

Melanostigma orientale, a New Species of Zoarcid Fish from Sagami Bay and Suruga Bay, Japan

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Abstract Three specimens belonging to the zoarcid genus *Melanostigma* were collected from Sagami Bay and Suruga Bay, Japan. They are similar to but distinct from *M. atlanticum*, and are described as *M. orientale*. The new species is the first record of *Melanostigma* from north-western Pacific Ocean.

During the cruises of the Tansei-maru, the research vessel of the Ocean Research Institute, University of Tokyo, three specimens belonging to the zoarcid genus *Melanostigma* (family Zoarcidae) were obtained from Sagami Bay and Suruga Bay, Japan. The new species, *M. orientale*, described here is based on them.

According to McAllister and Rees (1964), *M. gelatinosum* is distributed in the southern hemisphere, *M. atlanticum* in the northern Atlantic, and *M. pammelas* in the northeastern Pacific. Bussing (1965) described an additional species, *M. bathium*, off Chile. The present new species from Sagami Bay and Suruga Bay represents the first *Melanostigma* from the northwestern Pacific Ocean.

Genus *Melanostigma* Günther, 1881
(Konnyaku-hadaka-gege zoku:
New Japanese name)

Skin loose and without scales. Flesh gelatinous. Pelvic fins absent. Gill opening small, wholly above base of pectoral.

The genus *Nalbantichthys* agrees with *Melanostigma* in the above characters, but is different in having more numerous vertebrae, sensory pores on head, and vertical fin-rays; in lacking teeth on the prevomer and palatines (Schultz, 1967). Caudal fin is shorter in *Nalbantichthys* than snout length, but longer in *Melanostigma*.

For further informations of *Melanostigma*,

see McAllister and Rees (1964), and Bussing (1965).

Melanostigma orientale, sp. nov.
(Konnyaku-hadaka-gege:
New Japanese name)

Diagnosis. This species closely resembles to *M. atlanticum*. The *atlanticum-orientale* species group can be distinguished from other known species of the genus by higher numbers of vertebrae (more than 93), dorsal fin-rays (more than 92, including one half of caudal rays), and anal fin-rays (more than 77, including one half of caudal rays). *M. orientale* differs from *M. atlanticum* in having slightly more numerous caudal vertebrae (79–81 vs. 73–78), and smaller eye (3.4–3.5 in head length vs. 2.7–3.5), nostril, and sensory pores. Large pit organs (neuromasts) on head are more numerous in *M. orientale* than in *M. atlanticum*. The tail region is not darker in *M. orientale* than rest of the body.

Holotype. ZUMT 52454 (Department of Zoology, University Museum, University of Tokyo), a specimen probably male 131.5 mm in total length, 26 Jan. 1968, 21:56 to 23:18, from Sagami Bay (35°08'N, 139°16'E), by the oblique haul of larva net of 1.6 m in diameter, (haul depth ca. 600 m to surface; bottom ca. 1200 m). Fixed in formalin and transferred into ethanol.

Paratypes. ZUMT 52455, a young speci-

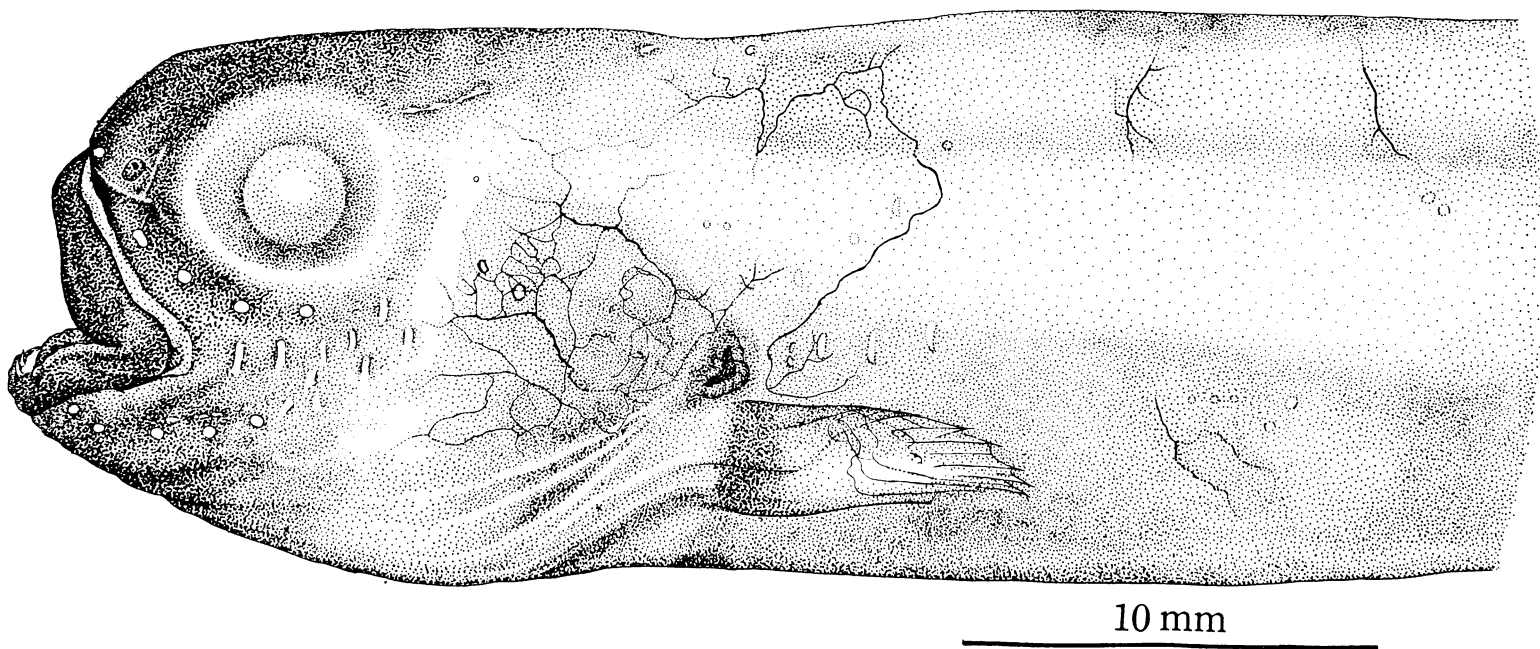
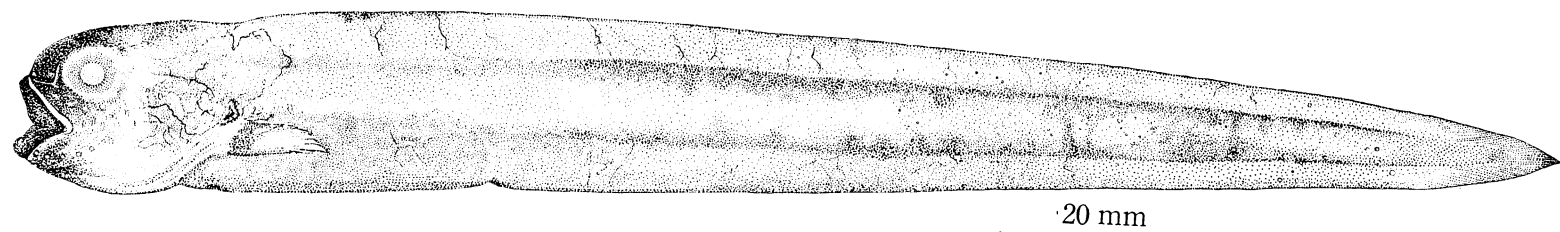


Fig. 1. *Melanostigma orientale*, sp. nov. Holotype, ZUMT 52454, 131.5 mm in total length.

men 52.5 mm in total length, 3 Nov. 1968, 20:13 to 21:47, from Suruga Bay (34°54.5'N, 138°38.1'E), by the oblique haul of larva net of 1.6 m in diameter, (haul depth 1250 m to surface; bottom ca. 1600 m). This specimen is cleaned by the application of tyrpsin and stained by alizarin red to examine the internal characters. ZUMT 52456 (now National Museums of Canada, Ichthyological Collection NMC 71-208), a young specimen 48.5 mm in total length, 3 Nov. 1968, 22:17 to 23:46, from Suruga Bay (34°55.1'N, 138°39.1'E), by the oblique haul of larva net of 1.6 m in diameter, (haul depth 1200 m to surface; bottom ca. 1500 m). Paratypes are also fixed in formalin and transferred into ethanol.

Comparative material of *Melanostigma atlanticum*. NMC 62-101-A, (now ZUMT 52459-52461), three specimens 36.0, 68.5, and 94.5 mm in total length, 14 Nov. 1960 at 48°46'N, 63°07'W, depth ca. 330 m.

Orthography. The species name, *orientale*, was coined to refer to occurrence of the new species in the Orient, the only species known in this area.

Description

In the succeeding paragraphs body proportions and counts for the holotype are followed by those of two paratypes, ZUMT 52455 and 52456, in that order in parentheses. In the case, only a single value is inserted in a parenthesis, it represents that of ZUMT 52455.

Dorsal rays, including one half of caudal rays 93 (94), anal rays, including one half of caudal rays 79 (79), caudal rays 8 (9), pectoral rays (8). Vertebrae 98 (99, 100), of which 79 (80, 81) are caudal. Branchiostegals 6, gill rakers (12). One prenasal, 5 suborbital, and 5 preoperculo-mandibular sensory pores on head. Temporal pore absent.

Body depth at insertion of pectoral 9.7 (9.6, 9.2), head length 7.7 (7.1, 7.7), body depth 7.5 (9.7, 10.3), snout to anus distance 3.5 (3.5, 3.3) in total length. Orbit 3.5 (3.4,

3.5), pectoral 2.5 (2.8, 2.7) in head length.

Body is elongate, cylindrical anteriorly and compressed posteriorly; surrounded by a gelatinous connective tissue. Head depth is considerably larger than its width. Mouth is oblique and terminal, extending to anterior margin of the eye. A single, short, tubular nostril is on each side of the snout. Eye is covered with a dermal membrane. Gill opening is small, and situated immediately above the insertion of the pectoral fin. Upper half of the first gill arch is without rakers and covered by a black-pigmented membrane.

The infraorbital canal begins slightly behind the nasal tube and proceeds posteriorly following border of the eye. The supraorbital canal continues forward between the eyes and terminates in a pore anterior to the nasal tube. The preoperculo-mandibular canal begins near the mandibular symphysis, follows the lower jaw, then continues up the preopercle where it ends below the level of the eye. Supratemporal canal is present but not continuous with its counterpart. Pattern of the sensory canal system of head is identical with that of *Melanostigma atlanticum* illustrated by Bussing (1965: 221, fig. 16E).

Irregular groups and series of large pit organs (neuromasts) are around nostril, between and posterior to the infraorbital and preoperculo-mandibular canals, along the post-orbital commissure, and above the gill-opening. They are elliptical and often form a continuous line in the adult holotype, whereas in the juvenile paratypes they are granular and isolated from each other (Fig. 2). Similar sensory organs are scattered on the trunk, especially on the posterior half of the body.

All teeth are conical and movable. Teeth are not countable exactly, for the jaws of the holotype is partly damaged and the paratypes are juvenile. Each of the premaxillary and dentary is equipped with about five recurved canines in the adult holotype. The presence of canines is the adult male character in *M. atlanticum* (McAllister and Rees, 1964).

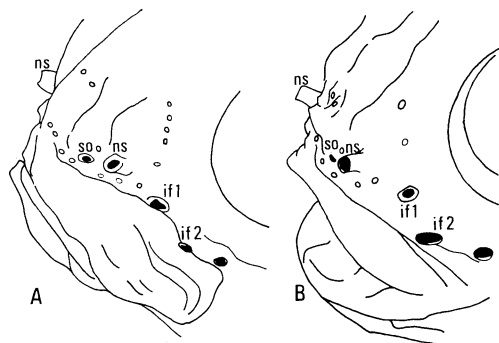


Fig. 2. Anterodorsal quarter view of the head of A: *Melanostigma orientale* (ZUMT 52456=NMC 71-208, 48.5 mm total length) and B: *M. atlanticum* (NMC 62-101-A=ZUMT 52460, 68.5 mm total length). Large pit organs are shown by open circles. Differences of jaws are due to the state of specimens and are not significant. if 1 and 2, openings of infraorbital sensory canal; ns, nostril; so, opening of supraorbital canal.

Besides these canines, there are about 20 teeth arranged in a row in both jaws. There are three teeth on the prevomer which are about the size of jaw teeth of the inner row: one at the front margin of the bone, the other two at the lateral ends. Palatine teeth are arranged in a row and about eight in number in the holotype.

The dorsal fin originates behind a vertical through tip of the pectoral fin, and the anal fin slightly behind the anus. Dorsal and anal fins are continuous with caudal fin and enclosed in gelatinous connective tissue. First pterygiophore of the dorsal fin is between the neural spines of the third and fourth vertebrae. First three pterygiophores of the anal fin are in front of the first haemal spine. Dorsal and anal fin-rays are equal in number to the vertebrae with which they are associated. The pectoral fin is short.

Scales are absent. The lateral line is absent, but there are neuromasts arranged rather regularly along the mid-lateral line of the body.

Color. The loose outer skin covering the dorsal and anal fins is pale tan; posterior part of the body including the caudal fin is without

surface melanophores. Both jaws and anterior part of the head are dark, becoming paler ventroposteriorly. The dark area extends behind the eye in the 131.5 mm holotype, whereas it is confined to anterior to the eye in the paratypes, which are less than 52.5 mm in total length. The pectoral fin is pale at the base and tip, whereas median part is brown in the holotype: uniformly pale in the paratypes. Erupted wrinkled region of the gill opening is dark brown. Isthmus and the area around anus are dark brown. Peritoneal, pharyngeal, buccal, and opercular linings are black and visible through the translucent skin. Trunk muscles which are seen through the skin are tinted violet.

Skeleton of a paratype, 52455. Owing to small size of a single material dissected, it is often difficult to check the detailed structures. The skeleton is compared with that of *M. pammelas*, studied in detail by Yarberry (1965). In the following paragraphs, characters of *M. pammelas* are put in parentheses. The infraorbitals form a contiguous chain (isolated from each other). The nasal is present, feebly ossified (not illustrated nor mentioned of).

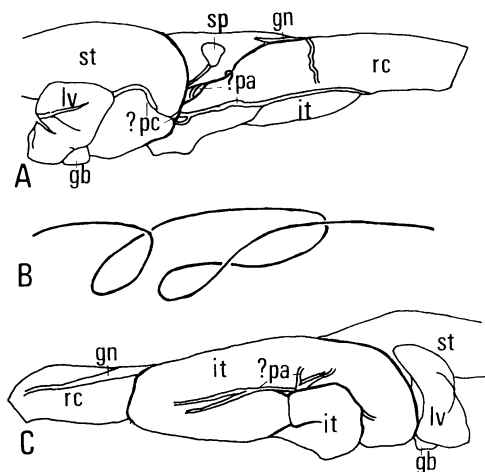


Fig. 3. Viscera of *Melanostigma orientale* (ZUMT 52455, 52.5 mm total length). A. left side; B. coiling pattern of alimentary canal; C. right side. gb, gall bladder; gn, gonad; it, intestine; lv, liver; pa, pancreas; pc, pyloric caeca; rc, rectum; sp, spleen; st, stomach.

The single postcleithrum is present (absent). The branchiostegals are six (seven). The pelvic bone is rudimentary but present in both species.

Viscera of a paratype 52455. (Fig. 3). The stomach and anterior part of the intestine are black-walled. Pyloric caeca are indistinct, probably represented by two rudimentary fleshy processes at the left side of the stomach wall. The intestine is rather short, and has a marked constriction on the right side. The liver is divided into left and right lobes. The gall bladder is on the posteroventral part of the liver. The spleen is situated in the left side of the intestinal coil. The gas bladder is apparently absent. The gonad is thread-like and immature.

Habit and habitat. Three specimens, holotype and paratypes, were taken by the oblique hauls of the larva nets fished down to depths of 600 to 1250 m, where the bottom were ca. 1200 to 1600 m. The sampled stations were always at the extremity of the canyons invading the bays. Although all hauls were non-closing, the specimens might be taken from

fairly deep layers, because the species has not been taken by the surface hauls or hauls at shallower depths. The species is mesopelagic, and the gelatinous tissue between the trunk muscles and skin may have to do with hydrostatic regulation.

The holotype was taken from Sagami Bay, and two young paratypes from Suruga Bay, both on the Pacific coast of Japan.

Remarks

Melanostigma orientale and *M. atlanticum* can be easily distinguished from other members of the genus by higher numbers of vertebrae, and dorsal and anal fin-rays. On the other hand, the two species are curiously closely related with each other, despite their isolation in different ocean basins. Although the number of the caudal vertebrae is the single non-overlapping meristic character at present, it will probably be shown to be overlapping when more material are studied. The sensory canal system of head is quite similar in both forms. Comparison of the

Table 1. Characters of the species of the genera *Melanostigma* and *Nalbantichthys*.

	<i>gelatinosum</i>	<i>bathium</i>	<i>Melanostigma</i> <i>pammelas</i>	<i>atlanticum</i>	<i>orientale</i>	<i>Nalbantichthys</i> <i>elongatus</i>
Vertebrae	82-85 (19-21+62-64)	84-88 (18-20+66-69)	87-90 (19-20+68-72)	93-99 (19+73-78)	98-100 (19+79-81)	144 & 150 (25+119 & 125)
Dorsal fin	80-84	82-84	84-88*	92-99	97-98	150 & 156
Anal fin	66-70	69-71	69-75*	77-84	83	124 & 130
Caudal fin	8		6-8	6-8	8-9	
Pectoral fin	8	7-9	6-8	6-8 (9)	8	> 6
Gill rakers	12		(10) 11-13	11-12	12	
Suborbital pores	4-5	4-5	4	(4) 5	5	> 6
Preoperculo- mandibular pores	4-6	3-5	5 (6)	(4) 5 (6) **	5	> 8
Temporal pore	1	0	0	0	0	+
Branchiostegals	6	5-6	7 (5+2)	6	6	> 7
Distribution	Southern hemisphere of ca. 40° lat.	Off coast of Chile	Off California	North Atlantic Ocean	Pacific coast of Japan	Bering Sea
Number of specimens	5	5	16	17	3	2
Sources of data	McAllister & Rees (1964) and Bussing (1965)	Bussing (1965)	McAllister & Rees (1964), Yarberry (1965), and Grinols (1966)	McAllister & Rees (1964) and present paper	Present paper	Schultz (1967)

* Clothier's (1951) counts are: dorsal 73 & 77, and anal 64 & 65.

** Six pores are found in the right side of a specimen of NMC 62-101-A, 68.5 mm in total length.

proportional measurements is almost meaningless in such flaccid fishes.

The Arctic Ocean is a probable zoogeographical barrier between the two forms. To show the closest relationship and allopatry, the use of trinominals is advisable for practical purposes in most cases. In the present case, however, the following differences will justify the separation of the Japanese specimens from *M. atlanticum* at species level. *M. orientale* tends to have higher numbers of vertebrae and dorsal and anal fin-rays than *M. atlanticum* (Table 1). *M. atlanticum* has a larger set of features than *M. orientale*. In both species, the size of the sensory pores on the head and nostril relative to the size of the body is larger in smaller specimens. The 94.5 mm-total-length specimen of *M. atlanticum* has the distinctly larger pores and nostril than the 131.5 mm holotype of *M. orientale* in absolute size as well as relative. The 36 mm *M. atlanticum* also has a larger set of features than 48.5 mm *M. orientale*. Number and position of the large pit organs are subject to individual variation, however, they are more numerous in *M. orientale* than in *M. atlanticum* (Fig. 2). The tail region is more or less sprinkled with melanophores in *M. atlanticum*, whereas no melanophores are present even in the holotype of *M. orientale* which is regarded as full-grown. On the other hand, the pigment band on the pectoral fin is absent in *M. atlanticum*.

In the northern hemisphere the North Atlantic and northwestern Pacific are now shown to be occupied by the twin species, *M. atlanticum* and *M. orientale*, but northeastern Pacific by the distinct species, *M. pammelas*. *M. pammelas* shows the characters intermediate between the *atlanticum-orientale* species group and *gelatinosum-bathium* group, however, it apparently shows more intimate relationship with the latter (Table 1). Several differences of the skeletal characters between *M. pammelas* and *M. orientale* are seemingly significant (see above).

Acknowledgments

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相模湾および駿河湾で得られたゲンゲ科の新種コンニャクハダカゲンゲ 富永 義昭

相模湾および駿河湾から、稚魚網採集によって *Melanostigma* 属の魚 3 個体が得られた。これらは大西洋に分布する *M. atlanticum* に酷似する新種と考えられるので、*M. orientale* として記載した。*Melanostigma* 属は北西太平洋からは初記録である。和名としてコンニャクハダカゲンゲ属およびコンニャクハダカゲンゲを提唱する。

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