Studies on the Deep-Sea Fishes of Japan.⁽¹⁾

X. On a New Fish, *Notacanthus fascidens*, belonging to Heteromi with Special Reference to its Variations.

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In March 1937 the present author procured one specimen from Tyôsi, Tiba Prefecture and in March 1938 eight ones from Kinkazan, located east to Ozika Peninsula, Miyagi Prefecture, belonging to *Notacanthus*, varying 435 to 632 mm in entire length and he has come to the conclusion that they all are referable to a single species which proved to be new to science although discrepant in several characteristics as given in the present paper.

The author wishes to return herewith his hearty thanks to Professor A. TERAÔ for the kind supervision during the course of his study.

Notacanthus fascidens sp. nov.

New Japanese name: *Kuro-sokogisu*

D. IX, 1; P. 13; V.I. 7; anal spines 13; pyloric caeca 7. Gill-rakers on first arch 3+12.

Head 7.12 in total length; depth at pectoral 11.04; same at ventral 9.82; distance from tip of snout to dorsal 2.75; from tip of snout to pectoral 6.76; between tip of snout and ventral 3.11; from tip of snout to vent 2.56; from tip of snout to anal 2.49; between tip of caudal and dorsal 2.05; base of dorsal 6.90; same of spinous part of anal 8.42; distance from base of pectoral to anal 3.90; from tip of pectoral to anal 5.18; between tip of pectoral and vent 5.55.

Snout 4.45 in head; eye 6.71; postorbital part of head 1.59; maxillary 4.68; interorbital space 5.06; distance from tip of ventral to anal 3.75; from tip of ventral to vent 6.18; horizontal distance between origin of ventral and dorsal 2.79; pectoral 2.12; ventral 3.03; longest anal spine (last one) 4.59; longest anal ray 3.64; caudal 6.98.

Body greatly elongate, compressed, gradually tapering into a long slender tail. Head compressed, oblong, longer than depth of body, much shorter than trunk, 1.78 times in the latter and 2.87 in the length from tip of snout to anal; Snout moderately long, 1.14 times of interorbital width and 1.51 times of diameter of eye which occupies a portion in the middle of the depth of the head. Interorbital space narrow, highly convex, its width 1.23 times of diameter of eye. Nostrils close together, much nearer eye than tip of snout, a line connecting tip of snout and center of anterior nostril, if continued, passes the middle of eye. Mouth inferior, gently curved, reaching anteriorly to below the mid-point between tip of snout and anterior orbital rim; maxillary nearly as long as the length of snout, extending posteriorly to below middle of eye, armed with a posteriorly directed pungent spine on its upper margin; mandible as long as the diameter of eye; teeth sharp and movable, those of upper jaw 33 on each side, set in a single regular series, lancet-shaped, and their acute points obliquely directed outwards; those of lower jaw and palatines slender and erected, in two rows anteriorly and in a single series posteriorly on lower jaw, but in irregular four series on palatines, forming

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a broad band and is parallel to those of the upper jaw. Many mucous pores are rather regularly distributed on sides of head, of which 2 pores before the anterior nostril, 1 above the posterior nostril, 19 are running from tip of snout through suborbital region and postorbital part to interorbital region, and 14 are extending in a line from lower jaw to the initial part of the lateral line with a right angle at the angular part of preopercular region. Lower anterior end of gill-opening reaching short of posterior orbital rim by a distance equal to the 1.25 times of eye; gill-rakers slender, pointed, and remote from each other, about half the length of gill-filaments, the longest one 2.60 in diameter of eye.

Pectorals shorter than half length of head and 2.71 times in the distance from tip of pectoral to vent. Ventrals confluent, not reaching vent, ventral spine armed with two small but pungent spines on its outer margin. First dorsal spine hidden under the skin and much nearer vent than origin of ventral; the last dorsal spine the longest, followed by a soft ray; base of dorsal slightly longer than length of head. Anal commences immediately behind the vent and opposite to the fourth dorsal spine, the base of the last anal spine opposite to the end of base of dorsal; the horizontal distance between end of base of dorsal and origin of first soft anal ray about 2.21 times in the diameter of eye; caudal rudimental. The vent lies below between third and fourth dorsal spine.

Scales very small, adhesive, covering almost every part of body and head exclusive of the marginal region of operculum, the width of the naked area of the latter equal to the diameter of pupil. Lateral line following profile of back in front of dorsal, then gradually into nearly median.

Body and fins dark brown; operculum narrowly edged with black. Inside of buccal cavity, operculum and peritoneum black.

Described and figured (Fig. 1, D) from a male specimen, Imperial Fisheries Institute Fish Sp. No. 5736, measuring 497 mm in total length. The dimensions of 8 cotypes are shown in Table I.

In the present 9 specimens, I observed some remarkable individual variations in the following lines (See Fig. I, A~F and Table I):

1) **Number of anal spines:** The number of spines of anal fin is more variable than that of any other fins. It varies from 10 to 17, each number being found in one, except 13 in two individuals. Hand in hand with the variation of number of anal spines, the length of base of spinous part of anal varies 6.44 to 16.97 in total length of body irrespective of the length of the latter.

2) **Origin of soft part of anal fin:** The origin of the soft part of anal fin also varies in accordance with the variation of number of spinous anal rays. Of 9 specimens I observed, 4 have the origin in question under posterior part of dorsal and the others behind the dorsal; but this variation is gradual as indicated by the vertical lines in Fig. I.

3) **Origin of dorsal fin:** This position is not so variable as is the case with the former. Horizontal distance between origins of dorsal and ventral ranges from 2.79 to 4.79 in head. In other words, 3 specimens have the origin of dorsal just midway between origin of ventral and vent, 1 somewhat nearer to the former than to the latter, and last 3 nearer to the latter than to the former.

4) **End point of base of dorsal:** Of the 9 specimens, 1 ends above sixth soft anal ray, 1 above fifth one, 1 above fourth one, 1 above second one, 3 above last anal spine, 1 above penultimate spine, and 1 above antepenult one. These discrepancies, however, are largely due to the variation of the number of anal spines as the number of dorsal spines and also the length of base of dorsal are less variable as given in Table I.

Fig. 1. Showing the variations of positions of the fins. A, ♂, 526 mm in total length; B, ♂, 469 mm; C, ♂, 435 mm; D, ♂, 497 mm (drawn from type); E, ♀, 632 mm; F, ♂, 576 mm.

....., origin of dorsal fin; —x—x—, origin of spinous part of anal fin;
——, origin of soft part of anal fin; -----, end of base of dorsal fin.

Table I. Measurements of *Notacanthus fascidens*, sp. nov.

Sp. No.	5730	5737	5732	5733	5734	5731	5735	5592
Localities	off Kin- kazan	"	"	"	"	"	"	off Tybat
Sex	♀	♂	♂	♂	♂	♂	♂	♂
Total length (mm).....	932.0	576.0	553.0	547.5	526.0	469.0	435.0	496.0
D.	9+1	9+1	9+1	9+1	9+1	8+1	9+1	9+1
A. (Spinous rays)	16	17	15	14	10	11	12	13
P.	14	12	15	13	13	14	12	12
V.	1+6	1+6	1+7	1+6	1+6	1+7	1+6	1+6
Gill-rakers	3+11	3+11	3+11	3+11	3+12	3+12	3+11	3+12
Pyloric coeca	7	6	6	?	6	6	6	6
Head in total length	6.65	7.11	7.52	6.72	6.92	7.27	7.10	6.89
Depth at pectoral in total length	9.03	11.29	11.29	10.23	10.42	11.17	10.74	10.12
Depth at ventral in total length	8.10	10.87	9.88	9.61	9.23	10.20	8.67	8.70
Dist. from tip of snout to dorsal in total length	2.59	2.61	2.78	2.73	2.66	2.73	2.74	2.71
Dist. from tip of snout to pectoral in total length	6.18	6.56	7.14	6.25	6.41	6.82	7.96	6.32
Dist. from tip of snout to ventral in total length	2.93	3.00	3.06	3.02	2.92	3.02	3.04	3.24
Dist. from tip of snout to vent in total length	2.46	2.42	2.62	2.48	2.45	2.51	2.49	2.65
Dist. from tip of snout to anal in total length	2.41	2.36	2.57	2.40	2.37	2.44	2.42	2.53
Dist. from tip of caudal to dorsal in total length	2.19	2.24	2.05	2.11	2.15	2.09	2.09	2.06
Base of dorsal in total length	5.71	6.10	6.54	6.48	6.68	6.51	5.84	6.36
Base of spinous part of anal in total length	7.09	6.44	7.99	8.62	16.97	11.22	10.88	9.27
Dist. from base of pectoral to anal in total length	3.89	3.60	3.84	3.83	3.63	3.78	3.85	4.19
Dist. from tip of pectoral to anal in total length	5.27	4.62	5.00	5.26	4.87	4.90	4.83	5.80
Dist. from tip of pectoral to vent in total length	5.58	4.92	5.40	5.79	5.16	5.27	5.18	6.40
Snout in head	4.17	4.20	4.20	4.08	4.11	4.08	3.90	3.79
Eye in head	6.79	6.09	6.56	6.68	6.03	6.32	6.52	7.20
Postorbital part of head in head	1.50	1.53	1.52	1.60	1.62	1.64	1.61	1.60
Maxillary in head	3.99	4.43	4.59	4.34	4.58	4.30	4.64	4.86
Interorbital space in head	4.52	5.40	4.65	5.03	4.55	5.08	4.38	4.74
Horizontal dist. between origins of ventral and dorsal in head	4.42	2.87	4.32	4.25	4.42	2.93	4.79	3.27
Pectoral in head	2.21	2.28	2.09	2.04	2.16	2.09	2.25	2.00
Ventral in head	2.95	3.16	2.86	3.02	3.06	2.95	2.85	2.96
Longest dorsal spine in head	9.69	7.23	6.68	6.63	6.50	5.56	5.68	7.06
Longest anal spine in head	?	5.13	4.59	4.22	?	3.62	4.26	4.31
Longest anal ray in head	3.88	4.22	3.91	4.03	4.02	4.03	3.88	3.79
Caudal in head	4.32	6.00	?	6.27	?	7.87	6.59	3.40
Longest gill-raker in eye	3.11	3.50	3.03	2.60	3.32	3.29	3.13	3.23

This new species may be distinguished from the related species as given in the following key*:

- a Head $4\frac{1}{2}$ in body length. The pectorals extend to the base of ventrals. The corner of mouth lies just behind a vertical through anterior border of eye. Pyloric coeca 4. Arabian Sea *N. indicus* LLOYD, 1909.
- a' Head shorter than one-fifth the length of body. The pectorals not reaching ventrals. The corner of mouth extending to at least under middle of eye.
 - b Diameter of eye between $\frac{1}{2}$ and $\frac{1}{3}$ length of snout. The vent lies behind fifth dorsal spine. Gill-openings reaching forward to behind the posterior margin of orbit. Ventral spine 3. Greenland; Iceland; West Indies (?)..... *N. chemnitzii* BLOCH, 1787. Syn. *N. nasus* BLOCH, 1795.

- b' Eye larger than half the length of snout. The vent lies below or before the fourth dorsal spine. Gill-opening appears to be not extending to the posterior orbital rim.
- c Palatine teeth set in a single series. Ventral spine without branch on its outer margin.
 - d Last dorsal spine over anterior part of soft anal. Anal spines 12. East Atlantic; Mediterranean.....*N. bonapartii* Risso, 1840.
 - d' Dorsal and soft anal not passing same vertical. Anal spines 13~14. Gill-rakers on first arch 18. Australian Seas; New Zealand*N. sexspinis* RICHARDSON, 1844.
- c' Palatines with several rows of slender teeth (4 rows in the present new species); teeth on lower jaw double series at least anteriorly.
 - e Anal spines 19 to 24; pectoral rays 17; ventral spines 2 or 3, without branches on their outer margins. Teeth of upper jaw directed inward. Grand Banks of Newfoundland; Sable Island, south of Newfoundland.....*N. phasganorus* Goode*, 1881.
 - e' Anal spines 10 to 17; pectoral rays 12 to 15; ventral spine always 1, with 2 sharp branches on its outer margin. Teeth of upper jaw obliquely directed outward. Off Työsi; off Kinkazan.....*N. fascidens*, n. sp.

NOTE

Among the characteristics used in the taxonomy of the fishes of the family Notacanthidae, the number of anal spines and the positions of the insertions and also end points of the fins, which are in reality most variable, are considered to be of most importance. For example, GOODE et BEAN (1895, p. 167) commented on the differences between *Notacanthus mediterraneus* DE PHILIPPI et VERANY (synonym of *N. bonapartii* Risso) and *N. sexspinis* RICHARDSON as: "This species is distinguished from *N. sexspinis*, . . . , by various characters, most striking of which is the difference in the relation of the position of the dorsal spines and soft anal fin" It would be superfluous to say that one must re-examine whether or not each known species belonging to Notacanthidae is an independent species by taking the above mentioned variabilities into consideration.

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* This species was fully described by GOODE (1881), GOODE et BEAN (1895) and BIGELOW et SCHROEDER (1935).

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