

## Occurrence of the Prickly Shark, *Echinorhinus cookei*, at Kumanonada, Japan

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An unusual shark was captured in a gill net used for catching slipper lobsters at a depth of 200~400 m in Kumanonada, off Kii Peninsula, Japan. The specimen was considerably damaged because the gill net had been set for two days. However, judging by the absence of the anal fin and pre-dorsal spines, and by the presence of multicuspid teeth similar in upper and lower jaws, the shark clearly belonged to the genus *Echinorhinus* (Echinorhinidae, Squaliformes). In Japan, *E. brucus* (Bonnaterre, 1788) (= *E. spinosus* Gmelin, 1789) was first recorded by Tanaka (1913) who gave a brief description and figures based on a specimen collected from the fish market of Tokyo. Kamohara (1942) noted the occurrence of *E. brucus* in the fish market of Kochi and mentioned the length of his specimen. Teng (1962) listed the sea off Izu, southern part of Honshu, as one of localities of *E. brucus* but did not give further details. Thus, *E. brucus* is the only *Echinorhinus* species so far reported from around Japan. A second species of the genus, *E. cookei* Pietschmann, 1928, which had generally been regarded as synonymous with *E. brucus* (eg. Fowler, 1941; Bigelow and Schroeder, 1948, 1957), is now recognized as a valid species since Garrick (1960) distinguished it from *E. brucus*. Our recently caught specimen coincides with *E. cookei* in having dermal denticles, which are small (less than 4 mm in diameter), numerous and uniformly distributed with indented, angular bases and prominently ridged spines, and in having almost smooth skin under the snout and around the mouth.

*Echinorhinus cookei* Pietschmann, 1928

(Japanese name: Kogiku-zame)

(Fig. 1)

*Echinorhinus cookei* Pietschmann, 1928: 297 (Hawaii); Pietschmann, 1930: 3, pl. 1 (Hawaii); Garrick, 1960: 110, fig. 2 (Cook Strait, New Zealand); Garrick, 1968: 134

(Cook Strait, New Zealand); Kato et al., 1967: 12, fig. 16 (Hawaiian Islands, southern California, Gaudalupe Island, and Peru); Chirichigno, 1969: 9 (Peru); Chavez-Ramos and Castro-Aguirre, 1974: 159, fig. 2 (Gulf of California, Mexico).

*Echinorhinus brucus* (Bonnaterre): Hubbs and Clark, 1945: 65, fig. 16 (off Los Angeles, California); Teng, 1958: 28, fig. 16 (Suo, Taiwan); Teng, 1962: 175, fig. 44 (Suo, Taiwan); Chirichigno, 1963: 11 (Peru); Yano, 1976: 159 (Nachikatsuura, Japan).

**Study material.** An immature male specimen 1250 mm in total length, 1000 mm in body length (distance from snout tip to upper caudal origin), captured at a depth of 200~400 m in Kumanonada off Taiji, Wakayama Prefecture, Japan, on 2nd November, 1978. This specimen is now deposited in the Marinarium of the Whale Museum at Taiji.

**Description.** Proportional measurements: Proportional dimensions in percent of total length are given below. Proportional dimensions expressed as percent of body length are also given in parentheses, because the total length is somewhat shortened due to damage of the upper caudal fin. Measurements follow Garrick (1960).

Trunk at pectoral origin: breadth 14.0 (17.5); height 10.0 (12.5). Snout length in front of: outer nostrils 5.6 (7.0); mouth 9.7 (12.6). Eye: horizontal diameter 2.9 (3.6). Mouth: breadth 11.2 (14.0); height 4.8 (6.0). Nostrils: distance between inner ends 4.7 (5.7). Gill opening lengths: 1st 2.6 (3.2); fifth 6.2 (7.8). 1st dorsal fin: vertical height 2.6 (3.3); length of base 5.4 (6.8). 2nd dorsal fin: vertical height 3.6 (4.5); length of base 4.6 (5.7). Caudal fin: upper caudal margin 20.0 (25.0); lower caudal margin 13.1 (16.4). Pectoral fin: length of anterior margin 13.1 (16.4); breadth 6.4 (8.0). Distance from snout to: eye 6.6 (8.2); 1st gill opening 24.4 (30.5); 5th gill opening 30.4 (38.0); pectoral origin 31.2 (39.0); 1st dorsal origin 62.9 (78.6); 2nd dorsal origin 74.6 (93.2); pelvic origin 58.7 (73.4); upper caudal origin 80.0 (100). Interspace between: 1st dorsal base and 2nd dorsal origin 4.6 (5.8); 2nd dorsal base and upper caudal origin 5.7 (7.1); pelvic base and lower caudal origin 8.2 (10.0). Distance from origin

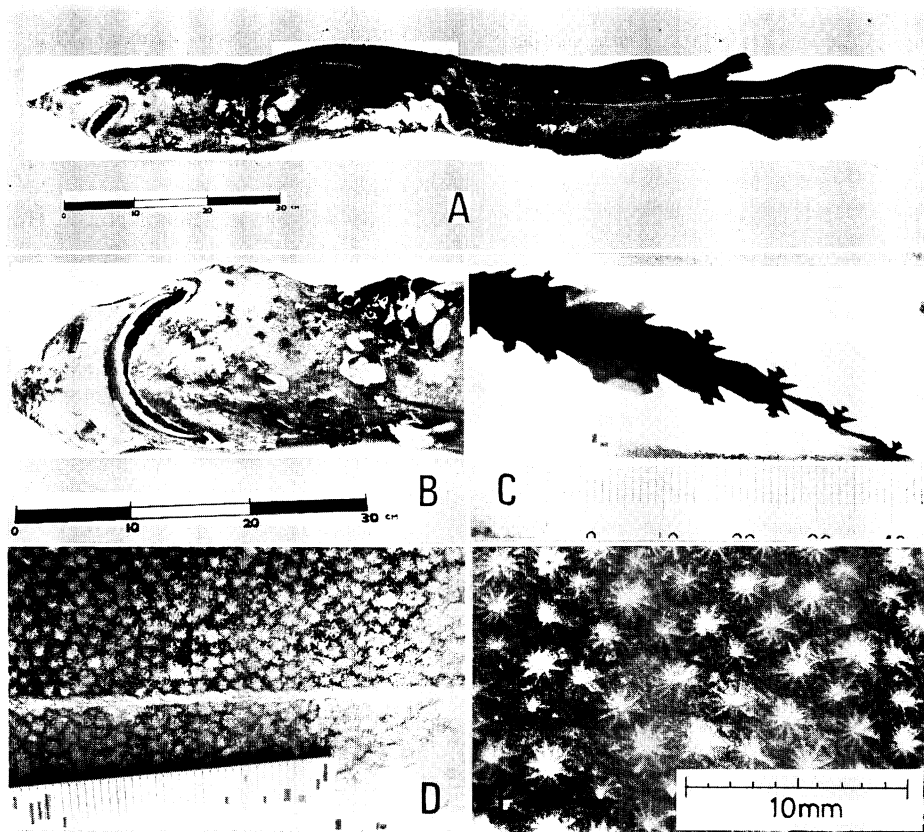


Fig. 1. *Echinorhinus cookei*, 1250 mm male, from Kumanonada, Japan. A: Lateral view. B: Ventral view of head. C: Upper and lower teeth on the left side of the jaw. D: Dermal denticles around lateral line halfway along trunk. E: Dermal denticles magnified.

to origin of: pectoral and pelvic 28.9 (36.1); pelvic and lower caudal origin 20.4 (25.6).

Teeth: Dental formula is 11~11/10~11. Teeth are similar in both jaws. Teeth toward symphysis have four cusps with the medial cusp much the largest, and so strongly oblique as to form a nearly continuous cutting edge along the jaw. Teeth near corner of mouth have only a single broad cusp.

Dermal denticles: Denticles are uniformly distributed over whole of body excepting underside of snout and around mouth. The largest denticles are on the mid-dorsal region where they range from 1.9 to 3.0 mm with an average of 2.55 mm in diameter. Denticles become smaller toward the ventral region where they are less than 1 mm in diameter. Each denticle has only one sharply pointed thorn and numerous angles.

Colour: Uniformly dark grey except around mouth. Distal margin of fins dusky, with obscure darker blotches on fore portion of belly in the preserved specimen.

#### Discussion

Comparison of proportional measurements with those given by Garrick (1960, 1968) for *E. cookei* specimens, either smaller (445 mm, 472 mm) or larger (1980 mm, 2985 mm) than our specimen (1250 mm), indicates that our specimen shows intermediate proportions in most characters. The damaged caudal fin in our specimen results in higher proportions for distance from snout to each fin. However, proportional dimensions of the same characters in percent of body length agree more closely with those calculated from Garrick's data. Our specimen shows no considerable differences in proportions

except those of damaged dorsal fins and caudal fin from *E. brucus* described by Bigelow and Schroeder (1948) and Musick and McEachran (1969). Garrick (1960) also stated that *E. cookei* is not separable from *E. brucus* in its dimensions, external morphology or teeth, but is strikingly different in the form of its denticles.

*Echinorhinus cookei* is reported widely in the Pacific Ocean from the eastern Pacific (Kato et al., 1967; Chavez-Ramos and Castro-Aguirre, 1974) through Hawaii (Pietschmann, 1928) to the southern Pacific (Garrick, 1960, 1968). The specimen reported here is the first from the western Pacific although the shark earlier reported as *E. brucus* by Teng (1958, 1962) can now be regarded as *E. cookei* on the basis of Teng's statement that its dermal denticles were small, numerous and uniformly distributed rather than in a form of sparse, irregularly distributed bucklers. Furthermore, the bramble shark briefly reported from Nachikatsuura by Yano (1976) seems to be *E. cookei* because he clearly indicated twenty five dermal denticles (less than 2 mm in diameter) per square centimeter of the skin. Thus, all western Pacific accounts of bramble sharks which give a locality and a description are referable to *E. cookei* according to Garrick's distinction. On the other hand, no descriptions of *E. brucus* have been made on the basis of specimens taken in the western Pacific. In addition, recent reports on the occurrence of *Echinorhinus* from elsewhere the Pacific Ocean refer almost exclusively to *E. cookei*; the exception being Garrick's (1960: 115) reference to a specimen of *E. brucus* in the Otago Museum, New Zealand. These facts suggest the virtual absence of *E. brucus* in the Pacific Ocean. Outside the Pacific, the shark illustrated as *E. brucus* from southern Africa by Smith (1965) resembles *E. cookei* in the size and distributional pattern of dermal denticles, though the shark reported from the same locality by Bass et al. (1976) is undoubtedly *E. brucus*. There may also be two species of *Echinorhinus* on the continental slope of India because Silas and Selvaraj (1972), who did not refer to Garrick (1960, 1968), pointed out great variations in the number, size, and distribution of dermal denticles in what they considered specimens of *E. brucus*. These uncertainties in identification point to the need for detailed examination of

specimens of *Echinorhinus* on a world-wide basis.

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- 熊野灘産のコキクザメ (新称) 谷内 透・柳沢 踐夫
- 和歌山県太地沖の熊野灘で採集されたコキクザメ *Echinorhinus cookei* Pietschmann を簡単に記載した。本報が西部太平洋域における本種の初記録である。本種はキクザメ *E. brucus* (Bonnaterre) と形態的には区別が困難であるが、皮歯が小さくて(直径4mm以下)数が多く、吻部腹面や口の周辺を除く全身にほぼ均一に分布することが特徴である。既往の文献を検討した結果、本種は西部太平洋域では日本のほか台湾にも分布すること、また、従来日本で記録されていたキクザメは本種である可能性が強いことを指摘した。
- (谷内: 113 東京都文京区弥生 1-1-1 東京大学農学部水産学科; 柳沢: 649-51 和歌山県東牟婁郡太地町太地町立くじらの博物館付属マリナリウム)