific name *Pseudorhombus sonei* in the Pleuronectidae based on an incorrect diagnosis. The incorrect placement, inadequate description, and mistaken type locality, warrant a rediagnosis and redescription.

Systematic Redescription

Class Osteichthyes Huxley, 1880
Order Pleuronectiformes Bleeker, 1859
Family Pleuronectidae Rafinesque, 1810
(sensu Sakamoto, 1984a)
Subfamily Pleuronectinae Rafinesque,
1810 (sensu Sakamoto, 1984a)
Genus *Pleuronectes* Linnaeus, 1758
(sensu Sakamoto, 1984a)

Pleuronectes sonei (Shikama, 1964) comb. nov.

[Japanese name: Sone-birame]

(Figs. 1–4)

Pseudorhombus sonei Shikama, 1964: 172, fig. 19; Masutomi and Hamada, 1966: 164.

Locality: Oguni-mura, Mogami-gun, Yamagata Prefecture, Japan (Sone, 1944).

Horizon: Miocene Oguni Group.

Material: Holotype, Institute of Geology and Paleontology, Sendai (IGPS) catalogue number 22255, about 110 mm in standard length.

Etymology: Named after Hiroshi Sone, who first recognized and reported this specimen.

Diagnosis: A species of the genus *Pleuronectes* with slender body (standard length/body depth is 2.7), blind-side scales with well developed ctenii, 10 abdominal and 29 caudal vertebrae, and 3 unbranched+13 branched+3 unbranched caudal fin rays.

Description: The specimen, except for the anteriormost portion of the head, is well preserved (Fig. 1). The body is an elongated oval in shape, its depth being greatest at about two-fifths of the standard length from the anterior tip. Its greatest depth is about 2.7 times in the standard length.

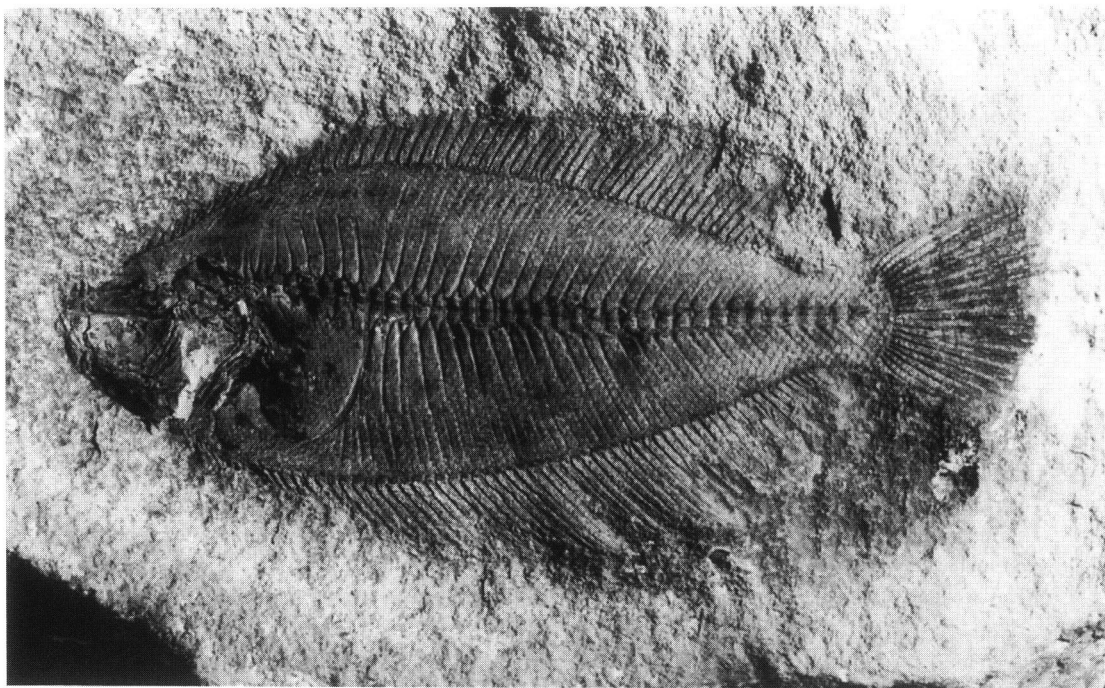


Fig. 1. *Pleuronectes sonei*, IGPS 22255, from the Miocene Oguni Group, Yamagata Prefecture, Japan. About 110 mm in standard length.

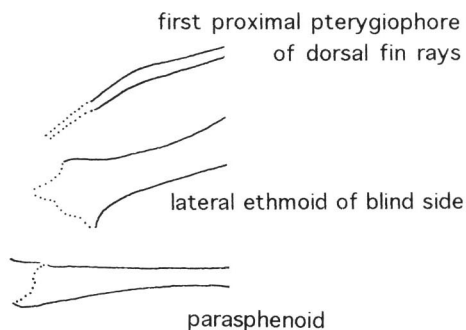


Fig. 2. *Pleuronectes sonei*, IGPS 22255, orbital cavity region on the blind side.

The head region, of which several elements are identifiable, is well preserved, although the anterior tip is lacking. Although parts of the lateral ethmoid and frontal of the blind side as well as the parasphenoid remain, the shape of these

cranial elements are not determinable (Fig. 2). Placement of the eyes can be recognized as being right-sided from the remnants of the orbital cavities on the left side of the body. No elements of both jaws remain.



Fig. 3. Anterior portion of *Pleuronectes sonei*, IGPS 22255, showing the moderately curved lateral line.

In the suspensorial and opercular regions, the quadrate, ectopterygoid, endopterygoid, preopercle, opercle, subopercle, interopercle, hyomandibular remain, however, no elements of the branchial apparatus and the urohyal can be observed.

The dorsal fin originates at just in front of the anterior margin of the orbital cavity of the blind side. Fifty-six rays (of an estimated 70 in total) and 63 proximal pterygiophores are present. In the anal fin, 56 rays and 53 proximal pterygiophores are observed. The anteriormost proximal pterygiophore is enlarged, elongated, and attached to the anterior surface of the first haemal spine. Its anteroventral end curves forward.

Of the shoulder girdle, the cleithrum, four actinosts, coracoid, scapular of the blind side, and well-developed postcleithra of both sides remain. Seven pectoral fin rays on the blind side are observable. The pelvic fin, with six rays, is located slightly behind the cleithrum. Part of the posterior edge of the pelvis of the blind side remains.

Ten abdominal vertebrae with neural spines can be seen, although most of the neural spine of the first and second ones are lacking. Well-developed ribs can be observed on the third to fifth and seventh vertebrae. Twenty-nine caudal vertebrae with neural and haemal spines are present. Intermuscular bones such as epipleurals, epicen-

trals and epineurals are not found.

The caudal fin is almost completely preserved, except for the distal portions of the lowermost three rays. Nineteen segmented rays can be counted, being composed of the three uppermost and three lowermost ones being unbranched, and the 13 middle ones, branched. Because the caudal peduncle scales are well preserved, the underlying skeleton cannot be observed.

The lateral line of the blind side curves moderately, anteriorly, being highest above the first caudal centrum (Fig. 3). The body on the blind side is covered with ctenoid scales exhibiting many well-developed ctenii (Fig. 4).

Discussion

Based on examination of the general shape of the anterior orbital region composed of the lateral ethmoid, frontal and parasphenoid, it is no doubt that the present specimen is a righteyed flatfish (see Amaoka (1969) and Sakamoto (1984a)). This flatfish is a member of the subfamily Pleuronectinae, family Pleuronectidae (both sensu Sakamoto, 1984a), because the postcleithra on both sides are well developed, and the caudal fin composition is 3 (unbranched)+13 (branched)+3 (unbranched) (Norman, 1934; Hubbs, 1945; Sakamoto, 1984a; Chapleau, 1993; Hoshino,

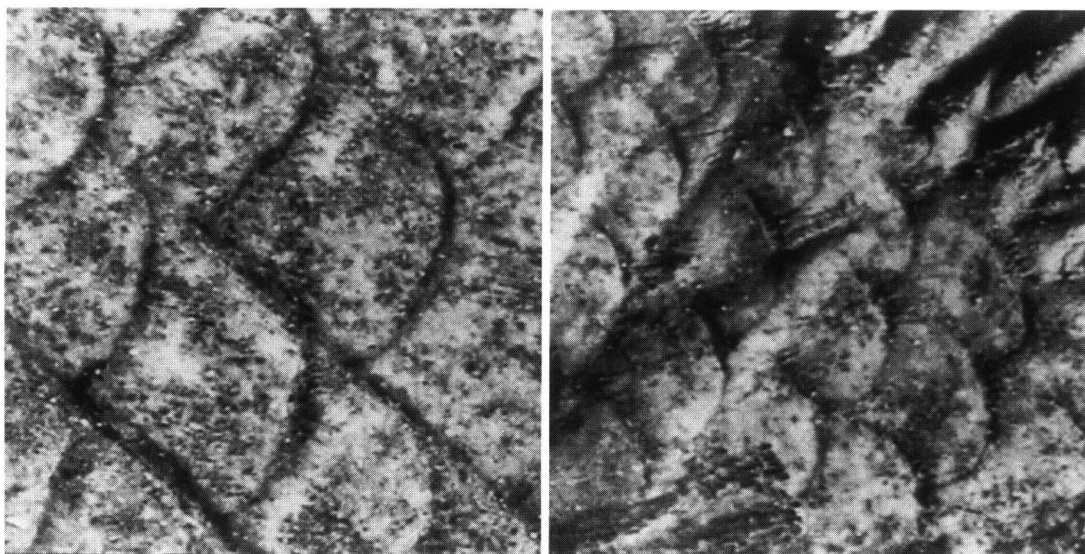


Fig. 4. *Pleuronectes sonei*, IGPS 22255; Left, scales slightly below the 4th caudal centrum; Right, scales at the base of the upper lobe of the caudal fin on the blind side.

2001).

Diagnostic characters for the pleuronectine genera given by Norman (1934), Sakamoto (1984a, b) and Cooper and Chapleau (1998) are not observable in the present fossil specimen. Nevertheless, the authors conclude that this specimen should be placed in the genus *Pleuronectes* Linnaeus, 1758 (sensu Sakamoto, 1984a) and it is unwise to establish a new genus to accommodate it, because it is more similar to several species of *Pleuronectes* than to any other pleuronectine in the number of vertebrae (10+29) and the caudal fin composition (3+13+3) (Sakamoto, 1984a).

In the genus *Pleuronectes*, 23 species have been reported: 22 Recent (*P. platessa* also from Oligocene) and 1 Miocene species (Sakamoto, 1984a, b; Nazarkin, 1997; Chanet, 1997; Cooper and Chapleau, 1998; Orr and Matarese, 2000), and within these, the vertebral count and caudal fin composition in this specimen fall within those of *P. yokohamae*, distributed in Japan and its adjacent waters (Sakamoto, 1984a, b; Nazarkin, 1997; Orr and Matarese, 2000). Its slender body (standard length/body height=2.7) distinguishes it from *P. yokohamae* (2.2–2.5) (Norman, 1934).

Sone (1944) stated that the fossil specimen was slightly similar to members of *Solea* and *Pseudorhombus* morphologically. However, he suggested that it might belong to an undescribed genus and species. Shikama (1964) placed the new species in the genus *Pseudorhombus*, family Pleuronectidae, based on a comparison of body, dorsal and anal fin shape with those of only *P. cinnamomeus*. He concluded that it differed from the latter in having a more slender body and non-angular dorsal and anal fins. From the above-mentioned considerations, however, we came to the conclusion that this placement was erroneous, and instead, it belongs to the genus *Pleuronectes*, family Pleuronectidae.

Further, *Pseudorhombus* Bleeker, 1862 is a genus of the left-eyed family Paralichthyidae (at that time, one of the three subfamilies of the left-eyed family Bothidae). This incorrect placement of *Pseudorhombus* in the family Pleuronectidae by Shikama (1964) is considered to be a mistake.

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