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Redescription of *Pomacentrus nagasakiensis* and comparison with specimens from Miyake-jima and the Bonin Islands

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Pomacentrus nagasakiensis Tanaka was described from two specimens collected at the Nagasaki Fish Market in about 1915. The original description is short with no figures, and written in Japanese. Aoyagi (1941) compared the description of *Pomacentrus nagasakiensis* Tanaka with that of *Pomacentrus caudovittatus* Schmidt (1930) and concluded that the latter is a junior synonym of *P. nagasakiensis*. To identify the *Pomacentrus* specimens from Miyake-jima 34°05′N, 139°30′E) and the Bonin Islands (26°38′N, 142°09′E), it became necessary to check the type specimens of *P. nagasakiensis*. Redescription of types in the Zoological Department, University Museum, the University of Tokyo (ZUMT) was made and our six specimens were compared with them.

Redescription of the holotype and the paratype of *P. nagasakiensis*

Both type specimens are in rather poor condition and were apparently once dried and therefore are somewhat shrunken. It is impossible to describe some details.

Catalogue numbers: holotype ZUMT 6583, 83.0 mm SL; paratype ZUMT 6582, 72.5 mm SL; both specimens were collected by Mr. Ichiro Kaneko at Nagasaki Fish Market. No other data are available.

Counts and proportional dimensions are in Table 1.

Body depth is greater than the head length. The eye diameter is slightly greater than the interorbital width or snout length. The pectoral fin is slightly shorter than the pelvic fin. The length of the second anal spine is equal to that of the last dorsal spine, but longer than the depth of the caudal peduncle.

Shape of fins: Posterior margins of the dorsal and anal fins are round when fully expanded. The tip of the pectoral is rounded, but that of the pelvic is pointed.

The caudal fin is slightly emarginate, both upper and lower tips are rounded, but the upper lobe is slightly larger than the lower.

Dentition: Teeth are compressed in two close-set alternating rows. Tips are slightly rounded. Due to the smallness of the inner row of teeth, only the larger tooth row is visible from the outside.

Internal characters: The vertebral count is 11+15. The caudal fin is supported by the last two haemal spines which are slightly expanded, the parhypural, five hypural plates, three epurals, and the one neural spine of the antepenultimate vertebra. There are three predorsals. Pterygiophores of all but the first two of the spinous dorsal correspond 1–1 to the neural spines of the vertebrae, and those of the soft dorsal correspond 2–1. The second and third predorsals are located between the first and second neural spines, and the first two pterygiophores are between the second and third neural spines. The pterygiophore of the anal spines attach to the haemal spine of the first caudal or 12th vertebra.

Color after 60 years of preservation: The body is uniformly chocolate brown, with the dorsal, anal, and pelvic fins somewhat darker. The pectoral fin is slightly paler than the body. The pectoral base is dark, as is the inner pectoral axil (about half of the entire base). The most distinctive characteristic of the species is the peculiar swirls appearing as wavy bands on the dorsal, anal, and caudal fins.

Comparison of specimens from Miyakejima and the Bonin Islands with type specimens.

Collection data, counts, and proportional dimensions are in Table 1.

The body depth is deeper by about 5% of standard length than that of the types. The pectoral fin length is about 1/3 of S.L., slightly greater than that of the pelvic. The first infraorbital is situated just behind the upper jaw, and has a rather deep notch posteriorly. The spines of the posterior angle of the bone are rather large. Both the holotype and paratype have two spines at its angle, but three of our six specimens have only one spine.

Color in alcohol: In large specimens the body and all of the fins except the pectoral are dark brown to black. The pectorals are hyaline.

Fine blue spots are scattered on the head, especially around the eye. These spots extend anteriorly and downward, forming a few fine lines on the preorbital and upper lip. A triangular black spot is present on the base of the pectoral and the inner axil is also black. The margins

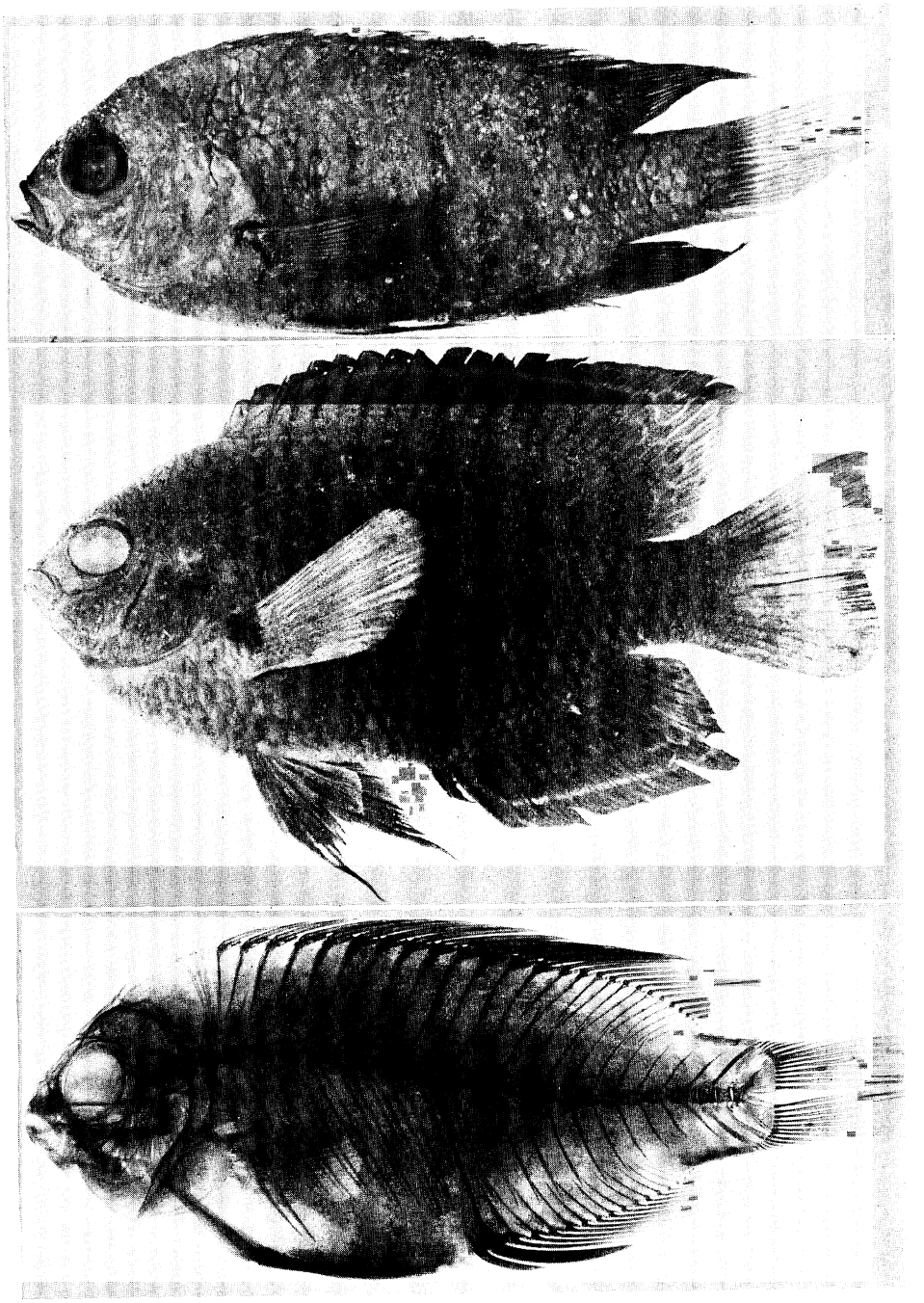

Fig. 1. *Pomacentrus nagasakiensis* Tanaka. Top: holotype, ZUMT 6583, 83.0 mm in s. l.; middle: reference specimen, TMBS 741120-02, 69.4 mm; bottom: radiograph of paratype, ZUMT 6582, 72.5 mm.

Table 1. Measurements in percentage of standard length and counts of the types and reference specimens of *Pomacentrus nagasakiensis* Tanaka.

Locality	Nagasaki		Miyake-jima (1973～1974)				Bonin Island (1969)	
	Holotype ZUMT 6583	Paratype ZUMT 6582	TMBS 741230 -01	TMBS 730726 -08	TMBS 741120 -02	TMBS 740716 -02	FSKU 690620 -05	FSKU 690600 -00
Standard length (mm)	83.0	72.5	87.0	86.0	69.4	53.2	71.0	70.8
In % of s. l.								
Body depth	43.5	44.0	49.4	50.4	49.7	47.4	53.2	46.3
Head length	30.3	29.0	29.9	28.5	30.3	31.0	28.6	28.0
Snout length	8.6	8.4	8.6	7.8	8.5	8.6	9.9	7.9
Eye diameter	9.6	10.6	9.2	9.4	9.8	10.5	10.4	10.3
Interorbital width	8.2	9.0	10.4	9.8	10.4	11.3	10.1	10.0
Pectoral fin length	32.7	31.9	30.8	30.2	32.4	34.9	32.1	30.5
Pelvic fin length	34.9	34.8	33.0	34.1	35.4	38.7	34.5	34.6
Caudal peduncle depth	14.7	15.3	16.1	16.3	15.9	15.4	14.7	15.3
Length of dorsal fin base	61.4	63.4	66.1	66.4	65.8	65.8	66.6	66.4
Length of anal fin base	30.1	30.3	34.9	32.6	34.9	32.0	31.1	32.5
Length from snout to dorsal origin	34.9	35.5	36.5	36.1	36.0	37.8	36.0	35.7
Length from snout to anal origin	65.1	66.2	62.0	65.1	65.8	61.7	63.6	60.9
D	XIII, 14	XIII, 14	XIII, 14	XIII, 16	XIII, 15	XIII, 14	XIII, 14	XIII, 14
A	II, 16	II, 16	II, 16	II, 17	II, 17	II, 16	II, 16	II, 16
P_1	ii, 14, ii	ii, 14, ii	ii, 14, i	ii, 14, ii	ii, 14, i	ii, 14, i	ii, 14, i	ii, 14, ii
P_2	I, 5	I, 5	I, 5	I, 5	I, 5	I, 5	I, 5	I, 5
Vertebrae	11+15	11+15	11+15	11+15	11+15	11+15	11+15	11+15
Longitudal scale	?	?	26	26	24	26	26	25
L. 1.	18+8	18+8	18+8	19+7	18+8	17+8	17+8	18+8
L. tr.	4/10 ?	4/10 ?	5/9	4/10	4/10	4/9	4/10	4/9
Gill raker	(5)+1+14 (broken)		6+1+12	6+1+13	6+1+14	6+1+13	6+1+14	6+1+14

of the dorsal and anal fins are clearly visible (Fig. 1).

Color in life: In juvenile specimens of less than 30 mm in standard length, many blue lines extend from the snout above and below the eye to the opercle. The body color is dark blue. Pelvic and anal fins are blue anteriorly, fading to grey posteriorly. The spinous dorsal is grey with dark tips to the spines. A large black eye-spot on the grey soft dorsal is rimmed in bright blue. The caudal fin is transluscent. The blue lines on the head and the blue body color disappear with growth. By 50 mm in S.L. the body has taken on the dark grey color of adult specimens, with a black spot on the pectoral base, and an orange spot at the inner pectoral axil. The black eye-spot on the soft dorsal remains, still rimmed in blue. This eye-spot remains faintly visible up to about 70 mm in S.L. It is not visible in larger specimens. In adults, more than 70 mm is S.L., head and body are uniformly dark grey. A black spot is visible on the pectoral base, and an orange spot can be seen above the base of the pectoral fin. Dorsal, anal, and caudal fins vary in color from dark grey to very light yellowish-grey, and the swirls, diagnostic in dead specimens, appear faintly visible. Color patterns related to reproductive and agonistic behavior will be described by Moyer. An excellent color photograph of *P. nagasakiensis* in reproductive display coloration was published by Honda and Imai, 1973.

Lateralis system of the head: Because of heavy squamation on the head, the pattern of distribution of the sensory canals cannot be followed. Small openings of the sensory canals are distributed on the naked circumorbital region (Fig. 2). Many small branches of these canals are distributed on the surface of post-ocular scales. The most distinctive feature of

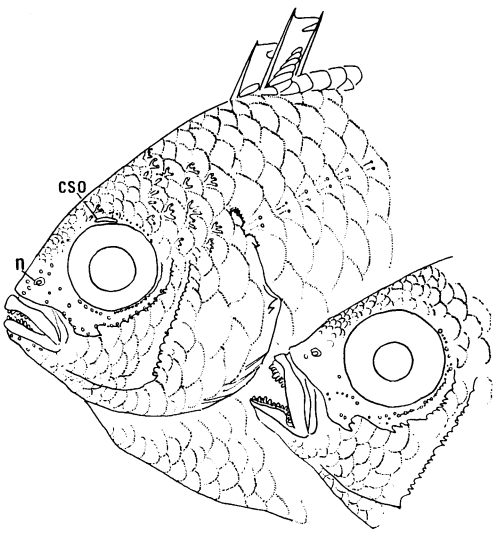

Fig. 2. Head of *Pomacentrus nagasakiensis* showing lateralis and serration of circumorbitals and preopercle. Left: TMBS 741120-02, right: ZUMT 6583 (holotype). n: nasal opening; cso: crescent opening of supraorbital canal.

the system is the presence of a large opening, crescent in shape, just above the eye. This crescent opening of the supraorbital canal can be seen in most pomacentrids, but not as large as in *Pomacentrus nagasakiensis*.

Discussion on synonymy

Aoyagi synonymized *Pomacentrus caudovittatus* Schmidt with this species on the basis of the markings on the soft dorsal, anal and caudal fins. We agree with Aoyagi's conclusion but Schmidt's (1930) description of "two strongly denticulated and stiff scales over the opercular slit" should be interpreted as "posterior ends of the posttemporal and supracleithrum are exposed and denticulated". The color photo by Yasuda and Tateishi (1971) under the name of *Pomacentrus* sp. is the juvenile of *P. nagasakiensis* and clearly shows the peculiar light swirls on soft dorsal, anal, and caudal fins and the orange marking on the pectoral base.

Distribution: Matsubara (1955) shows *Pomacentrus nagasakiensis* ranging from Nagasaki Prefecture to Kochi in Shikoku and the Kii Peninsula of Honshu. Schmidt's *Pomacentrus caudovittatus* is from Amami Island. Mr. T. Yoshino informed us that the species occurs quite commonly at Okinawa-jima. Our records from Miyake-jima and the Bonin Islands slightly extend this range.

Comparison of *Pomacentrus nagasakiensis* with other species of *Pomacentrus*

The range of meristic counts of our six specimen overlaps those of the two types. There is rather wide variation in the number of soft dorsal rays, lateral line scales, and transverse scales. The proportional dimensions vary with specimens and according to stages in growth. This is especially true of eye diameter and snout length. The color change from blue or other brilliant colors to dark or dull colors with growth is not rare among the family Pomacentridae, e.g. *Pomacentrus coelestis, P. nagasakiensis, Abudefduf xanthonotus,* and *Cheiloprion labiatus* are bright blue when young, darkening with age. Eye spot coloration on the soft dorsal and a smaller spot on the origin of the lateral line vary with individuals and growth and are discussed by some authors (Aoyagi, 1941; Fowler and Bean, 1928).

Species of the genus *Pomacentrus* having a distinct notch between the first and second infraorbitals with serrated edges are as follows: *Pomacentrus tripunctatus, P. moluccensis, P. bankanensis, P. littoralis, P. dorsalis, P. lepidogenis* etc. Of these, the first three species are light yellow when young and distinguishable from the dark blue colored young of *P. nagasakiensis*. The latter three species resemble *P. nagasakiensis* in their body color but lack narrow light wavy lines on their caudal fins. *Pomacentrus reidi* has very similar coloration to this species but has smooth infraorbitals (Fowler and Bean, 1928).

One of the peculiar features of *Pomacentrus nagasakiensis* is the presence of a large crescent shaped perforation of the supraorbital canal, just above the eye. We are unable to confirm the presence of this feature in the type specimens, due to their poor condition.

The character that most easily distinguishes *P. nagasakiensis* from other species in the genus is the presence of light wavy swirls on the caudal, dorsal, and anal fins.

Among the fishes of the genus *Pomacentrus*, specimens having combinations of the following characters should be identified as *Pomacentrus*

nagasakiensis: region of snout and infraorbitals naked; posteroventral corner of the first infraorbital with one or two stout spines; a deep notch present between the first and second infraorbitals; posterior margins of infraorbitals and preopercle strongly serrated; posterior ends of the posttemporal and supracleithrum are exposed and denticulated; body color blue with pale caudal fin and having an eye spot on the base of soft dorsal when young; a dark triangular blotch saddling upper base and axil of the pectoral fin.

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ナガサキスズメダイの形態と色彩

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ナガサキスズメダイ *Pomacentrus nagasakiensis* の模式標本の再記載を行ない，新たに得られた標本を調査した．ナガサキスズメダイは同属の他種と同様に眼下骨および前鰓蓋骨の鋸歯縁は良く発達し，周眼部は無鱗で多くの側線分枝の開孔があり眼上部の開孔は特に大きい．成魚の他種との区別点は背鰭鰭軟条部と尾鰭の淡色の波状ないし網状の模様がある事である。若令魚の体色は暗青色で後部の背鰭軟条に濃色の眼状斑がある．成長に伴ない体色は次第に暗色となり胸鰭基底に黒色斑が，その内側に橙色斑が出現し体長が約 70 mm 前後で背鰭の眼状斑は消失する．

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