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Droplets from the Sado Marine Biological Station, Niigata University-VII. Further Notes on Some Anomalous Fishes

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Droplets from the Sado Marine Biological Station, Niigata University-VII. Further Notes on Some Anomalous Fishes[1]

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Abstract : Six cases of anomalies found in five species of bony fishes from off the coast of Sado Island and one species of cartilaginous fish from off the coast of Naoetsu, western Niigata facing the Sea of Japan, were examined macroscopically. They are : one specimen of a tailless file fish, *Rudarius ercodes* ; one specimen of a yellowtail, *Seriola quinqueradiata,* with a distorted lower jaw; one specimen of a sinistral Korean flounder, *Glyptocephalus stelleri,* as the first document in this species ; one specimen of a file fish, *Thamnaconus modestus,* with a bifurcate dorsal spine; one specimen of an injured striped beakperch, *Oplegnathus fasciatus;* and one specimen of a skate, *Raja* sp. (probably, *kwangtungensis)* with aberrant pectoral fins, as the second record of this kind of deformity in the batoids from Japanese waters.

1. A Tailless File Fish, *Rudarius ercodes* Jordan et Fowler

On 17 November, 1989, an aberrant (rather pathetic) file fish, *Rudarius ercodes* Jordan et Fowler, without a tail was caught in a hand net from the seaweed bed of Himezu Fishing Port adjacent to the Sado Marine Biological Station of Niigata University (Figs. 1, 2).

Measurements and counts of this specimen were as follows : distance from the tip of the snout to the posterior end of the upper half of the body, 38 mm, and of the lower half of the body, 39 mm ; distance from the tip of the snout to the base of first dorsal fin (spine), 17 mm, and to the tip of ventral process, 30 mm ; head length, 14 mm ; eye diameter, 5 mm ; snout length, 8 mm ; length of dorsal spine, 9 mm ; depth of body at the tip of ventral process, 38 mm ; distance between the upper and lower halves of the posterior end of the body, 11 mm ; D, **H** +20 ; A, 23 ; **P,** 11; vertebrae, 7+8=15. A supposed standard length in the normal condition may be estimated as more than 40 mm, and also total length may more than 50 mm.

As the tail region, ca. 5 vertebrae and the caudal fin, was lost probably by a single bite of a piscivorous fish, a naked vertebra in the knob condition was seen in the center of the scarred of concavity (crevasse). Several soft rays of both dorsal and anal fins and also several posterior vertebrae were lost in this attack. Viewed from the posterior cut plane (surface) of the median axis, the injury to the left side was severer and greater than that to the right side. The wound at the posterior edge (margin) had undergone considerable regeneration, but it was not closed perfectly. On the other hand, the development of spinules (a kind of scales) in the skin of the right side was more remarkable than that of the left (Figs. 1, 2).

Previously, tailless specimens of another type of file fish, *Thamnaconus modestus*, were reported by Abe (1987) and Honma (1990). However, a similar tailless specimen of *Aluterus monoceros,* corresponding to the present *R. ercodes,* was already documented by Honma and Noda (1987), in addition to a nearly identical specimen of *Stephanolepis cirrhifer* described by Hori (1977). Besides these 3 cases of

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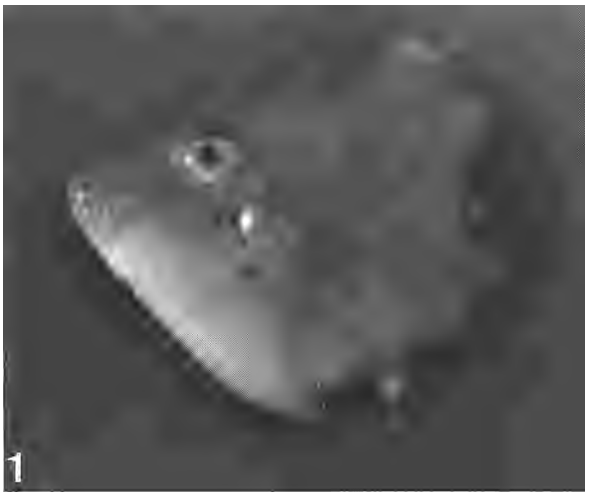

Fig. 1. General features of a tailless file fish, Rudarius ercodes, caught from Himezu Fishing Port of Aikawa Town, Sado Island, on 17 November, 1989.
Fig. 2. X-ray photograph of the specimen in Fig. 1.

file fishes belonging to Monacanthidae, Higashikawa et al. 1984 mentioned many cases of malformed pomfrets, Pampus spp., the wounds healed of which had been caused by piscivorous fish with very sharp teeth, such as cutlass fish, Trichiurus lepturus, in the open sea. In the habitat of seaweed beds, however, the sunrise sculpin, Pseudoblennius cottoides, is thought to be an enemy of *R.* ercodes.

2. A Young Yellowtail, *Seriola quinqueradiata* Temminck et Schlegel, with a Distorted Lower Jaw

On 26 March, 1990, an aberrant yellowtail, *Seriola quinqueradiata* Temminck et Schlegel, with a distorted lower jaw was caught in a set net off the coast of Tsubaki, Ryotsu Bay, Sado Island (Figs. 3, 4). The specimen was presented to the author through the agency of Mr. Eikichi Noda (Niigata Prefectural Cultural Fisheries Center, Sado Island).

Measurements of this specimen were as follows : total length, 365 mm ; standard length, 307 mm ; fork length, 327 mm ; head, 84 mm ; snout, 28 mm ; eye, 12 mm ; greatest depth, 64 mm ; upper jaw (normal), 32 mm ; lower jaw (deformed), 12 mm ; body weight, 410 g. Sex could not be determined by macroscopic observation.

As the lower jaw was remarkably reduced and downwardly curved, the mouth was permanently open, exposing the mouth cavity and tongue at all times. The length of the exposed part of the tongue was 12 mm (left side view) and 7 mm (right side view). Probably because of a lack of left mandibular components, the right dentary was strongly bent, and reaching the left corner of the mouth. Accordingly, there was no median symphysis, and the chin was distorted toward the left side. The overall effect was somewhat reminiscent of a micrognath.

As far as I am aware, there have been no similar or related deformities reported from fishes, although several cases of a malformed lower jaw in fishes have been reported. Among others, the cases reported by Whitley (1940), Greenbank (1942), Swan (1968), Honma (1989, 1990), Honma et al. (1981) and Honma and Suzuki (1983) are considered to belong to the same category of jugular abnormality. Johnsone (1907) described in detail the lower jaw bones of a gurnard with malformed (dwarfed) dentary and articulare bones, the external appearance of the fish being very similar to that of the present specimen.

Honma's (1985) report on Masu salmon, *Oncorhynchus masou,* lacking a right lower jaw suggested the cause to have been a long line hook. In contrast, the present case seems to be congenital, although the factors responsible for such a condition are unknown.

3. Sinistrality in the Korean Flounder, *Glyptocephalus stelleri* (Schmidt)

Reversal of sides or sinistrality in heterosomate fishes is not as rare an occurrence as abnormalities such as albinism, ambicoloration and osteological deformities. Gudger (1935) provided an early review of sinistrality in flatfishes, and more recent bibliographies of fish anomalies (Dawson, 1964, 1966, 1971 ; Dawson and Heal, 1977), included many papers on reversal. Gartner (1986) recorded several anomalous flatfishes taken off Florida, U. S. A., and summarized the abnormalities recorded in flatfishes taken from the western Atlantic Ocean and eastern Gulf of Mexico. Honma (1956) reported a sinistral olive flounder *Paralichthys olivaceus* (Temminck et Schlegel), caught in the Sea of Japan and later reported several examples of heterosomate fishes having anomalous coloration and vertebral deformities (Honma, 1958; Honma and Mizusawa, 1965 ; Honma, Mizusawa and Kakimoto, 1979; Honma and Suzuki, 1983). However, no further sinistral specimens were obtained.

Recently, a sinistral specimen, identified as the Korean flounder, *Glyptocephalus stelleri* (Schmidt), was made available through the courtesy of Mr. Eikichi Noda, Niigata Prefectural Cultural Fisheries Center, Sado Island. The specimen was

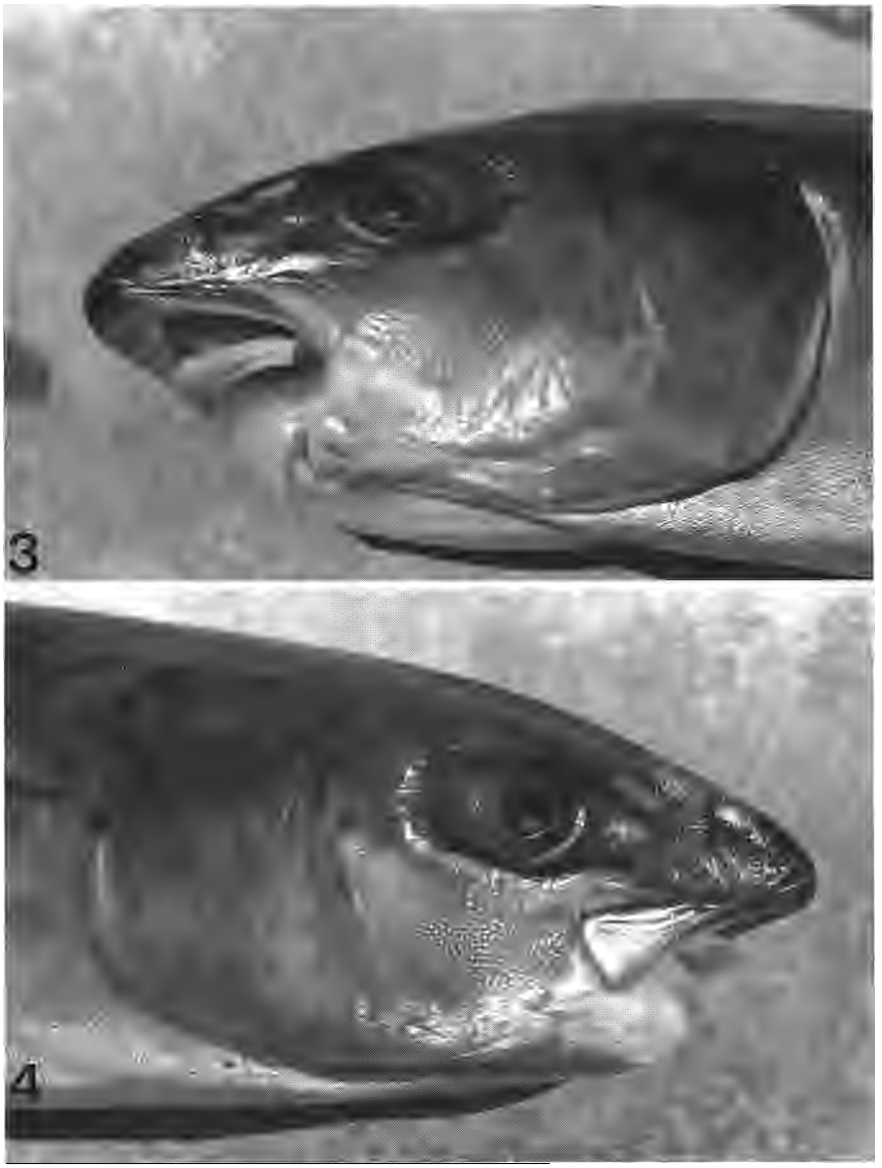

Fig. 3. General features of a young yellowtail, *Seriola quiqueradiata*, with a distorted lower jaw, caught by set net off the coast of Ryotsu Bay, Sado Island, on 26 May, 1990. Total length 365 mm. Left side view.
Fig. 4. The same specimen. Right side view.

caught by a deep sea gill net for walleye pollock, *Theragra chalcogramma,* installed off the coast of Suizu, Sado Island, on 4 April, 1991. Measurements and counts of this specimen, 220 mm total length, are given in Table 1. The external morphology of the specimen looks normal other than its sinistrality (Fig. 5a, b). As far as I am aware, this is the first report of sinistrality in the Korean flounder.

Amaoka (1964) described in detail a sinistral specimen of a brick sole, *Poecilopsetta plinthus,* and tabulated the known records of reversed specimens of flatfishes. Follett et al. (1960) reported a sinistral specimen of a rex sole, *Glyptocephalus*

5a

5b

Fig. 5a, b. A sinistral specimen of the Korean flounder, *Glyptocephalus stelleri* (Schmidt), caught by gill net installed off the coast of Suizu, Sado Island, on 4 April, 1991. 200 mm in total length.
a : eyeside, b : noneye side.

Table 1. Measurements and counts of a sinistral Korean flounder, *Glyptocephalus stellell* (Schmidt), caught off the coast of Sado Island in the Sea of Japan.

	mm		
Total length	220	Weight	80
Standard length	180		
Head	39	D	88
Depth	66	A	72
Eye diameter	11	P	11
Snout	7	V (eye side)	6
Jaw	8	V (non eye side)	6
Length of pectoral fin (eye side)	24		
Length of pectoral fin (non eye side)	18		
Length of ventral fin (eye side)	12		
Length of ventral fin (non eye side)	11		

zachirus, belonging to the same genus of the present Korean flounder, from the Pacific coast of North America. Abe and Senna (1987) announced in short a reversed marbled sole, *Limanda yokohamae,* from Tokyo Bay.

As a possible cause of morphological abnormalities in heterosomate fishes, Koski (1974), Moore and Posey (1974) and Gartner (1986) were of the opinion that changes in environmental factors influenced by human activities might cause and / or enhance such anomalies in species inhabiting shallow coastal or estuarine waters. However, because the habitat of the Korean flounder extends into a relatively deeper zone of the Sea of Japan, more than 200 m deep, it is difficult to apply such an idea in this case.

It has been estalished that percentage sinistrality in the starry flounder, *Platichthys stellatus,* on the North American west coast increases from south to north (Forrester, 1969), whereas sinistrality in the same species in Japan was 100% (Hubbs and Kuronuma, 1942). Neverthless, the role of genetic determination of sinistrality in heterosomate fishes has yet to be established.

4. Another Specimen of a File Fish, *Thamnaconus modestus,* with a Bifurcate Dorsal Fin Spine

As was reported previously, a file fish, *Thamnaconus modestus,* with a bifurcate dorsal fin spine caught offshore from Sado Island seemed to be the first example of the species with such a deformity (Honma, 1990).

On 21 November, 1991, another specimen of the same species was caught in a deep-sea gill net installed off the coast of Aikawa Town, Sado Island (Figs. 6, 7).

The specimen was 230 mm in total length, 220 mm in standard length, 65 mm in depth, 5 mm in width, and 20 g in body weight. As in the previous specimen (Honma, 1990), no abnormalities were detected, with the exception of the first dorsal spine. The diameter of the dorsal fin near the basal region were about 3.6 x 2.4 mm. Seven mm from the level of the occiput, the dorsal fin was bifurcated at an angle of ca. 30°. The lengths of the left and right branches were 15 and 21.6 mm, respectively. The tip of the right branch was gently curved posteriorly. Each branch was well serrated along its inside margin. The split dorsal fin spine was not housed in any pocket or groove (Fig. 7).

Comparison with the previous specimen showed differences such as the uneven length of the bifurcated branches and narrow angle of bifurcation in the present specimen. Undoubtedly, close attention to future specimens caught will disclose further, similar deformities.

Recently, another individual of the same species, 182mm long, with the same teratology was caught from Ryotsu Bay, Sado Island, in late April, 1993.

5. An Injured Striped Beakperch, *Oplegna thus fasciatus* (Temminck et Schlegel)

On 4 June, 1992, a curious striped beakperch, *Oplegnathus fasciatus* (Temminck et Schlegel) with seven dark cross bands, was caught in a small set net installed off the coast of Toyooka Village, Ryotsu City, Sado Island (Fig. 8). Following the receipt of information by Mr. Eikichi Noda from the fisherman concerned, the frozen specimen was forwarded to the author. Before examination, the specimen was defrosted and subsequently preserved in 5% formalin.

Measurements of the specimen are given in Table 2. As a result of an injury to

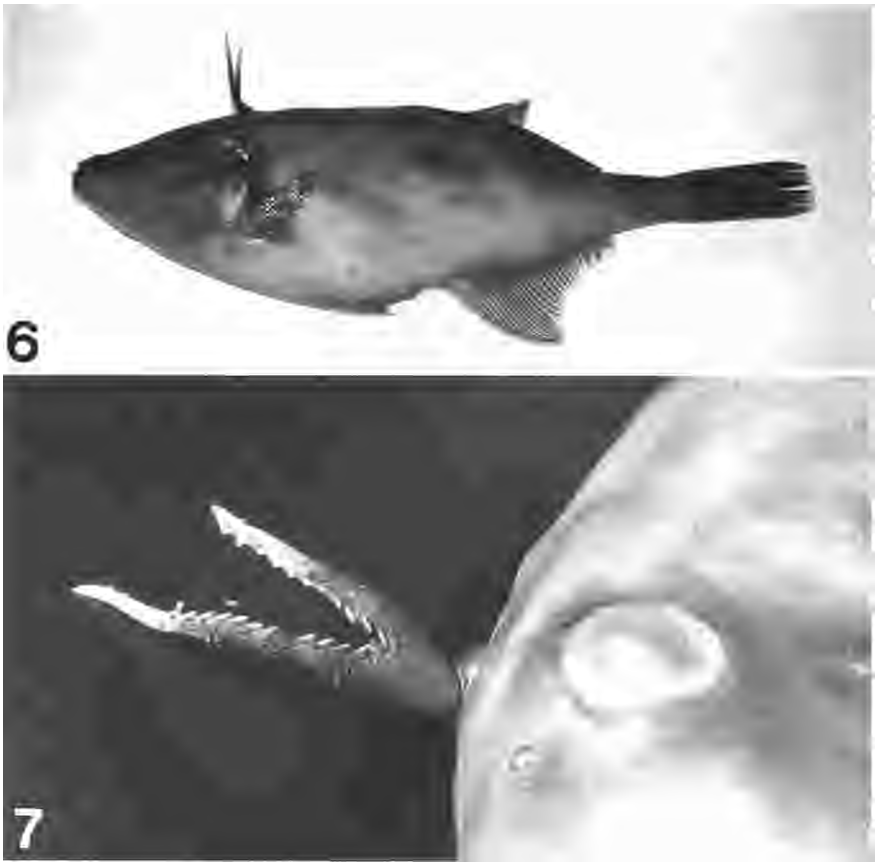

Fig. 6. A file fish, *Thamnaconus modestus,* with a bifurcate dorsal spine, caught from off the coast of Aikawa Town, Sado Island, on 21 November, 1991.
Fig. 7. Enlarged view of a bifurcate dorsal spine in Fig. 6.

the dorsal part, the body contour of the fish was reminiscent of an emaciated morwong, *Goniistius* spp. Externally, a portion of the dorsal region from the nape to the caudal peduncle was lost, leaving a small portion each of the anterior most dorsal spines and posterior most dorsal rays. The deepest part of the resulting concavity reached just to the level of the lateral line. The wound surface was covered with scaly skin. Although the wound surface was healed and sutured, the ridgeline was not straight, instead showing a slightly irregular curve. Accordingly, both sides of the third and fourth dark cross bands did not met each other precisely at the ridgeline. Along the ridgeline a narrow vermicular band had newly formed. No other abnormalities were noted on the specimen.

The considerable loss of dorsal fin and neural spine elements is evident in an X-ray photograph (Fig. 9). A small portion only of the bases of the Ist to IVth dorsal spines and pterygiophores and the bases of the four soft rays just anterior to the last to fourth-to-last rays were left, the greater part of the fin spines and rays, and neural spines of the vertebrae being removed by the bite of a supposed piscivorous fish. The

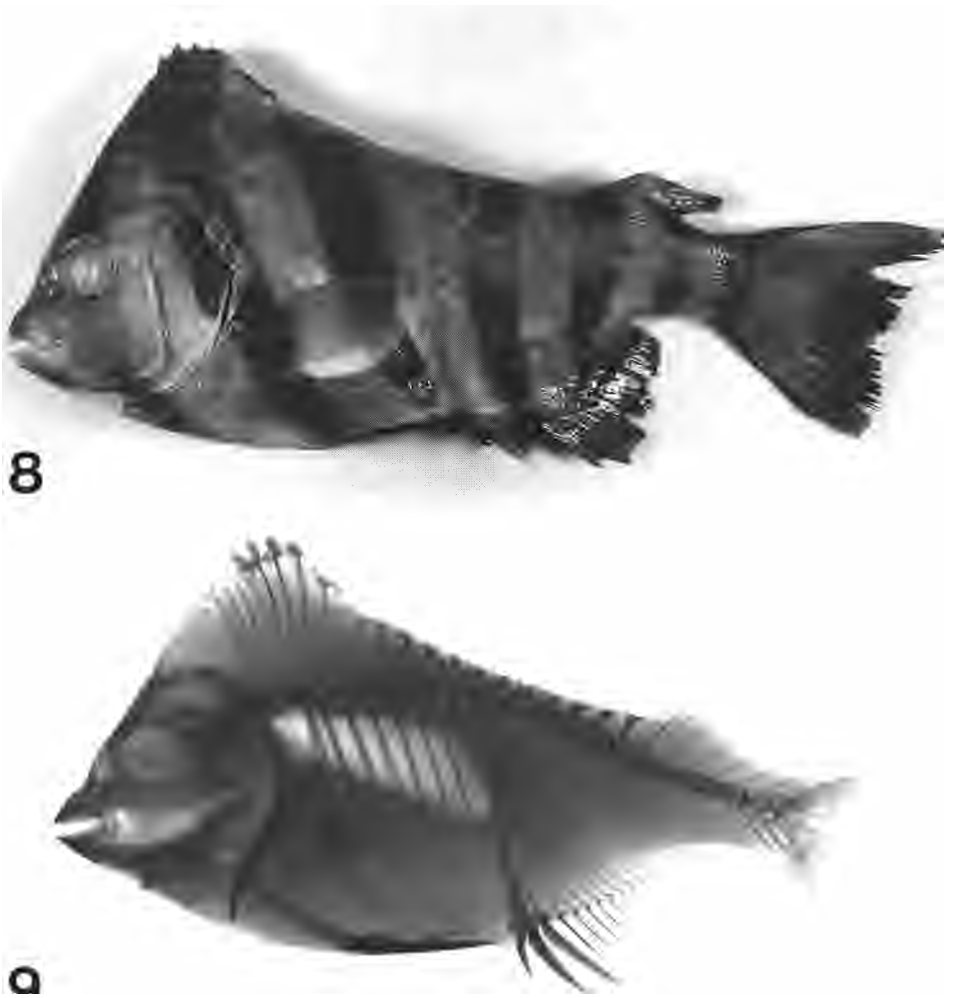

Fig. 8. General features of an injured striped beakperch, *Oplegnathus fasciatus,* caught from off Toyooka, Sado Island, on 4 June, 1992.
Fig. 9. X-ray photograph of the specimen in Fig. 8.

dorsal body contour (i. e. the ridgeline) was concave. The neural spines of the 1st to VIth vertebrae appeared normal, whereas the VIth and later spines were deformed ; the upper parts of the VIth to XVIIth spines were angled anteriorly, the XVIIIth to

Table 2. Measurements of an injured striped beakperch, *Oplegnathus fasciatus,* caught from off Toyooka, Sado Island, on 4 June, 1992.

	mm		
Total length	132	Head	34
Standard length	110	Eye	8
Height at pectoral base	55	Upper jaw	8
Height at anal base	35	Caudal peduncle	13

XXVth appeared normal, but slender, and the XIth to XIVth were the shortest.

This condition seems to have resulted from an attack by a fairly large and sharp-toothed piscivorous fish. Thereafter, the attack not being fatal, the wounded area had healed. Since the axial skeleton of a striped beakperch has been illustrated diagrammatically by Hotta (1961), a comparison can be made between the present aberrant specimen and a normal one. Accordingly, several neurospines of the former appear to have been deformed during healing.

Higashikawa et al. (1984) reported many cases of deformities in pomfrets, *Pampus* spp., which might have resulted from attacks by piscivorous fish, such as cutlass fish, *Trichiurus lepturus.* Several examples showed similar features to the present specimen. Honma and Noda (1987) described a tailless file fish, *Aluterus monoceros,* collected from Ryotsu Bay, Sado Island. The cause of injury was also considered to have been an attack by a sharply toothed fish. In his report on a deformed black porgy *Acanthopagrus schlegeli*, lacking a spinous dorsal fin, Kobayashi (1981) suggested that the deformity was congenital, because there were no recognizable traces of bites or lacerations. However, I surmise that his photographs indicate a similar condition to the present specimen, although the degree of injury is less than in the latter.

6. A Skate, *Raja* sp., with Aberrant Pectoral Fins

Mr. Rokuroh Mizusawa, Noh-machi, Niigata Prefecture, kindly sent me photographs of a skate with the pectorals non-adherent to the head (Fig. 10a, b). The

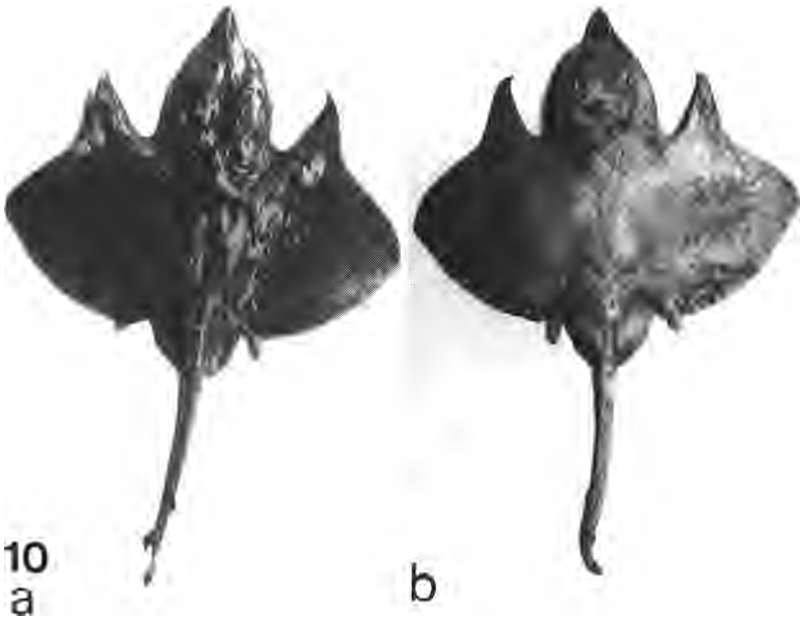

Fig. 10a, b. General features of a skate, *Raja* sp., with aberrant pectoral fins, on 26 December, 1991.
a: dorsal view, b: ventral view.

specimen, identified by Mr. Mizusawa as *Raja kwangtungensis,* was caught at a depth of 230 m off the coast of Naoetsu, western Niigata, in a motor trawler-operated net on 26 December, 1991.

Measurements of the specimen in female are as follows : total length 275 mm, disc length 153 mm, snout length 45 mm, and tail length 134 mm. Mizusawa (1992) considered that the deformity was an example of cranial abnormality. However, I consider that the deformity is a pectoral anomaly, as was reported for a stingray, *Dasyatis akajei,* being the only other record of such a deformity from Japanese waters (Honma and Sugihara, 1971). Remarkably, both the left and right pectoral fins of the present specimen are not adherent to the cranio-thoracic region, the separated fins projecting forward at an acute-triangle, with the hooked tip of each being somewhat inwardly curved level with the nostrils. The angles between the projected fins and the sides of the head are about 40° in each case. No other abnormalities were detected.

Although only a single paper dealing with fin abnormalities in Japanese batoids has been published, at least nineteen papers have documented such abnormalities elsewhere (Williams, 1935 ; Bennet, 1964 ; Honma and Sugihara, 1971).

Although the reason for the failure of the anterior pectoral lobes to join with the head during embryonic development is unknown, Honma, Iwami and Aoyagi (1993) recently obseved that the pectorals of unhatched embryos with filamentous external gills were in fact expanded laterally from level with and just beneath the fifth gill slits to above the ventral fin. Viewed ventrally, the pectoral tips were hook-like, being strongly inwardly curved. Accordingly, the cause of the above-described anomaly seems to be a factor influencing the otherwise normal extension of the anterior portion of the pectoral fins along the lateral margins of the head.

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