

Trigonognathus kabeyai, a New Genus and Species of the Squalid Sharks from Japan

Kenji Mochizuki and Fumio Ohe

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Abstract Two specimens of the peculiar squalid shark, *Trigonognathus kabeyai* gen. et sp. nov., were collected from the coastal waters of Wakayama and Tokushima, Japan, by bottom trawl at depths of 330 and 360 meters. Shape of teeth similar in both jaws; slender, unicuspid, canine-like, without any cusplets or serrations, with weak thin fold on both lingual and labial sides in anterior teeth on both jaws; tooth at symphysis of each jaw longest. Interspace between teeth very wide. Both jaws triangular in shape. Most of dermal denticles on body and head roughly rhombic, swollen very much near central part, with about 10–40 facets on the dorsal surface of its crown. Preoral snout length very short. Many small organs considered to be photophores present mainly on ventral surfaces of head and body.

Two individuals of a shark species were collected from the coastal waters of Japan. Though general characters of the shark indicate that it is a species of the family Squalidae as defined by Compagno (1984), some characters are quite unique and different from those of other previously described genera of the family. Both jaws, dentition, and shape of dermal denticles are especially unique.

In the present paper, we describe the shark as a new genus and species.

Measurements mainly followed Yamakawa et al. (1986). Length of bases of 1st and 2nd dorsal fins included their spines. Overall length was measured from upper origin of base of pectoral fin to posterior tip of the fin. Distances between tip of snout to nostril and between tip of snout to cloaca and interspiracle space were measured. Counts of vertebrae were made according to the methods of Springer and Garrick (1964). Observation of dermal denticles and organs considered to be photophores was made by an optical microscope and a scanning electron microscope (Hitachi S-700) in the University Museum, the University of Tokyo.

Trigonognathus gen. nov.

(New Japanese name: Waniguchi-tsunozame-zoku)

Type species. *Trigonognathus kabeyai* sp. nov.

Diagnosis. Two dorsal fins preceded by a spine: middle point of 1st dorsal fin base situated

above midway between origins of pectoral and pelvic fins. Both jaws triangular in shape. Shape of teeth similar in both jaws; unicuspid, slender, canine-like, without any cusplets or serrations, with weak thin fold on labial and lingual sides in anterior ones on both jaws; tooth at symphysis of each jaw longest; the numbers 7-1-7/7-1-7 in holotype, 8-1-8/8-1-8 in paratype; interspace between teeth very wide. Body and head covered by dermal denticles; most of the denticles on body and head roughly rhombic, swollen near central part, with about 10–40 facets on the dorsal surface of its crown. Many small round organs considered to be photophores, about 100 microns in diameter, present mainly on ventral surface of body and head. Preoral snout length very short. No barbels at nostrils. Caudal peduncle without lateral keels, or precaudal pits. Rear tip of pectoral fin rounded.

Etymology. The generic name refers to the triangular jaws of the shark.

Trigonognathus kabeyai sp. nov.

(New Japanese name: Waniguchi-tsunozame)

(Figs. 1–5)

Holotype. FUMT (Department of Fisheries, University Museum, University of Tokyo)-P 21151, 216 mm TL, an immature male, 33°23.40'N, 135°45.33'E, off Shionomisaki, Wakayama Pref., Japan, at a depth of 330 m, May 25, 1986.

Paratype. FUMT-P 21152, 372 mm TL, an immature male, 33°34.29'N, 134°45.81'E, off Hiwasa, Tokushima Pref., Japan, at a depth of 360 m, February

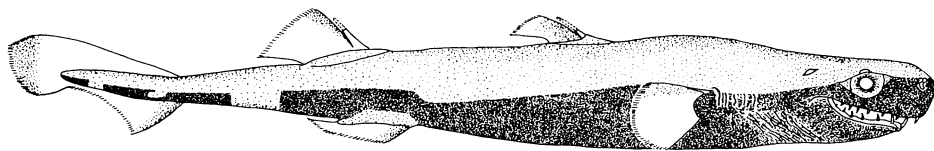


Fig. 1. *Trigonognathus kabeyai* gen. et sp. nov., holotype, FUMT-P 21151, male, 216 mm TL.



Fig. 2. Head region of *Trigonognathus kabeyai*, gen. et sp. nov., holotype, FUMT-P 21151. A, dorsal view; B, lateral view; C, ventral view.

25, 1986.

These two specimens were collected by Mr. Hiro-michi Kabeya, the captain of the bottom trawler "Seiryō-Marū", in Katahara, Gamagori, Aichi Pref., Japan.

Diagnosis. See genus diagnosis.

Description. In the following, description of the holotype is given first, followed by that of the

paratype. Proportional measurements of the specimens are shown in Table 1.

Body slender, cylindrical. Dorsal surface of head somewhat flattened. Preoral snout length very short. Nostril nearly vertical, anterior nasal flap single with rounded margin, not expanded into barbels. Both jaws triangular (Figs. 1, 2). No preoral cleft and labial furrow. Shape of

spiracle of an elongated ellipse. Two dorsal fins preceded by a weakly grooved spine. First dorsal fin originates between pectoral and pelvic fins; middle point of base of 1st dorsal fin above midway between origins of pectoral and ventral fins (Fig. 1). Anal fin absent. Rear tip of pectoral fin rounded. Caudal peduncle without lateral keels, or precaudal pits. Vertebral counts: monospondylous 43, 43, diplospondylous 19, 19, precaudal 62, 62, and total vertebrae 87, 88. Number of turns in spiral valves 8 in paratype. Five gill openings; lengths of 1st to 4th gill openings nearly equal, 0.9, 1.8% of TL; length of 5th gill opening greater than those of the 1st to 4th, 1.6, 2.1% of TL.

Teeth 7-1-7/7-1-7, 8-1-8/8-1-8. All teeth similar in both jaws; unicuspid, slender, canine-like, slightly recurved inside mouth, without any cusplets or serrations, with weak thin folds on both labial and lingual sides on the anterior ones (Fig. 3B). Tooth at symphysis of each jaw longest, the posterior teeth shorter than the anterior ones. Interspace between teeth very wide. Each succession of teeth generally contains a functional tooth, sometimes two (Fig. 3A: arrow).

Body and head covered with dermal denticles, fins naked; the denticles on almost all the ventral surface of head and body covered by surface layer of skin (Fig. 4D). Most of the denticles on body and head roughly rhombic, some triangular or elliptic, swollen near center, with about 10-40 facets on the dorsal surface of its crown. Those are roughly contiguous to each other, not imbricated, arranged irregularly (Fig. 4).

Almost all the ventral surface of body and head covered with many minute organs presumed to be photophores (Figs. 4D, 5). The organ round in shape, with black margin, about 100 microns in diameter. The areas covered with the organs in high density are black in color. Except for the black areas the organs are scattered in very low density.

Color in alcohol: Body and head brown or dark brown, except for three black areas on ventral side of head and body (Fig. 1).

Middle part of dorsal margin of each orbit with small colorless areas not covered by dermal denticles. Pectoral fin translucent, except for its slightly light brownish upper part. First dorsal fin slightly brownish with translucent

marginal area. Anterior parts of 2nd dorsal, pelvic, and lower lobe of caudal fins slightly

Table 1. Proportional dimensions of *Trigonognathus kabeyai* gen. et sp. nov. in % of total length.

	FUMT- P 21151 holotype	FUMT- P 21152 paratype
Total length (mm)	216	372
Snout tip to:		
eye	4.9	5.4
mouth	2.3	2.0
nostrils	1.2	1.0
spiracle	10.9	10.2
1st gill opening	18.1	17.5
5th gill opening	22.2	22.3
pectoral insertion	22.2	23.4
pelvic insertion	55.6	58.9
cloaca	60.2	61.0
1st dorsal origin	37.5	37.9
2nd dorsal origin	60.6	63.2
upper caudal origin	81.9	83.3
Distance between bases:		
1st and 2nd dorsal fins	21.5	23.7
2nd dorsal and caudal fins	15.0	14.1
pectoral and pelvic fins	32.9	32.7
pelvic and caudal fins	19.2	18.3
Mouth width	8.1	9.1
Horizontal diameter of eye	5.3	5.2
Interorbital space	7.9	7.1
Interspiracle space	5.5	5.9
First dorsal fin:		
overall length	9.5	9.8
length of posterior margin	4.7	4.8
height	2.3	2.2
length of base	4.7	4.6
length of spine	—	3.5
Second dorsal fin:		
overall length	11.9	12.1
length of posterior margin	4.6	5.0
height	3.2	3.6
length of base	7.4	7.3
length of spine	—	—
Pectoral fin:		
overall length	11.1	9.8
Pelvic fin:		
overall length	10.7	11.7
length of base	6.3	6.7
Caudal fin:		
length of upper lobe	19.2	17.6
length of lower lobe	8.6	8.6
Trunk at origin of pectoral fin		
width	9.3	11.0
height	12.0	12.4



Fig. 3. Jaws and teeth of *Trigonognathus kabeyai* gen. et sp. nov. A: Lateral view (right) of both jaws in the holotype, FUMT-P 21151. B: Lateral views of teeth at symphyses of lower and upper jaws in the paratype, FUMT-P 21152 (left and right, respectively). Arrow: a new functional tooth. Bar: 5 mm in both A and B.

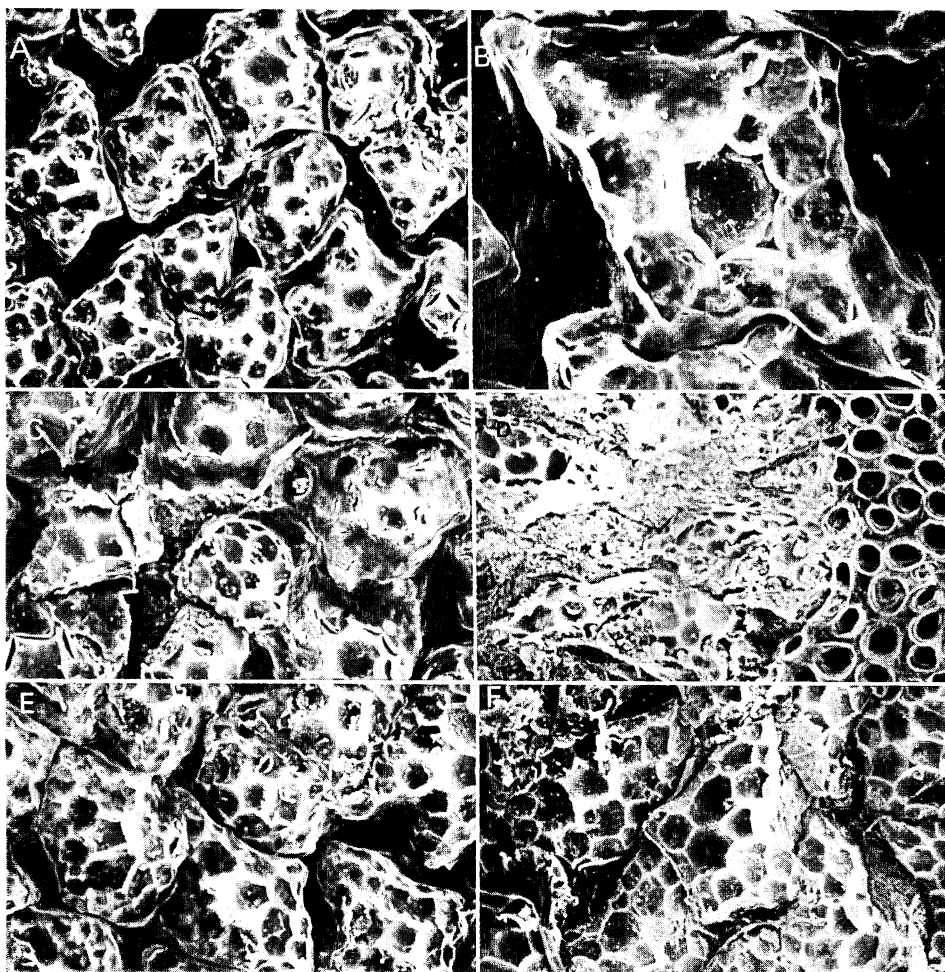


Fig. 4. Dermal denticles and photophores of *Trigonognathus kabeyai* gen. et sp. nov. in holotype (A–D) and paratype (E, F) taken by scanning electron microscope. A: Dermal denticles of trunk below 1st dorsal fin. $\times 40$. B: Enlarged photograph of a denticle on trunk below 1st dorsal fin. $\times 140$. C: Dermal denticles of head above gill openings. $\times 50$. D: Denticles and photophores (round holes in the right part of this photograph; only surface layer of skin in this part is removed) between pelvic fins. $\times 40$. E: Denticles on trunk below 1st dorsal fin. $\times 50$. F: Denticles between pelvic fins. $\times 55$.

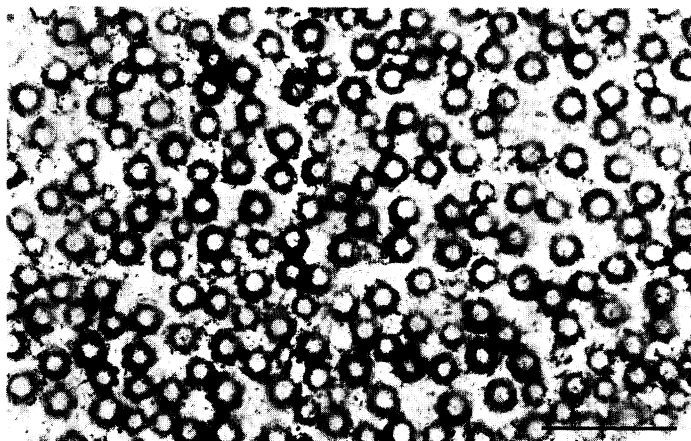


Fig. 5. Photophores between pectoral fins in holotype of *Trigonognathus kabeyai* gen. et sp. nov., FUMT-P 21151, by optical microscope. Bar: 500 μ m.

brownish, and the remaining parts of the fins transparent. Posterior part of caudal fin dark brown.

Biological note. Gut contents of the paratype consist of a part of vertebrae and cycloid scales of bony fish, and several pieces of crustacean exoskeleton.

The two specimens are not mature because the clasper is soft and short, 3.6, 7.0% of TL, not reaching to the posterior point of the pelvic fin in the holotype, and not over the point in the paratype, and because the testes of the paratype are not developed.

Etymology. This new species is named *kabeyai* in memory of Mr. Hiromichi Kabeya who collected the type specimens.

Remarks. According to Compagno (1984) and Bigelow and Schroeder (1957), the squalid genera are as follows: *Aculeola*, *Centrophorus*, *Centroscyllium*, *Centroscyrnus*, *Cirrhigaleus*, *Dalatias*, *Deania*, *Etmopterus*, *Euprotomicroides*, *Euprotomicrus*, *Heteroscyrnoides*, *Isistius*, *Scymnodalatias*, *Scymnodon*, *Somniosus*, *Squaliolus*, and *Squalus*. Taniuchi and Garrick (1986) considered *Zameus* as a valid genus. Chu et al. (1981) reported the new genus *Pseudocentrophorus* of the Squalidae from China, and Dolganov (1984) described the other new genus *Mollisquama* from Naska Submarine Ridge. The present new genus *Trigonognathus* clearly differs from all of the genera in the characters shown in the diagnosis of the genus.

Acknowledgments

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(KM: University Museum, University of Tokyo, Hongo 7-3-1, Bunkyo-ku, Tokyo 113, Japan; KM, present address: Natural History Museum and Institute, Chiba, Aoba-cho 955-2, Chiba 280, Japan; FO: Aichi Prefecture Education Center, Morowa, Togocho, Aichi-gun, Aichi Pref. 470-01, Japan)

ツノザメ科の 1 新属新種ワニグチツノザメ

望月賢二・大江文雄

和歌山県潮岬沖の水深 330 m と徳島県日和佐沖の水深 360 m で、底曳網によって採集された未成熟の雄の 2 標本をもとに、ツノザメ科の 1 新属新種 *Trigonognathus kabeyai* ワニグチツノザメを記載した。このサメはツノザメ科の他の属や種と比べ、両顎の形態、歯の形態や配列、鱗の形態が極めて特異であり、これらの形質により容易に区別できる。また、口前吻長が極めて短いこと、発光器を持っていること等の特徴をもつ。

(望月: 113 東京都文京区本郷 7-3-1 東京大学総合研究資料館; 望月現住所: 280 千葉市青葉町 955-2 千葉県立中央博物館; 大江: 470-01 愛知県愛知郡東郷町大字諸輪字上鉾 68 愛知県教育センター)