

Occurrence of a Megachasmid Shark in Suruga Bay: Photographic Evidence

Masaki Miya¹⁾, Masumi Hirose²⁾ and Kenji Mochizuki¹⁾

1) Natural History Museum and Institute, Chiba
955-2 Aoba-cho, Chiba 280, Japan

2) 2698-18, Asahigaoka-cho, Chiba 281, Japan

On 12 June 1989, an unusual shark was found during a hauling of the set-net (teichi-ami) on the boat at the western coast of Suruga Bay, central Japan. The fishermen initially regarded it "gonshika", a local Japanese name given to the basking shark *Cetorhinus maximus* (Gunnerus, 1765). Although the shark was released alive from the net, several university students who happened to be there for part-time assistance noted its strange appearance and one of them took four photographs using a handy automatic camera. The four photographs were later brought to our home institute (Natural History Museum and Institute, Chiba) and have come to our attention. It was undoubtedly the megachasmid shark *Megachasma pelagios* Taylor, Compagno et Struhsaker, 1983 (Lamniformes) because of its huge terminal mouth and extremely short but broadly rounded snout. In this paper we report its occurrence in Suruga Bay as the fifth record of this shark to

date. Also we estimated its total length (TL) and precaudal length (PCL) on the basis of available proportional dimensions on the photographs as compared with those of the holotype (Taylor et al., 1983).

The set-net is located 0.5 km south of Kogawa fishing port, Ishizu, Yaizu-shi, Shizuoka, Japan (34°50.4' N, 138°20.4' E; Fig. 1). The net is regularly set at a fixed position to stay on the expected course of fish migration. The wall of the net (extended from the beach line perpendicular to ca. 200 m off shore) blocks the migration of fishes, leading them to the final trap located at the off-shore side of the net (ca. 40 m deep). Nearly every morning the fishermen haul the trap net to examine their catches. On early morning (04 : 30-07 : 30) of 12 June 1989, the shark was found in their catches along with various kinds of coastal fishes (e.g. *Engraulis japonicus*, *Trachurus japonicus*, *Scomber japonicus*, etc.). No peculiar

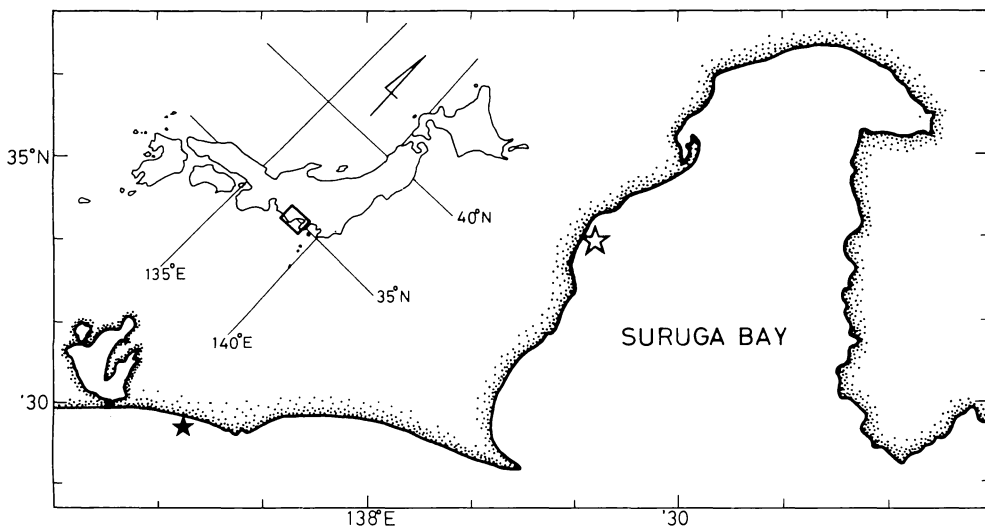


Fig. 1. Locality of the present record (open star) and that reported by Nakaya (1989) (closed star).

event has occurred in terms of the set-net catches, weather and ocean condition before and after the occurrence of the shark.

Although no entire image of the shark was available from the four photographs, an array of characters unique to a megachasmid shark (Compagno, 1984) was clearly observed: extremely short but broadly rounded snout (Fig. 2A); very large and long head (Fig. 2B, C); huge terminal mouth that extends behind the eyes (Fig. 2B); moderately long gill slits (Fig. 2B); two dorsal fins and an anal fin (Fig. 2A); caudal peduncle without keels (Fig. 2B); caudal fin asymmetrical, not lunate but with a short and strong ventral lobe (Fig. 2A, B); and no light spots (Fig. 2A–D).

In addition, although Taylor *et al.* (1983) have described its coloration of the lower jaw as one mottled with black and this feature is evident in all the previous and the present photographs (see Lavenberg and Seigel, 1985; Western Australian Museum, 1988; Nakaya, 1989; Fig. 2B), none of the authors have pointed out that it is a unique

feature to the megamouth shark. To our knowledge, no lamniform shark has such coloration under the lower jaw. [Dusky spots are occasionally found on the underside of snout and jaw in adult *Lamna ditropis* (pers. comm. L. J. V. Compagno).]

Among ninety-five proportional dimensions taken from the holotype (Taylor *et al.*, 1983), twelve can be reasonably measured on one of the photographs (Table 1). These actual dimensions on the photographs were then compared with landmarks [either yellow floats (longest axis = 200 mm; see Fig. 2A) or a label alongside the ship (“YANMAR DIESEL”; horizontal axis = 540 mm; see Fig. 2C)] to estimate their real sizes. These real sizes were further used to calculate estimated total length (TL) and precaudal length (PCL) on the basis of the proportional dimensions of the holotype (Taylor *et al.*, 1983). The estimated sizes of the shark range from 4300 mm TL to 5400 mm TL with a mean size of 4900 mm TL and from 3000 mm PCL to 3700 mm PCL with a mean

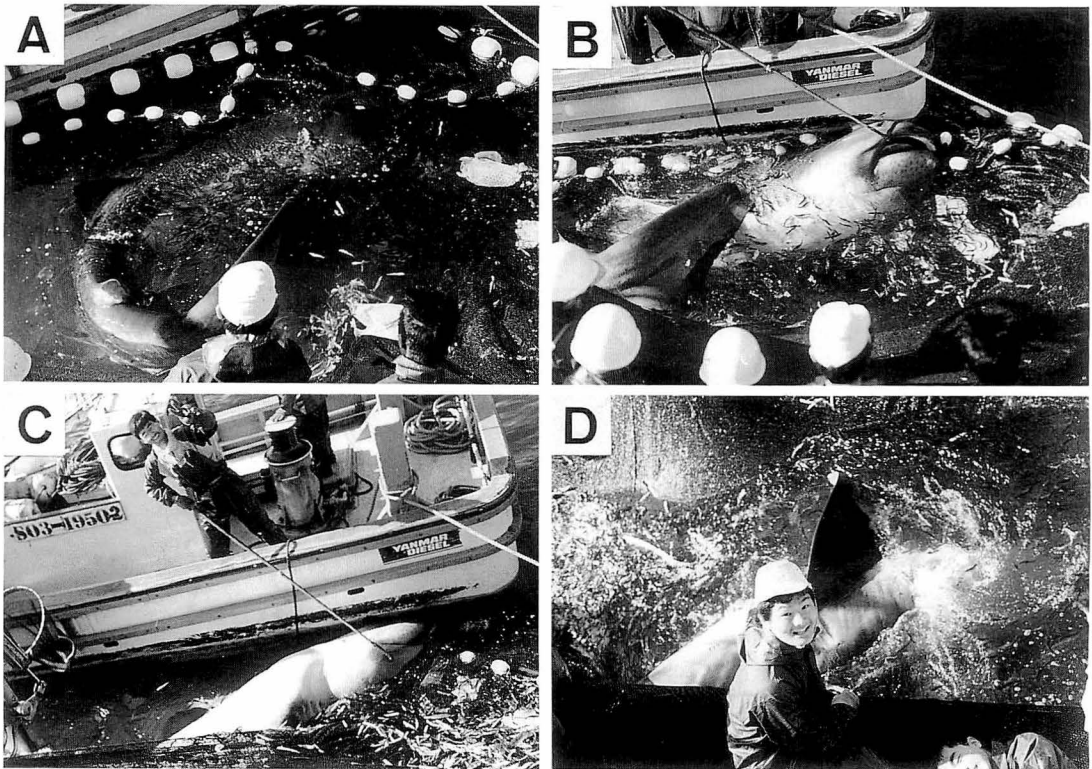


Fig. 2. The four photographs of the megamouth shark (for details see text and Table 1). Photos taken by Mr. Michio Nakajima.

Table 1. Total length and precaudal length of the present shark estimated from selected proportional dimensions of the holotype of *Megachasma pelagios* (data from Taylor *et al.*, 1983). For detailed procedure of the calculations, see text.

	Length (mm) (holotype)	%TL (holotype)	%PCL (holotype)	TL (mm) (estimated)	PCL (mm) (estimated)	Figure	Landmark*
Total length	4,460	100	144.3				
Precaudal length	3,090	69.3	100.0				
Tip of snout to orbit	240	5.4	7.8	4,490	3,460	2A	F
Tip of snout to 1st gill opening	850	19.1	27.5	4,960	3,440	2C	L
Tip of snout to 2nd gill opening	920	20.6	29.8	4,930	3,420	2C	L
Tip of snout to 3rd gill opening	1,020	22.9	33.0	4,700	3,240	2C	L
Tip of snout to 4th gill opening	1,150	25.8	37.2	4,300	3,000	2C	L
Tip of snout to pectoral origin	1,110	24.9	35.9	4,400	3,060	2C	F
Tip of snout to 1st dorsal origin	1,540	34.5	49.8	5,230	3,620	2A	F
Anterior margin of 1st dorsal fin	415	9.3	13.4	5,370	3,720	2A	F
Posterior margin of 1st dorsal fin	265	5.9	8.6	4,940	3,430	2A	F
Base of 1st dorsal fin	404	9.1	13.1	4,550	3,160	2A	F
Inner margin of 1st dorsal fin	82	1.8	2.7	5,270	3,650	2A	F
Height of 1st dorsal fin	226	5.1	7.3	5,300	3,680	2A	F
			Mean	4,920	3,410		
			Standard Error	1,240	860		

* F and L denote the yellow floats (see Fig. 2A) and the label (see Fig. 2B), respectively.

size of 3400 mm PCL, respectively.

Nakaya (1989) and Compagno (1990) have summarized available information of the megamouth shark. To date three megamouth shark have been recorded by actual specimens and one has been reported solely by photographs: the first megamouth shark was tangled with a parachute sea anchor and brought on the deck of the U. S. Navy research vessel off Oahu, Hawaii on 15 November 1976 (4460 mm TL, 750kg, adult male) (Taylor *et al.*, 1983); the second was captured in a pelagic gill net by a commercial fishing boat off Catalina Island, California on 29 November 1984 (4490 mm TL, ca. 705 kg, adult male) (Lavenberg and Seigel, 1985); the third was washed up alive on a beach at Mandurah, near Freemantle, Western Australia on 18 August 1988 (5150 mm TL, ca. 690 kg, adult male) (Western Australian Museum, 1988); the fourth was stranded on a beach at Hamamatsu-shi, Shizuoka, central Japan on 23 January 1989, which was photographed by a beachgoer but lost before scientists recognized its identity (over 4 m, adult male) (Nakaya, 1989).

Therefore our record on the photographs is apparently the fifth megamouth shark to date and the second one in Japan. Also it should be noted that the all previous four was recorded within the

winter season: three boreal and one austral winter. Thus the present occurrence is the first record of the megachasmid shark during the summer season.

Although locality of the fourth megamouth shark is not in Suruga Bay, it is very close to the present one, just about 50 km SWS. In addition the date of the fourth record was 23 January 1989, just about six months earlier than the present one. We have no idea about why these two megamouths have come to our attention within such a short time period in a very small area. The head of the fishermen told us that it was his first experience to see such an unusual shark when we showed him these photographs about two years after the occurrence. This statement is further supported by the other experienced fishermen working with him.

Although sex cannot be determined from the photographs, estimated sizes of the shark (mean; 4900 mm TL; 3400 mm PCL) falls within the size range of the previous records (4490–5150 mm TL; 3090 mm PCL), suggesting that the shark already attains adult stage unless remarkable sexual dimorphism occurs. No specific difference can be recognized on these photographs.

Acknowledgments

The photographs were taken by Mr. Michio Nakajima who willingly permitted to use his photographs in the present paper. Mr. Hisanori Sakai, the head of the fishermen, gave us invaluable information on the shark. Drs. L. J. V. Compagno, Kazuhiro Nakaya and Shigeru Shirai sent a copy of literatures pertaining to the megamouth and gave constructive comments on the earlier draft of the manuscript. We wish to thank all of them.

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駿河湾に出現したメガマウス

宮 正樹¹⁾・廣沢真純²⁾・望月賢二³⁾

1) 千葉県立中央博物館

〒280 千葉市青葉町955-2

2) 〒281 千葉市朝日ヶ丘町2698-18

1989年6月12日、静岡県焼津市小川港地先の定置網の揚網作業中に奇妙なサメが発見された。サメは現場で網外に逃がされたものの、漁労作業実習のために偶然現場に居合わせた学生により4枚の写真が撮影された。これら4枚の写真を鑑定した結果、巨大な口が体の前端についていること、吻が短く丸みを帯びていること、さらに下顎下面に斑点模様をもつこと等の特徴から、世界でまだ4個体しか記録されていないメガマウス (*Megachasma pelagios*) であることが判明した。写真内で実測値のある浮子や船側のラベルをもとに各部位の長さを比例計算し、さらにそのデータをもとに完模式標本の相対長を使って大きさを推定した結果、全長で4900mm (平均) という値が得られた。本個体の性は不明であるが、この値は過去に計測された3個体の雄の全長(4490~5510mm)にほぼ一致する。なお、従来本種の記録はすべて冬期であり、夏期に記録されたのは本個体が初めてである。