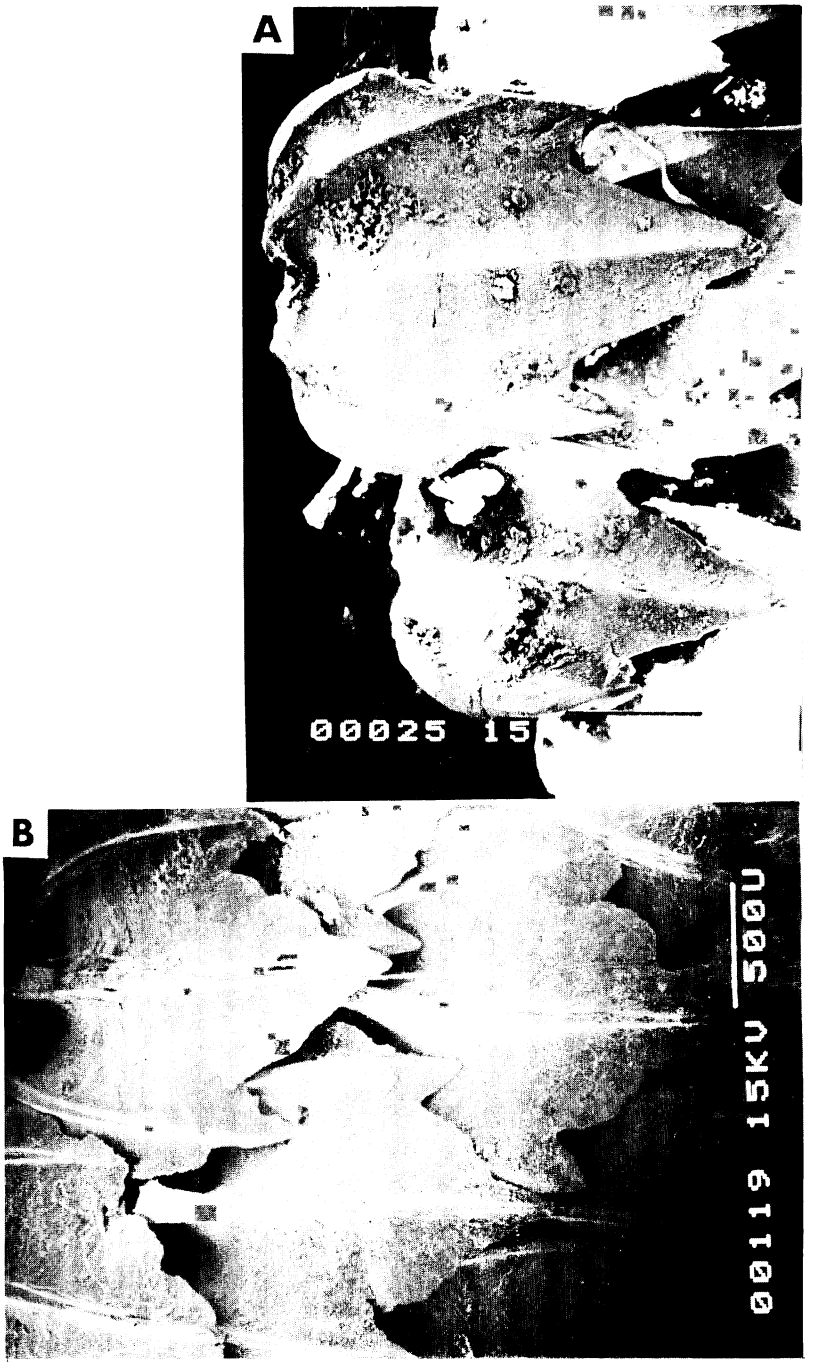


Fig. 7. Dermal denticles on the trunk below 1st dorsal fin of *Scymnodon ringens* and *S. plunketi*. A, syntype of *S. ringens*, 880 mm TL, BMNH 1867. 7. 23.3; B, *S. plunketi*, Canterbury Museum Fish cat No. 437, 1,375 mm TL. Each scale indicates 500 $\mu$m.

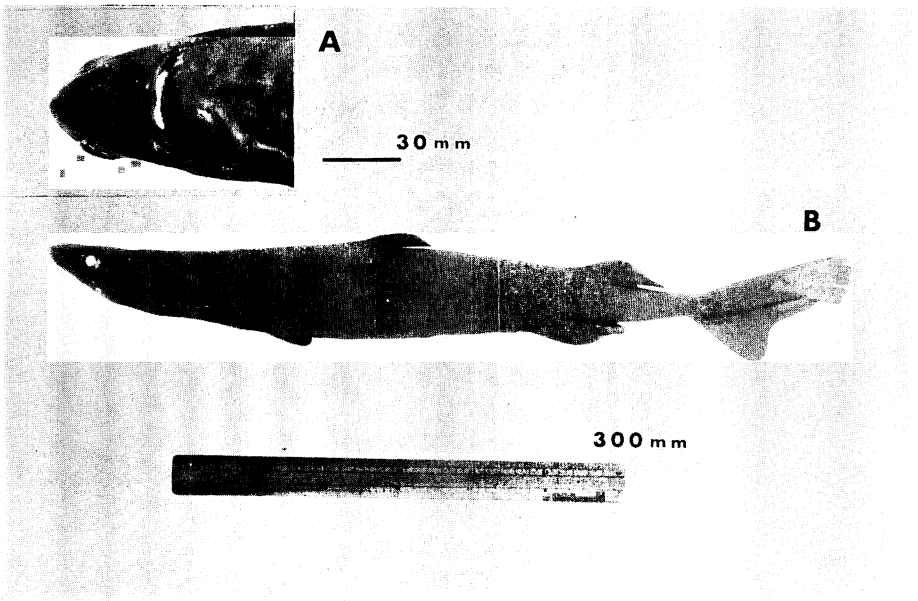


Fig. 8. *Scymnodon squamulosus*, male, 547 mm TL, NSMT-P 21725. A, ventral view of head region; B, lateral view.

Testis weight was 36.6 g in 993 mm TL and 42.7 g in 892 mm TL. The juvenile, 492 mm TL, had very small and soft claspers.

Five larger females, from 1,260 mm to 1,455 mm TL, had developing ova. The ovary contained 29 to 56 ova measuring 30 mm to 50 mm in diameter, and the uteri measured 20 mm to 45 mm in width. One immature female, 1,055 mm TL, had small ova measuring less than 5 mm in diameter and undeveloped uteri measuring 8 mm in width.

**Etymology.** The specific name *ichiharai* is dedicated to the late Dr. Tadayoshi Ichihara who was a Professor of Tokai University and suggested this work.

**Remarks.** The proportional dimensions in percentage of TL of the closely related *S. ringens* and *S. plunketi* are shown in Table 2. *S. ringens* differs from *S. ichiharai* in having: longer head region, e.g., distance from snout tip to mouth, distance from snout tip to pectoral origin; longer distance from snout tip to 1st dorsal spine origin; longer upper caudal lobe and eye diameter (Tables 1, 2); and tridentate dermal denticles in the adults (Fig. 7A). *S. plunketi* differs from *S. ichiharai* in having: shorter head region, e.g., distance from snout tip to outer nostrils, to eye, to spiracle, to mouth and to pectoral origin; longer upper caudal lobe; (Tables 1, 2); and tridentate dermal denticles in the adults (Fig. 7B).

***Scymnodon squamulosus*** (Günther, 1877)
(Japanese name: Biroudozame)
(Fig. 8)

*Centrophorus squamulosus* Günther, 1877: 433, (type locality: Japan). Günther, 1887: 5～6, pl. II, fig. B.

*Centroscymnus obscurus* Vaillant, 1888: 67～68, pl. II, fig. 2a～e (type locality: Soudan).

*Zameus squamulosus*: Jordan and Fowler, 1903: 633 (Japan).

*Scymnodon squamulosus*: Regan, 1908: 48; Garman, 1913: 209; Fowler, 1930: 496; Schmidt, 1931: 7 (Japan).

*Scymnodon obscurus*: Bigelow and Schroeder, 1957: 101; Krefft, 1980: 3～7, fig. 1 (Atlantic); Nakaya, 1982: 47, pl. 9 (Japan).

**Material examined.** NSMT-P 21725, male, 547 mm TL, 437 mm BL, entrance of Suruga Bay (off Omaezaki, F8), 450～830 m in depth, bottom longline, Nov. 9, 1982. TMFE 1274, male, 522 mm TL, 416 mm BL, entrance of Suruga Bay (off Omaezaki, F8), 450～830 m in depth, bottom longline, Nov. 9, 1982. TMFE 522, male, 527 mm TL, 421 mm BL, outside Suruga Bay (Kanesu-no-se, F9), bottom longline, July 26, 1981. FUMT-P 3858,

male, 539 mm TL, 430 mm BL, outside Suruga Bay (Kanesu-no-se, F9), bottom longline, July 26, 1981. FSFL-EB 527, female, 634 mm TL, 527 mm BL, off Australia (33°58.2′S, 114°21.3′E), 965 m in depth, bottom trawl net (Kaiyo Maru), Nov. 23, 1975. NSMT-P 40455, male, 284 mm TL, 222 mm BL, off Suriname (7°46′N, 54°14′W), Jan. 17, 1980. NSMT-P 40454, male, 262 mm TL, 202 mm BL, off Suriname (6°51′N, 52°26′W), 675 m in depth, Jan. 26, 1981. NSMT-P 40458, male, 392 mm TL, 310 mm BL, off Suriname. NSMT-P 40457, male, 365 mm TL, 290 mm BL, off Suriname (7°44′N, 53°50′W) 726 m in depth, Nov. 27, 1980. NSMT-P 40453, female, 334 mm TL, 261 mm BL, off Suriname (7°43′N, 53°59′W), 570 m in depth, June 16, 1981. NSMT-P 40452, female, 352 mm TL, 278 mm BL, off Suriname (7°53′N, 54°08′W), 620 m in depth, Apr. 6, 1980. NSMT-P 40456, female, 332 mm TL, 262 mm BL, off Suriname (6°52′N, 52°29′W), 625 m in depth, Jan. 26, 1981.

**Diagnosis.** Length from snout tip to 1st dorsal fin spine 49.4～56.4% of body length. Interspace between pelvic and caudal fins 13.4～17.6% of body length. Preoral length about equal to mouth width. First dorsal fin triangular.

Size of 2nd dorsal fin about equal to pelvic fin. Cutting edges of lower teeth inclined toward the outer corner of jaw. Median lower tooth symmetrical. Dermal denticles leaf-like, tridentate. External surface of each denticle has three distinct longitudinal ridges and transverse ridges.

**Description.** Proportional dimensions in percentage of TL are shown in Table 3.

Trunk subcylindrical, moderately elongate; head depressed, flat above; abdomen with distinct abdominal ridges ventrolaterally. Caudal peduncle without lateral keels or precaudal pits. Snout length anterior to eye 0.69～1.14 (1.00～1.13 in ranges of seven Atlantic specimens, NSMT-P 40452～NSMT-P 40458) in horizontal diameter of eye and 1.41～2.00 (1.70～2.21) in interorbital length. Length from posterior end of eye to 1st gill opening slightly longer than snout tip to mouth. Length from snout tip to mouth 1.00～1.15 (0.96～1.16) in posterior end of eye to 1st gill opening. Eye large, vertical diameter of eye 2.17～2.50 (2.22～3.40) in horizontal diameter. Spiracle semicircular, its length 3.13～4.33 (2.86～4.40) in horizontal diameter of eye. Gill openings very small, almost vertical. Length of 1st gill opening 3.67～5.00 (2.86～5.60), 3rd 3.37～5.20 (2.86～5.60) and 5th 2.75～4.33 (2.86～4.40) in horizontal diameter of eye. Nostrils oblique, each nasal aperture subdivided into a circular, anterolateral aperture and an elongate, subovoidal, posteromedial aperture by posterior nasal flap, which extends anteriorly as a fleshly triangular process from posterior nasal margin. Mouth little arched. Mouth width as long as the preoral length. Preoral length 0.84～1.05 (0.86～1.11) in mouth width. Upper lip fimbriated, lower lip smooth. Preoral clefts deep. Distance between inner corners of the nostrils 1.09～1.44 (0.95～1.33) in distance between inner ends of preoral clefts. Pectoral fin, when laid back, clearly forward of 1st dorsal spine. First dorsal fin triangular (Fig. 3B). First dorsal fin similar in shape to 2nd dorsal fin. Length of 1st dorsal fin base, from point of emergence of spine to rear end, shorter than that of 2nd dorsal base similarly measured. Length of 1st dorsal fin base 1.39～1.75 (1.25～1.73) in length of 2nd dorsal base. First dorsal fin lower than 2nd dorsal fin, height of 1st dorsal fin 1.05～1.58 (1.10～1.63) in that of 2nd dorsal fin. First dorsal spine scarcely projecting beyond the skin, length of spine 16.7～31.6% (11.1～14.3%) of height of 1st dorsal fin. First dorsal fin base 5.00～6.17 (5.33～7.00) in head length. Size of 2nd dorsal fin about the same as pelvic fin. Second dorsal fin triangular. Height of 2nd dorsal fin 1.32～1.90 (1.44～1.90) in length of 2nd dorsal base. Second dorsal spine scarcely projecting beyond the skin. Length of 2nd dorsal spine 5.6～30.0% (8.3～15.4%) of height of 2nd dorsal fin. Pectoral fin rounded, posterior margin slightly curved. Pelvic axilla anterior to 2nd dorsal spine. Subterminal notch clear. Clasper subcylindrical, with spur present.

Dental formulae $\frac{(25\sim28)-(1\sim2)-(21\sim28)}{(16\sim19)-1-(15\sim19)}$ in four specimens. Upper teeth smooth-edged, lanceolate-shaped. Counting from the symphysis, the teeth in the 1st and 2nd series are smaller than those in the 4th to 11th series, which include the largest teeth in the upper jaw (Fig. 8). Lower teeth triangular, their cutting edges inclined toward the outer corners of the jaw, except for median symmetrical tooth (Fig. 9). Two or three rows of teeth regularly functional in upper jaw, and one in lower jaw.

Talbe 3. Proportional dimensions in percentage of total length of *S. squamulosus* and *S. obscurus*. B, broken.

| Catalogue number | *S. squamulosus* NSMT-P 40454 | NSMT-P 40455 | NSMT-P 40457 | NSMT-P 40458 | TMFE 1274 | TMFE 522 | FUMT-P 3858 | NSMT-P 21725 | NSMT-P 40456 | NSMT-P 40453 | NSMT-P 40452 | FSFL-EB 527 | *S. obscurus* Holotype MNHN 84-388 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sex | male | male | male | male | male | male | male | male | female | female | female | female | female |
| Total length (mm) | 262 | 284 | 365 | 392 | 522 | 527 | 539 | 547 | 332 | 334 | 352 | 634 | 590 |
| Snout tip to: | | | | | | | | | | | | | |
| outer nostrils | 1.2 | 2.8 | 1.9 | 2.3 | 1.5 | 2.5 | 1.3 | 1.8 | 1.8 | 1.8 | 2.3 | 2.1 | — |
| eye | 5.7 | 4.6 | 4.9 | 5.6 | 4.6 | 6.1 | 4.1 | 4.4 | 4.8 | 5.1 | 5.7 | 6.2 | 6.4 |
| spiracle | 12 6 | 12.0 | 11.5 | 11.2 | 10 3 | 12.3 | 10.0 | 10 2 | 11.8 | 12.3 | 12 8 | 12.3 | 11.4 |
| mouth | 10 7 | 9.2 | 8.2 | 9.2 | 7.3 | 9.3 | 7.4 | 7.3 | 8.1 | 8.7 | 10.5 | 7.9 | 7.0 |
| 1st gill opening | 19.9 | 18.3 | 17.3 | 17.4 | 16.9 | 17.3 | 15.2 | 15.7 | 18.4 | 18.9 | 19.0 | 16.7 | — |
| 5th gill opening | 23.7 | 22.2 | 21.9 | 21.9 | 21.6 | 22.4 | 20.6 | 20.1 | 22.6 | 23.1 | 23.3 | 21.9 | — |
| pectoral origin | 24.1 | 23.6 | 22.5 | 22.5 | 21.8 | 22.6 | 21.2 | 20 8 | 23.5 | 23.7 | 23.6 | 23 7 | 23.1 |
| pelvic origin | 55.7 | 57.8 | 56.4 | 58.4 | 58.4 | 59.9 | 57.5 | 60 3 | 59.0 | 56.3 | 58.2 | 61.0 | 59.3 |
| cloaca | 59.9 | 62.3 | 63.8 | 61.5 | 64.4 | 63.8 | 62.5 | 64 5 | 63.9 | 61.4 | 62.5 | 65 9 | 63.7 |
| 1st dorsal spine origin | 43.5 | 42.6 | 41.6 | 42.9 | 40.2 | 40 6 | 40.5 | 39.5 | 43.4 | 42.8 | 42.6 | 41.2 | 40.7 |
| 2nd dorsal spine origin | 66.0 | 64.8 | 67.1 | 68.6 | 67.0 | 67.2 | 66.2 | 66 5 | 66.0 | 65.6 | 68.5 | 69.7 | 66.1 |
| upper caudal origin | 77.1 | 78.2 | 79.5 | 79.1 | 79.7 | 79.9 | 79.8 | 79.9 | 78.9 | 78.1 | 79 0 | 83.1 | 80.5 |
| lower caudal origin | 76.0 | 75.4 | 75.9 | 77.0 | 78.0 | 77.6 | 77.9 | 79.0 | 76.5 | 75.5 | 76.1 | 80.4 | — |
| Interspace between: | | | | | | | | | | | | | |
| 1st dorsal and 2nd dorsal spine origins | 21.0 | 20.1 | 22.2 | 21.7 | 23.9 | — | 21.3 | 23.8 | 18.1 | 18.3 | 21.9 | 24.9 | — |
| 2nd dorsal and caudal | 6.5 | 8.8 | 8.8 | 6.4 | 8.4 | 8.7 | 9.1 | 8.6 | 7.8 | 6.6 | 8.5 | 7.9 | — |
| pelvic and caudal | 12.6 | 14.1 | 11.2 | 12.0 | 14.0 | 13.5 | 14.3 | 12.8 | 10.5 | 10.5 | 11.4 | 11.8 | — |
| Distance between origins of pectoral and pelvic | 31.7 | 35.2 | 34.8 | 36.0 | 36.8 | 37.0 | 35.8 | 39.5 | 34 9 | 33.2 | 33 0 | 36.4 | — |
| Nostrils: distance between inner corners | 4 6 | 3.5 | 4 7 | 4.3 | 4.4 | 3.8 | 3.3 | 4.2 | 4.2 | 4 8 | 4 8 | 4.4 | 3.7 |
| Mouth width | 9.9 | 8.8 | 9.0 | 8.9 | 7.3 | 7.8 | 7.8 | 7.3 | 9.0 | 9.6 | 9 1 | 7.7 | 7.6 |
| Preoral clefts: distance between inner corners | 6.1 | 5.3 | 5.8 | 4.9 | 4.8 | — | 4.8 | 4.9 | 5.4 | 4.8 | 5.1 | 4.7 | 4.1 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Gill opening lengths: | | | | | | | | | | | | | |
| 1st | 1.5 | 1.1 | 1.6 | 1.0 | 1.1 | 1.1 | 0.9 | 1.3 | 2.1 | 1.8 | 1.7 | 1.9 | — |
| 5th | 1.5 | 1.8 | 1.6 | 1.3 | 1.1 | 1.5 | 1.5 | 1.3 | 2.1 | 2.1 | 1.7 | 1.9 | — |
| Horizontal diameter of eye | 6.1 | 6.0 | 6.3 | 5.6 | 5.0 | 4.2 | 4.6 | 4.8 | 6.0 | 6 0 | 5.7 | 5.5 | 4 8 |
| Interorbital width: | 11.1 | 9.9 | 10.1 | 10.2 | 8.8 | 8.5 | 8.2 | 8.2 | 9.9 | 9.0 | 9.7 | 9.8 | — |
| First dorsal fin: | | | | | | | | | | | | | |
| length of base from spine | 3.4 | 3.5 | 4.1 | 4.1 | 4.2 | — | 3.3 | 4.0 | 3.3 | 3 3 | 4 3 | 4.4 | 4.4 |
| length of posterior margin | 3.8 | 3.9 | 4.1 | 3.3 | 3.8 | 4.7 | 2.8 | 4.6 | 3.0 | 3.0 | 2.8 | 4.7 | — |
| height | 3.1 | 2.8 | 2.5 | 2.0 | 3.3 | 2.5 | 2.2 | 3.5 | 2.1 | 2.1 | 2.3 | 2.7 | — |
| spine length | 0.4 | 0.4 | 0.3 | 0.3 | B | 0.6 | 0.4 | 1.1 | 0.3 | 0 3 | 0.3 | 1.1 | — |
| Second dorsal fin: | | | | | | | | | | | | | |
| length of base from spine | 5.7 | 4.6 | 5.5 | 5.1 | 7.3 | — | 4.6 | 5.9 | 4.8 | 5.7 | 6 0 | 6.0 | 7.6 |
| length of posterior margin | 6.1 | 5.3 | 6.9 | 5.6 | 6.7 | 6.6 | 5.9 | 7.7 | 6.0 | 6.3 | 5.7 | 7.9 | — |
| height | 3.8 | 3.2 | 3.0 | 3.3 | 3.8 | 3.4 | 3.5 | 3.7 | 3.3 | 3.0 | 3.4 | 3.2 | — |
| spine length | 0.4 | 0.4 | 0.3 | 0.5 | B | 0.2 | 0.4 | 1.1 | 0.3 | 0.3 | 0.3 | 1.0 | — |
| Pectoral fin: | | | | | | | | | | | | | |
| length of anterior margin | 9.9 | 9.5 | 11.5 | 12.0 | 11.5 | 11.8 | 12.2 | 11.9 | 12.1 | 10 8 | 12.2 | 11.0 | 12.5 |
| length of distal margin | 5.3 | 5.3 | 5.8 | 5.1 | 5.6 | 6.3 | 5.6 | 4.6 | 4.5 | 5.7 | 4.3 | 5.5 | 4.9 |
| Pelvic fin: | | | | | | | | | | | | | |
| length of anterior margin | 5.0 | 4.9 | 8.2 | 5.4 | 6.9 | 6.6 | 7.4 | 8.2 | 7.5 | 4.5 | 6.3 | 6.6 | 7.1 |
| depth | 3.8 | 3.9 | 4.1 | 2.8 | 4.0 | — | 3.9 | 3 8 | 3.3 | 3 0 | 3.4 | 3.3 | — |
| Caudal fin: | | | | | | | | | | | | | |
| length of upper lobe | 22.9 | 20.8 | 20.6 | 21.7 | 20.1 | 20.9 | 20.4 | 19.4 | 23.2 | 22.5 | 21.9 | 19.7 | 17.3 |
| length of lower lobe | 11.5 | 10.6 | 12.3 | 11.7 | 11.9 | 11.4 | 12.4 | 10.2 | 11.1 | 13.5 | 12.8 | 12.6 | 12.4 |
| depth of notch | 2.7 | 3.9 | 4.1 | 3.8 | 2.9 | 2.7 | 2.8 | 3.7 | 3.6 | 3 6 | 4.3 | 3.3 | — |
| Trunk at pectoral origin: | | | | | | | | | | | | | |
| width | 15.3 | 13.0 | 14.0 | 13.5 | 12.6 | 11.0 | 12.2 | 12.2 | 14.5 | 12.6 | 14.2 | 12.6 | — |
| height | 13.4 | 11.6 | 12.6 | 10.2 | 10.9 | 11.0 | 9.3 | 8.8 | 12.7 | 12.0 | 12.2 | 11.8 | — |

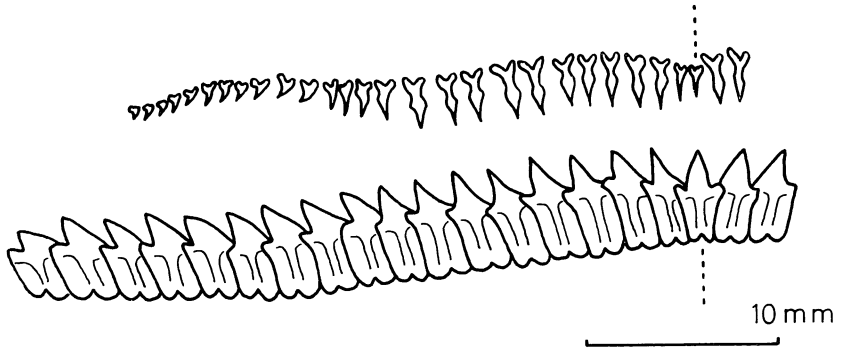


Fig. 9. Teeth of *Scymnodon squamulosus*, male, 527 mm TL, TMFE 522.

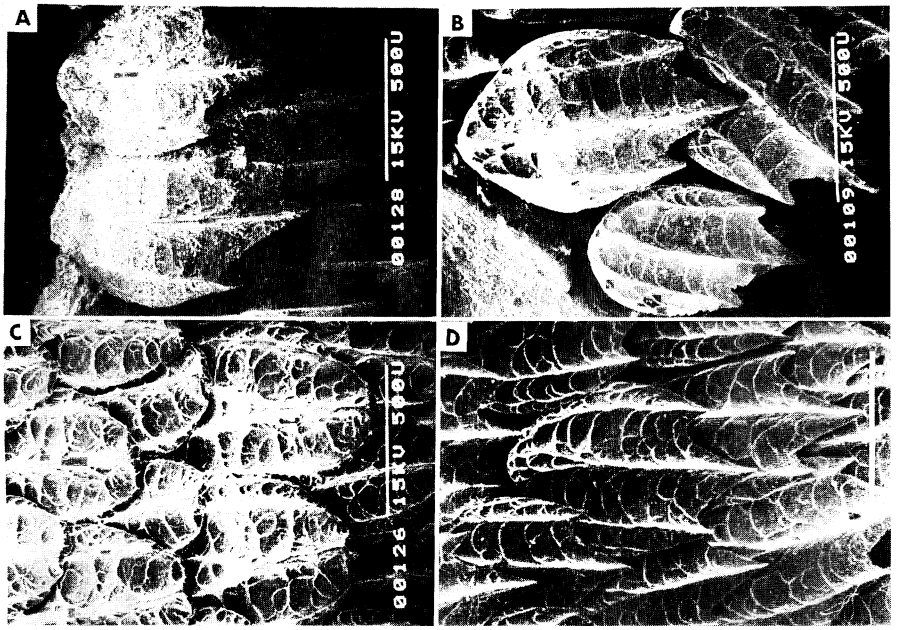


Fig. 10. Dermal denticles of *Scymnodon squamulosus* and *S. obscurus*. A, holotype of *S. squamulosus*, 670 mm TL, BMNH 1880. 5.1.1, side of trunk below 1st dorsal fin; B, holotype of *S. obscurus*, female, 590 mm TL, MNHN 84–388 (Muséum National d'Histoire Naturelle), side trunk below 1st dorsal fin; C, *S. squamulosus*, adult male, 547 mm TL, NSMT-P 21725, interorbital region; D, specimen same as C above, side of trunk below 1st dorsal fin. Each scale indicates 500 μm.

Dermal denticles very small, leaf-like, with three longitudinal ridges, including a median ridges extending to posterior edge of the denticle, and with transverse ridges. Posterior margin of the dermal denticles on the trunk below 1st dorsal fin have three pointed processes, the median process longest (Fig. 10). Dermal denticles on the interorbital region and preoral region have rounded posterior margins. Posterior margin of the upper caudal lobe lacks denticles. Denticles of juveniles (262～392 mm TL, males) similar to those of adults (522～547 mm TL, males).

Color uniformly black.

Number of turns in spiral valves 16 (TMFE 522).

Total vertebral number 93, 98, 103 and 105 (97～102), monospondylous 54, 50, 51 and 53

(51～53), and precaudal 67, 69, 73 and 76 (72～75).

**Distribution.** Four adult males of *S. squamulosus* were caught outside Suruga Bay, i.e., at Kanesu-no-se and off Omaezaki, in depths from 450 m to 830 m, on two bottom longlines which had 1,700 hooks in total. Inside Suruga Bay, however, no *S. squamulosus* have been caught in spite of greater fishing effort, i.e., 17 bottom longline operations (13,100 hooks) and 112 bottom drop line operations (2,240 hooks). At depths between 39 m and 56 m in the northwestern North Pacific (Fig. 1, F10) where water temperature was about 10°C, seven mature females and one immature female of this shark were caught with floating longlines for salmon sharks (*Lamna ditropis*).

These results suggest that this species is distributed outside the bay, is oceanic and not always a deep sea inhabitant, and comes near the surface when the temperature is low enough. Seasonal segregation by sex and size seems to occur.

**Reproduction.** Males, from 522 mm TL to 547 mm TL, were considered to be mature since they had large, hard claspers with spurs. Testis weight was 8.70 g in a 527 mm TL specimen. Juvenile males, from 262 mm to 392 mm TL, had very small and soft claspers.

Six mature females, from 750 mm to 840 mm TL, had developing ova. The ovaries contained 3 to 10 ova measuring 10 mm to 40 mm in diameter, and the uteri measured 10 mm to 15 mm in width. A mature female, 770 mm TL, had undeveloped ova measuring less than 5 mm in diameter and developed uteri of 20 mm in width. One immature female, 720 mm TL, had small ova measuring less than 8 mm in diameter and undeveloped uteri measuring 4 mm in width. Ovary weight in mature females was from 15 g to 110 g.

**Remarks.** In separating *S. squamulosus* from *S. obscurus,* the presence or absence of transverse ridges on the dermal denticles was previously used as the main taxonomic character (Bigelow and Schroeder, 1957; Cadenat and Blache, 1981). But examination of the dermal denticles of the type specimens and of our specimens revealed that the transverse ridges are present in the denticles of *S. squamulosus,* just as they are in *S. obscurus* (Fig. 10A, B). Proportional dimensions of the type specimen and of Atlantic specimens of *S. obscurus* in percentage of total length are shown in Table 3; the dimensions do not seem to be different in *S. squamulosus* and *S. obscurus.* Therefore, we consider *S. obscurus* as a junior synonym of *S. squamulosus.* In immature Atlantic specimens, the 1st dorsal fin spine is located posterior to the mid point of body length, but in mature Japanese specimens, and in the holotype of *S. obscurus,* the 1st dorsal fin spine is located about the middle of body length. It is concluded that the location of spine changes with growth of the shark. Yano and Tanaka (1983) reported that the body proportions of the genus *Centroscymnus* changed with growth of the shark, just as this case.

### Key to species of *Scymnodon*

1a. Outer surface of dermal denticles with transverse ridges.....*S. squamulosus*

1b. Outer surface of dermal denticles without transverse ridges.

2a. First dorsal spine located posterior to mid point of body length; subterminal notch scarcely evident; median lower tooth symmetrical; posterior margin of dermal denticles on side of trunk tridentate.....*S. ringens*

2b. First dorsal spine located anterior to mid point of body length; subterminal notch well-developed; median lower tooth not symmetrical.

3a. Posterior margin of dermal denticles on side of trunk tridentate; interspace between pelvic and caudal fins 15.4～17.6% of body length.....*S. plunketi*

3b. Posterior margin of dermal denticles on side of trunk not tridentate but serrated or smooth in adults though tridentate in juvenile; interspace between pelvic and caudal fins 10.2～14.0% of body length.....***S. ichiharai*** sp. nov.

### Discussion

In *S. ichiharai* the median lower tooth is not symmetrical (Fig. 4) and the 1st dorsal fin has a steeply sloped posterior margin (Fig. 3); these characters are similar to those of the genus *Centroscymnus.* We consider, however, that *S. ichiharai* is included in the genus *Scymnodon*

because of the following characters: the upper teeth are much longer midway along each side of jaw than toward either the center of mouth or its outer corner; the lower teeth are more erecter than those of *Centroscymnus*; and the dermal denticles lack concave crowns. Garrick (1959b) stated that the lower teeth are not always reliable creteria even in *Centroscymnus,* and where there is confusion with reference to the upper and lower teeth this can be resolved in all except the most juvenile specimens by examination of the dermal denticles. The dermal denticles are not in the form of concave crowns in *C. rossi* Alcock, 1898, *C. macracanthus, C. waitei* Thompson, 1930, and *C. furvescens* Buen, 1960. *C. rossi* and *C. waitei* were described from juvenile specimens (Alcock 1898; Thompson, 1930) and their denticles are strongly tridentate, just as juvenile denticles of *C. owstoni* and *C. coelolepis* (Yano and Tanaka, 1983). Garrick (1959b) reported that *C. waitei* was, in fact, a juvenile of *S. plunketi.* The dermal denticles on the side of trunk of *C. crepidater* Bocage and Capello, 1864 (FSFL-EA 634, female, 848 mm TL, 47°21.5′S, 148°01.7′E) and *C. furvescens* are similar to those of the head region of *C. owstoni* (Buen 1960; Yano and Tanaka 1983). We believe that the denticles of *C. macracanthus* are probably similar to those of *C. crepidater* and *C. furvescens,* judging from a description in Garman (1913). In the above four species whose descriptions are not always sufficient for comparision, at least *C. furvescens* can be distinguished from *S. ichiharai* in having the arrangement of teeth; *C. rossi* and *C. crepidater* in having the very long preoral clefts; and *C. macracanthus* in having the pectoral fin reaching a vertical from the 1st dorsal fin spine. We think that the above four species probably refer to *Centroscymnus* or *Centrophorus* because of the arrangement of the teeth. *S. plunketi* and *C. macracanthus* have been variously placed in *Centroscymnus, Centrophorus* and *Scymnodon* by several authors (Regan 1906; Waite 1910; Garman 1913; Bigelow and Schroeder 1957; Garrick 1959b; Cadenat and Blache 1981). The dermal denticles of *S. ichiharai* are tridentate in juveniles, and in this character and in their lower teeth they are similar to the description of *S. plunketi* by Waite (1910) and Garrick (1959b). The denticles of *S. ringens* are tridentate in a juvenile female (295 mm TL, MNHN 1969–90). Tridentate dermal denticles were found in juveniles of *Centroscymnus owstoni* and *C. coelolepis* (Bigelow and Schroeder 1954, Garrick 1959a, Yano and Tanaka 1983) and in *C. crepidater* (FSFL-EA 535, male, 340 mm TL, 47°15.1′S, 148°30.8′E) also reported by Garrick (1959a). The shape of the dermal denticles in adults is a key character to differentiate the two genera, but in juveniles there is no difference between *Centroscymnus* and *Scymnodon.* We think that *Scymnodon* is closely related to *Centroscymnus.*

*S. ichiharai* was mostly caught inside Suruga Bay, but *S. squamulosus* was always outside the bay. The two species seem to live separately; *S. ichiharai* is more or less coastal and *S. squamulosus* is oceanic. *S. obscurus* (=*S. squamulosus*) was caught from off Brazil and from the South Atlantic Subtropical Convergence with pelagic trawls (Krefft, 1980). Since this species is reported from the Pacific Ocean, Atlantic Ocean and Indian Ocean (Günther 1877; Vaillant 1888; Bass et al. 1976; Compagno 1977; Krefft 1980; Zhu et al. 1982), *S. squamulosus* seems to be cosmopolitan. Large specimens of *S. ichiharai* were caught in Suruga Bay, but the only small specimen was taken off Omaezaki at the enterance to the bay. Large and small individuals of *S. ichiharai* may live separately, as in the case of *C. owstoni* (Yano and Tanaka, in press).

*S. ichiharai* has 29 to 56 developing ova, whereas *S. squamulosus* has only 3 to 10 developing ova, hence the fecundity of *S. ichiharai* is higher than that of *S. squamulosus.*

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senior author, to Dr. Garrick. Dr. Garrick sent back SEM photographs of denticles of the specimen to Dr. Taniuchi with the suggestion of the presence of an undescribed species in Japan. Dr. Garrick's suggestion at the initial stage of this study encouraged the present authors who had also recognized the presence of 2 species of the genus in Japan. We wish to express our sincere thanks to Dr. Ch. Roux, Muséum National d'Histoire Naturelle, Mr. Jean-Pierre Sylvestre, Section: Cétacés et Siréniens, Dr. Peter J. Whitehead, British Museum (Natural History), and Dr. G. A. Tunnicliffe, Canterbury Museum for sending dermal denticles and photographs, and for measuring type specimens. We are grateful to Dr. Teruya Uyeno, National Science Museum, Tokyo, for his valuable advice and criticism of the manuscript and for materials, to Dr. Hiroshi Hatanaka, Far Seas Fisheries Research Laboratory, Dr. Kenji Mochizuki, University Museum, University of Tokyo and Mr. Masahiro Aizawa for materials, and to Prof. Tamotu Tamura, Faculty of Marine Science and Technology, Tokai University for his valuable advice and criticism of the manuscript. Also, we are much indebted to Mr. Yasuji Fukuda, Department of Anatomy, University of Tokyo School of Medicine for taking photographs of the denticles. We are grateful to the members of "Hokuto II" and "Bousei-maru II", research vessels of Tokai University, and to the fishermen of "Keiju-maru", "Shinsei-maru", "Choukane-maru" and "Kyuho-maru" for obtaining specimens.

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## 日本産深海性ツノザメ科ビロードザメ属魚類の再検討および1新種の記載

矢野和成・田中　彰

駿河湾の水深 450 m から 830 m で得られた新種イチハラビロードザメ *Scymnodon ichiharai* を記載した．さらに，これまで世界中で知られている同属の 4 種についても形態的比較を行った．

従来日本から報告されていたビロードザメ *S. squamulosus* の模式標本を再調査した結果，鱗に transverse ridges が存在し，またその種の外部形態，脊椎骨数が，大西洋から報告されている *S. obscurus* と変わらないことが判明した．従って，*S. obscurus* はビロードザメの同種異名と考えられた．ビロードザメ属は，新種を含め 4 種が存在する．これら 4 種の検索表を以下に掲げる．

ビロードザメ属の検索表

1a　鱗に transverse ridges がある……ビロードザメ
1b　鱗に transverse ridges がない．
2a　第 1 背鰭棘が体長のほぼ中央に位置する；subterminal notch がはっきりしていない；下顎中央歯が左右相称形である；鱗の形態は 3 叉形である．……*S. ringens*
2b　第 1 背鰭棘が体長の中央より前方に位置する；subterminal notch がはっきりしている；下顎中央歯は左右不相称である．
3a　鱗の形態は 3 叉形である；腹鰭と尾鰭の間の距離は体長の 15.4～17.6% である……*S. plunketi*
3b　成魚の鱗の外縁は鋸歯状かあるいはなめらかであり，3 叉形ではない，しかし幼魚においては 3 叉形である．腹鰭と尾鰭の間の距離は体長の 10.2～14.0% である．
……***S. ichikarai*** sp. nov. イチハラビロードザメ

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