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On the Meristic and Morphometric Differences between *Scombrops boops* and *S. gilberti*

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Abstract *Telescopias gilberti* Jordan and Snyder, so-called "kuromutsu", has been treated as a synonym of *Scombrops boops* (Houttuyn) "mutsu". These scombropid fishes have been given many local names within the same area, and their prices in markets vary with those names. The meristic and morphometric characters of these scombropid fishes from Sagami Bay and Izu Islands were surveyed. Marked differences were found in four meristic characters, internal characters, and also body coloration, between these two forms and the results agree well with the descriptions of Jordan and Snyder for *S. boops* and *T. gilberti*. Because of these differences, we concluded that these two species should not be treated as synonymous, but these differences do not warrant their recognition as different genus.

Introduction

In the original description the genus *Scombrops* Temminck and Schlegel (1845) was not accompanied with the name of species. Bleeker (1854) was the first to name the species *Scombrops cheilodipteroides*. However, Jordan and Snyder (1901a) found that this species is identical with *Sparus boops* Houttuyn and thereby established *Scombrops boops* (Houttuyn). After that, Jordan and Snyder (1901b) described *Telescopias gilberti* and distinguished it from *S. boops* on the basis of the differences in numbers of pored scales in the lateral line, transverse scales, gill rakers, and spines of the anal fin. Tanaka (1931) synonymized *T. gilberti* with *S. boops* and succeeding authors followed him except Oshima (1939).

On the other hand, the age and body length composition of these scombropid fishes were studied by Yasuda and Iehisa (1939) and Yasuda (1939), and Isokawa (1949) studied the morphology of teeth.

In the present study, the authors revealed that the scombropid fishes were given many local names within the same area and it was also found that the price varies with the name.

In view of the above points the authors surveyed the meristic and morphometric characters of the scombropid fishes from Sagami Bay and Izu Islands.

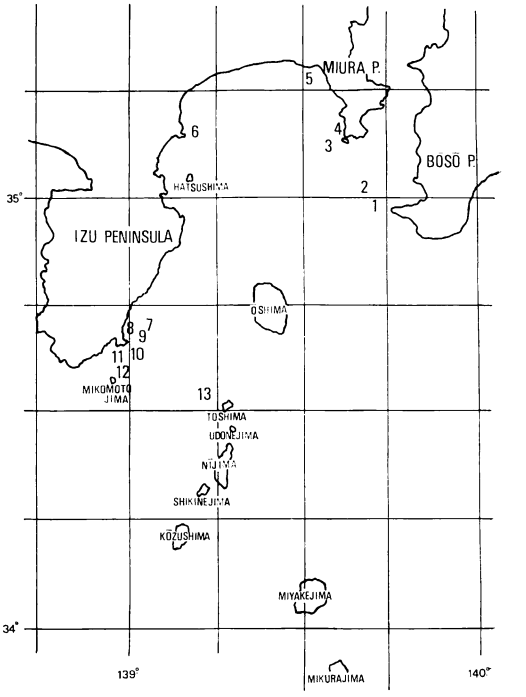

Fig. 1. Location of fishing grouns surveyed. 1. Nakanba 2. Okinose 3. Kadooki 4. Moroiso 5. Kamakura 6. Nebukawa 7. Rokujūne 8. Kawazu 9. Ōgatagyosho 10. Ikabanosagari 11. Gangara 12. Shijūne 13. Udomaawase

Table 1. List of the materials: figures show the range and the means are in parentheses.

Fishing ground (cf. Fig. 1)	Water depth (m)	Sampling date	Fishing method	Number of specimens	Body length (mm)
Nakanba	80–130	Dec. 19, '70	hand line	8	220–467 (348)
Okinose	100–160				
Kadooki	100–200	Dec. 7, '70	hand line	2	356–398 (377)
Moroiso	10 – 15	Dec. 7, '70	set net	14	151–202 (159)
		Jul. '68		15	95–130 (112)
Kamakura	30	Nov. 9, '70	set net	9	153–169 (162)
Nebukawa	100	Dec. 8, '70	hand line	2	216–254 (235)
		Dec. 27, '70		3	316–535 (393)
Rokujūne	100	Nov. 6, '70	hand line	3	239–259 (247)
		Dec. 16, '70		15	215–286 (254)
Kawazu	50	Oct. 15, '70	hand line	6	109–147 (127)
		Nov. 16, '70	set net	12	111–145 (125)
Ōgatagyosho	50 – 60	Nov. 16, '70	hand line	8	181–256 (202)
Ikabanosagari	140	Nov. 16, '70	hand line	22	229–343 (277)
Gangara	120	Dec. 19, '70	hand line	1	404
Shijūne	60	Dec. 19, '70	hand line	1	233
Udomaawase	130–300	Nov. 6, '70	hand line	1	455
		Dec. 16, '70		14	359–522 (455)
		Dec. 27, '70		2	303–397 (350)
		Feb. 24, '71		25	392–544 (454)
30 miles off Torishima	500–600	Dec. 8, '70	hand line	9	358–762 (620)

Materials and methods

The materials examined in the present study are shown in Table 1 and a map of the fishing ground is shown in Fig. 1.

Ordinarily the specimens were preserved by freezing after their color photographs were taken. Counts and measurements were done in the laboratory except the large specimens which were examined at the field. The eight meristic and 20 morphometric characters, including two internal characters such as cranium and premaxillary were selected for examination as they are the characters which are commonly used and can be measured after defrosting.

The number of transverse scales was counted from the scale under the 3rd dorsal spine. Together with these the body color were also examined.

Results

Local name: The local names of scombropid fishes found in our investigation, mainly based on the information from anglers, people in fish markets, and boat-owners, are shown in Table 2.

The local name of "shiromutsu" or "medaka" commonly used around the west coast of Miura Peninsula indicates the members of the genus *Malakichthys*. The "kinmutsu",

Table 2. Local names of scombropid fishes.

Local name	Locality
mutsu	South of Bōsō Peninsula and around Sagami Bay
kuromutsu	South of Bōsō Peninsula and around Sagami Bay
akamutsu	Tateyama, Misaki, Hayakawa, and Shimoda
ginmutsu	Around Sagami Bay
kinmutsu	Misaki
tsunokuchi	Misaki (Tanaka and Abe, 1955)

"ginmutsu" and "akamutsu" are mainly classified by the body color of the scombropid fishes, however in some cases the term "akamutsu" is used to mean a species of a different family, *Doederleinia berycoides* (Hilgendorf). The "mutsu" and "kuromutsu" are distinguished by the fishermen on the basis of the shape of head, size of scales and body color. The local name "tsunokuchi" recorded in Tanaka and Abe (1955) cannot be clarified in the present study.

Meristic and morphometric characters: The number of pored scales in lateral line of the 172 individuals is shown in Fig. 2. As shown in the figure, the samples can be divided into two groups: type A with 50–56 (mean 53) in lateral line scales and type B with 60–68 (mean 63).

The number of transverse scales of the 113 individuals varies widely, those above the lateral line ranges from 6 to 9 and those below the lateral line from 10 to 17. As shown in Fig. 3, the number of transverse scales in type A ranges from 6–9/10–15 (mean 7/13) and type B from 8–9/14–17 (mean 8/15).

The number of gill rakers of the 100 individuals also varies widely (Fig. 4). The number of gill rakers is from 1 to 5 on the upper arch, 1 at the junction and from 8 to 16 on the lower arch. As shown in Fig. 4,

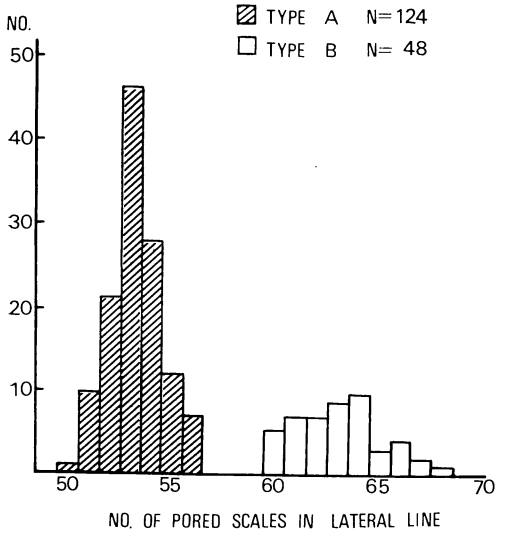

Fig. 2. Frequency distribution of number of pored scales in lateral line in types A and B.

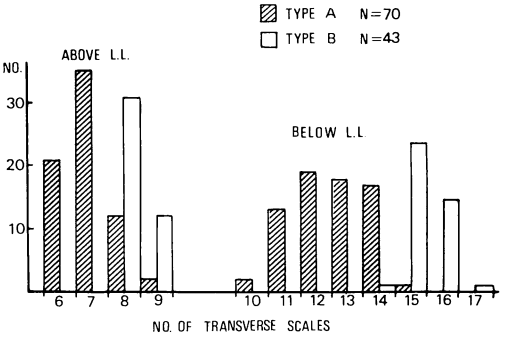

Fig. 3. Frequency distribution of number of transverse scales in types A and B.

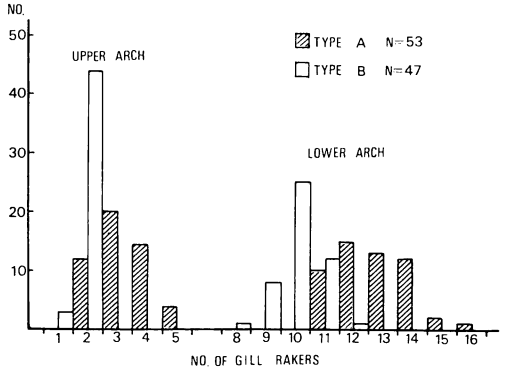

Fig. 4. Frequency distribution of number of gill rakers in types A and B.

Table 3. Number of teeth on both jaws in types A and B; the means are shown in parentheses.

	Upper jaw		Lower jaw		Body length (mm)	
	left	right	left	right		
A	13–15 (14)	13–15 (14)	10–12 (11)	9–11 (10)	259–360	(302)
B	16–20 (18)	16–21 (18)	13–18 (15)	14–17 (16)	354–426	(396)

in type A it is 2–5+1+11–16 (mean 3+1+13) and in type B 1–2+1+8–12 (mean 2+1+11). In case of type A, undeveloped gill rakers are arranged regularly between normal gill rakers, these undeveloped ones were not included as gill rakers in the present study.

Teeth of four individuals selected from each type were observed. Teeth of the two types are conical and similar, but those of type B are slightly slenderer than type A. Types A and B are different in the number of teeth as shown in Table 3.

Internal characters: The internal characters of the two types having four individuals each as classified above by meristic characters were compared. Marked differences were found in the following characters such as frontal, supraoccipital, ethmoid, and vomer of cranium and premaxillary. The shape of the posterior part of frontal of type A is narrowly produced and the angle which is made with right and left frontals is much sharper than

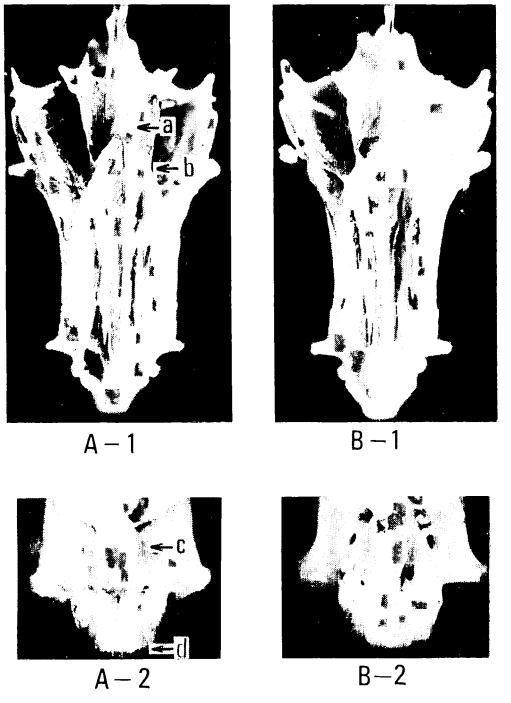

Fig. 5. Crania of type A (B.L. 360 mm) and type B (B.L. 354 mm). Anterior upper edge of supraoccipital (a), posterior part of frontal (b), ethmoid (c) and vomer (d).

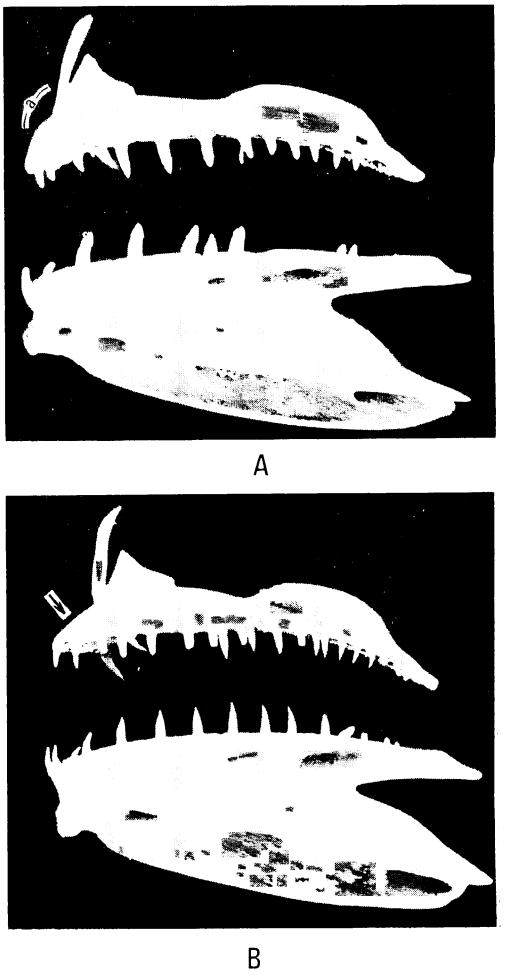

Fig. 6. Shape of premaxillary and dentary in type A (B.L. 360 mm) and type B (B.L. 419 mm).

Table 4. Comparison of meristic and morphometric characters in types A and B.

		A				B			
		Min.	Max.	Mean	N	Min.	Max.	Mean	N
B.L. (mm)		95	762	234	124	316	535	447	48
D.	1st	VIII	IX	IX	124	VIII	IX	IX	48
	2nd	I, 12	I, 14	I, 13		I, 12	I, 13	I, 13	
A.		III, 11	III, 13	III, 12	124	III, 11	III, 13	III, 12	48
P_1.		15	17	16	97	16	17	16	3
P_2.		I, 5	I, 5	I, 5	124	I, 5	I, 5	I, 5	48
G.R.	upper	2	5	3		1	2	2	
	junction	1	1	1	53	1	1	1	47
	lower	11	16	13		8	12	11	
L.l.		50	56	53	124	60	68	63	48
L. tr.	above	6	9	7	70	8	9	8	43
	below	10	15	13		14	17	15	
B.L./H.L.		2.53	3.07	2.86	124	2.79	3.17	2.96	48
B.L./B.D.		2.86	4.03	3.42	122	2.71	3.98	3.21	48
H.L./C.P.D.*		3.00	3.75	3.40	69	3.20	3.77	3.46	29
H.L./Intor.**		3.14	4.20	3.71	69	3.39	4.59	3.98	29
H.L./S.L.		3.14	3.92	3.60	55	3.29	3.86	3.56	48
H.L./E.D.		3.00	4.47	3.73	90	3.42	4.15	3.78	48

* C.P.D.—Depth of caudal peduncle. ** Intor.—Interorbital space.

that of type B (Fig. 5–b), and interorbital space of type A is wider than that of type B. Although the surveyed samples are a few in number, the ratio of interorbital space to cranium length (from the tip of vomer to the end of basioccipital) ranges from 3.20 to 3.55 (mean 3.39) in type A and from 3.41 to 4.04 (mean 3.73) in type B. These results agree with the external characters, in which cranium length will be replaced by head length. The part which joints the supraoccipital to frontal was gibbous and triangular in case of type A, but in type B that is a little slender than in type A (Fig. 5–a). Ethmoid of type A is widely gibbous and its tip is more produced than that of type B (Fig. 5–c). Anterior edge of the vomer of type B is more produced than that of type A (Fig. 5–d). Shape of the anterior part (Fig. 6–B–↑) of the premaxillary, especially the angle between the premaxillary pedicel and anterior part of premaxillary (Fig. 6–A–a) is smaller in type B than in type A and anterior part of premaxillary is more produced in type B.

Coloration: The ground color of body in type A, when fresh, is widely variable, mainly reddish brown or golden brown with silvery tint in belly. Caudal fin is yellowish brown with transparent margin and a black narrow band is present along the transparent margin. On the contrary, in type B, ground color is blackish brown with caudal fin also blackish brown.

Details of the meristic characters and ratio of the morphometric measurements of the types A and B studied here are shown in Table 4.

Discussion

The two types can be distinguished by the number of pored scales in lateral line. There are also marked differences in numbers of transverse scales, gill rakers, and teeth. Among these the numbers of pored scales in lateral line, transverse scales, gill rakers of the two types agree well with *S. boops* "mutsu" (type A) and *T. gilberti* "kuromutsu" (type B) of Jordan and Snyder (1901b) and Oshima (1939) respectively.

However, the number of gill rakers of *S. boops* does not always agree with that of type A. Some error might have occured in counting due to the presence of some undeveloped gill rakers.

In case of the number of dorsal fin rays, Temminck and Schlegel (1845) noted 8 and 2+13 for the genus *Scombrops*. Similarly, for *S. boops*, Jordan and Snyder (1901b) reported VIII–I, 13, whereas Bleeker (1854) as 8–1–1/13–14 etc. Bleeker's formula for dorsal fin rays, 8–1–1, means that the first dorsal has eight spines, the second dorsal has one spine and there is a small spine between the first and second fins.

On the contrary, Jordan and Snyder (1901b) and Oshima (1939) reported the number of dorsal fin rays of *T. gilberti* as VIII–I, 13. Nakamura (1934) pointed out some changes in the number of dorsal fin rays with growth, and reported that the eighth and ninth spines of the first dorsal fin in young stages of *S. boops* were connected with the fin membrane. From above point of view he also proposed that the number of the first dorsal fin rays of *S. boops* should be nine.

In the present study, the ninth dorsal spine was found to be the shortest of all the spines and was also found buried in a groove of the dorsal fin base in large specimens. Therefore, this spine can only be recognized by dissection or by the examination of soft X-ray films. The small spine between two dorsal fins should belong to the first dorsal fin on the basis of the results of Nakamura (1934) and the facts revealed from our survey about the structure of dorsal fin rays and interneural spines.

In case of the number of anal fin rays, Temminck and Schlegel (1845) reported 2+12 for the genus *Scombrops*. For *S. boops*, Jordan and Snyder (1901b), and many other researchers reported III, 13.

On the other hand, Jordan and Snyder (1901b) and Oshima (1939) reported the number of anal fin rays of *T. gilberti* as II, 13. The difference between II and III was a point of division of the above two species.

In the present study, the first anal spine was occasionally found buried in the body so that it was not easily visible except the examination of soft X-ray films. The number of anal fin rays did not vary in the two species like that of the dorsal fin rays.

Research on only a few meristic counts was done previously, but in the present study the authors examined and compared some internal characters such as the cranium and premaxillary as well as body color etc. The above results indicate that the two types A and B belong to two different species: type A is referred to *S. boops* and type B, to *T. gilberti*. However, marked differences were not found in many meristic and morphometric characters except in the four meristic characters. This fact may indicate some close phyletic relationship between these two forms. Therefore the present authors recommend to place both species under the genus *Scombrops*.

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ムツおよびクロムツの形態的差異について

安田 富士郎・望月 賢二・河尻 正博・能勢 幸雄

相模湾一帯及び伊豆諸島より得られたムツおよびクロムツ 172 個体について，8 計数形質，20 計量形質，体色及び内部形態として頭蓋骨，前上顎骨の比較検討を行なったところ，4 計数形質，体色及び内部形態で両者を識別することが出来た．

以上の点からクロムツとムツとを同一種として取扱うことは適切でなく，別種の魚として扱われるべきである．

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