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Two New Records of Anomalous Coloration in Japanese Heterosomata with a Summary of Known Records*

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UP to the present not a few cases of anomalous coloration have been recorded for the Japanese flatfishes. The present article adds two new records, one for the bastard halibut and the other for the flathead flounder, and is also intended to give a summary review of the hitherto known records.

THE ABNORMAL BASTARD HALIBUT

An unusual specimen of the bastard halibut, *Paralichthys olivaceus* (TEMMINCK & SCHLEGEL), was caught by gill-net in eight meters of water depth east of Awashima Island, Niigata Prefecture, by Mr. USHINOSUKE KASHIWABA (柏葉丑之祐) of the island in the last ten days of October, 1960. The specimen is an almost completely ambicolorate individual and constitutes the second record of anomalous coloration of the same type (ambicoloration) observed for the bastard halibut from Japan. This abnormally pigmented fish was presented to the senior author through the kind favor of Mr. SHUN'ICHI NAGATA (永田俊一) of the Japan Sea Regional Fisheries Research Laboratory, Niigata (now at the Yamata Fishing Co., Ltd., Tokyo) and is now deposited in the collection of the laboratory.

Description.— The right or lower surface is distinctly anomalous in that except for the pectoral fin its area is pigmented in a manner normally encountered only on the left or upper surface of this species (Fig. 1). This unusual pigmentation is slightly lighter than that of the left side, but tone of color is quite similar. The incomplate eye rotation and hooking of the anterior dorsal fin over the eye, which are said to occur in cases of complete or almost complete ambicoloration (NORMAN 1934; GUDGER & FIRTH 1936), are also remarked (Fig. 2). Thus,

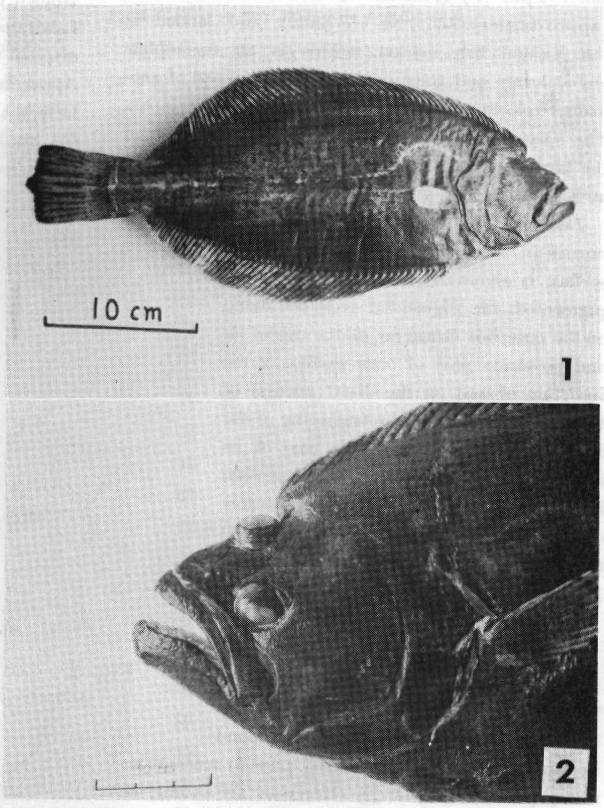

Fig. 1. Right or lower side of almost completely ambicolorate *Paralichthys olivaceus*.

Fig. 2. Left or upper surface of head of the same specimen of *Paralichthys olivaceus* as in Fig. 1, showing the incomplete eye rotation and the hooked anterior dorsal fin.

* 西村三郎・小川良徳：　ヒラメとアカガレイとの両側有色奇形；　付　日本近海産異体類にみられた異常体色奇形の一覧表.

the present specimen may be properly described as an almost complete ambicolorate with incomplete eye rotation and hooked dorsal fin. Measurements of bodily parts of the specimen are given in mm: total length (from tip of the lower jaw) 355; standard length 293; body height 109; head length **L** (left or upper side) 83, **D** (right or lower side) 85; length of upper jaw **L** 36, **D** 35; length of longest pectoral ray **L** 39, **D** 28; length of pectoral base **L** 11, **D** 11; length of longest pelvic ray **L** 23, **D** 23; length of pelvic base **L** 8, **D** 8. Sex not determined.

The Abnormal Flathead Flounder

On May 4, 1962, the junior author found an abnormal specimen of the flathead flounder, *Hippoglossoides dubius* (SCHMIDT), which had been trawled at a water depth of 250 meters due east of the Oki Islands (approximatery 34°05′N, 133°55′E) and landed at the Kasumi fish market. This is an incomplete ambicolorate and constitutes the second record of anomalous coloration for the present species from Japan. The specimen is deposited at the Kasumi Branch of the Japan Sea Regional Fisheries Research Laboratory at Kasumi, Hyogo Prefecture.

Description. — Whereas the right side is normal in all aspects, the left or lower surface is anomalous in that it is partially pigmented: the pigmented areas are found on the posterior dorsal fin, on the caudal fin and posterior part of body surface, at the insertion of and on the distal portion of the pelvic fin, around the beginning of the anal fin and on the greater part of its anterior portion(Fig. 3). The eye rotation is complete and no hooking of the anterior dorsal fin is observed. Total length 230 mm; standard length 194 mm; body height 74 mm; head length 52 mm. Male.

Summary of Known Records

In Table 1 are summarized the hitherto known records (including the present two specimens)of the abnormal coloration found in Japanese flatfishes. Excluding popular accounts and newspaper items, some 23 references are extant; and these are concerned with twelve categories of abnormal conditions in 17 species and subspecies of the families Bothidae, Pleuronectidae, Soleidae and Cynoglossidae. It is apparent that in certain species anomalies are noticed with greater frequency and wider variety than in other species. Although we have not a clear image as to the absolute or relative number of fish of respective species caught from surrounding waters of Japan per annum, it may be tentatively concluded that *Kareius bicoloratus and Limanda yokohamae*-group are particularly apt to produce abnormal individuals within their natural population. It is also remarked that except for *Hippoglossoides dubius* and *Cleisthenes pinetorum herzensteini* the flatfishes listed in the table are mostly shallow-water species inhabiting mainly the upper reaches of the continental shelf, with some representatives which penetrate even into coastal embayments (e. g., *Kareius bicoloratus* and *Limanda yokohamae*-group — the species with most frequent occurrence of anomalies as suggested above).

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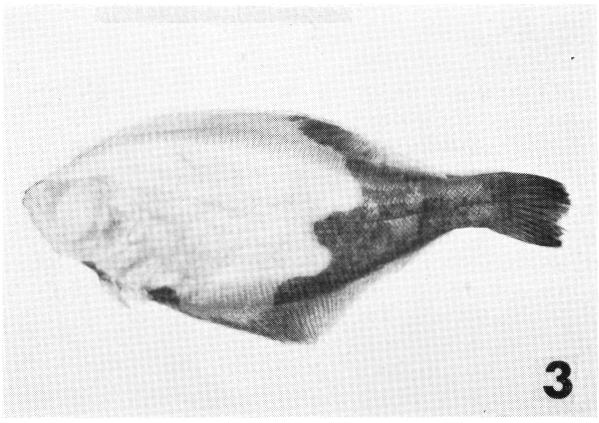

Fig. 3. Left or lower side of incompletely ambicolorate *Hippoglossoides dubius*.

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Table 1. Summary of known records of anomalous coloration of Japanese flatfishes.

Species	Number of specimens	Anomaly*	Place of capture	Sources
Bothidae				
Paralichthys olivaceus	1	B	Kominato, Chiba Pref.	TANAKA (1934)
	1	B	Niigata	OUCHI(1953); HONMA(1956)
	1	A_2	Akita Pref.	YAMAGUCHI(1955, 1956)
	1	A_3	Awashima Isl.	Present article
Pseudorhombus cinnamoneus	1	C_1	Kochi	KAMOHARA (1934)
Pseudorhombus pentophthalmus	1	A_4(?)	Kochi	KAMOHARA (1935)
	2	B	Kochi	KAMOHARA (1935)
Pleuronectidae				
Hippoglossoides dubius	1	A_3	Sado Isl.	HONMA (1958)
	1	A_1	East of the Oki Isls.	Present article
Cleisthenes pinetorum herzensteini	1	C	San'in District	ITO, KATSUCHIYO (personal communication)
	1	A	Off Hachinohe	KASAHARA, KOHEI (personal communication)
Eopsetta grigorjewi	2	B	Off Hamada	IMAOKA (1959a)
	1	A_2	Off Hamada	IMAOKA (1959b)
	1	A_2	Off Hamada	IMAOKA, YOJIRO (personal communication)
	1	A_3	Off Hamada	IMAOKA, YOJIRO (personal communication)

* For the meaning of symbols of the anomaly types see the note overleaf.

Table 1. (Continued).

Species	Number of specimens	Anomaly*	Place of capture	Sources
Eopsetta grigorjewi (contd.)	1	B	Off Senzaki	IMAOKA, YOJIRO (personal communication)
	1	F	San'in District	IMAOKA, YOJIRO (personal communication)
Verasper variegatus	1	A_3	Shiogama	KURONUMA (1940)
Pleuronichthys cornutus	?	A	?	TANAKA (1934)
Limanda yokohamae yokohamae	1	A_3	?	TANAKA (1936)
	1	C_3	?	TANAKA (1936)
	1	A_3	Tokyo Bay	KURATA (1959)
	2	A_4	Tokyo Bay	KURATA (1959)
Limanda yokohamae schrenki	1	A_2	Lake Onnenuma, Hokkaido	HIKITA (1955)
	1	C_1	Lake Onnenuma, Hokkaido	HIKITA (1955)
Dexistes rikuzenius	1	A_1	Off Hamada	IMAOKA, YOJIRO (personal communication)
Platichthys stellatus	1	B	Noheji, Aomori Pref.	TANAKA (1934)
	1	A_5	?	TANAKA (1936)
Kareius bicoloratus	1	A_4	Tokyo (?)	OTAKI (1897)
	1	C_3	Ise Bay	TANAKA (1916)
	1	C_2	Mouth of the Tonegawa	TANAKA (1934)
	?	A_3–A_4	?	TANAKA (1934)
	?	C_3	?	TANAKA (1934)
	1	A_4	Lake Hamanako	KURONUMA (1940)
	1	A_1	Tokyo Bay	MATSUBARA (1955)
	1	A_1	Tokyo Bay	KURATA (1959)
	1	D	Tokyo Bay	KURATA (1959)
Tanakius kitaharai	1	A_1	Off Cape Takayama, Yamaguchi Pref.	IMAOKA, YOJIRO (personal communication)
Soleidae				
Zebrias japonicus	2	E	Seto Inland Sea	TAKI (1938)
Zebrias zebra	1	F	Seto Inland Sea	TAKI (1938)
Cynoglossidae				
Rhinoplagusia japonica	1	B	East China Sea	NISHIKAWA & MAEDA (1954)

* The anomalies are classified and designated by the following symbols:

A – Ambicoloration.

A_1 – Incomplete ambicoloration.

A_2 – Almost total ambicoloration.

A_3 – Almost total ambicoloration, incomplete eye rotation and hooked dorsal fin.

A_4 – Total ambicoloration, incomplete eye rotation and hooked drosal fin.

A_5 – Total ambicoloration, complete eye rotation and normal dorsal fin.

B – Reversed.

C – Albinism.

C_1 – Partial albinism.

C_2 – Total albinism with incomplete eye rotation.

C_3 – Total albinism with hooked dorsal fin.

D – Xanthochroism.

E – Abnormal color markings with anomaly in scalation.

F – Abnormal color markings.