

A Taxonomic Revision of Genus *Carcharhinus* (Pisces: Elasmobranchii) with Description of Two New Records in Korea

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ABSTRACT

The taxonomic revision of the genus *Carcharhinus* in Korea was made based on the shark specimens collected in the western and southern coasts including Cheju Isl. of Korea from July 1996 to April 1997. Five species were recognized from the Korean waters and they are described herein. Among them, two species of *Carcharhinus dussumieri* (Valenciennes, 1839) and *Carcharhinus sorrah* (Valenciennes, 1839) were collected for the first time from the Cheju Isl. coast of Korea. *Carcharhinus dussumieri* differs from other species of genus *Carcharhinus* in following morphological characters: a black or dark spot on the second dorsal fin but no other markings, a small first triangular dorsal fin and a second dorsal fin with a short inner margin, and *Carcharhinus sorrah*: conspicuous black tips on the ventral caudal lobe, pectoral and second dorsal fins, and low second dorsal with a inner margin.

Key words: Elasmobranchii. *Carcharhinus*. revision. Korean fish fauna.

INTRODUCTION

The living sharks comprise approximately 350 species in the world (Compagno, 1984). Since the sharks of Korea were first reported by Jordan and Metz (1913) with seven species, Mori (1952) and Chyung (1977) treated 36 species of sharks from the waters around the Korean Peninsula. Among the sharks of genus *Carcharhinus*, two species *Carcharhinus brachyurus* and *C. japonicus* has been reported in Korea in a list (Mori, 1952). Chyung (1977) described two species *C. gangeticus* and *C. brachyurus* with photographs. However his identification appears to be erroneous, and his *C.*

gangeticus looks like *C. brachyurus* and his *C. brachyurus* is similar to *C. limbatus*. Kim and Lee (1994) included *C. plumbeus* in a list of Cheju Isl., Korea. *C. japonicus* is regarded as a synonym of *C. plumbeus* (Garrick, 1982; Compagno, 1984). Therefore, three species *C. plumbeus*, *C. brachyurus* and *C. limbatus* appear to have been reported from Korean waters.

We investigated the waters of south Korea, including Cheju Island., and western coast of Korea in 1996 and 1997, and we newly recognize two species *C. dussumieri* and *C. sorrah* from Korean waters. Here we give a key to these five species, and describe them based on specimens caught in Korean waters.

MATERIALS AND METHODS

Proportional measurements for specimens and terminology for external characters are those used in Compagno (1984) and Last and Stevens (1994). The specimens are deposited in Department of Marine Living Resources, Kunsan National University (KNUM), Korea.

Family Carcharhinidae

Genus *Carcharhinus* Blainville, 1816

The sharks of *Carcharhinus* with small, wide spaced nostrils, rounded eyes with developed nictating membrane, no spiracles, labial furrows confined to mouth corners, no keels on caudal peduncle, second dorsal origin usually about opposite anal origin, anal fin with preanal ridges short to absent. Five species from Korea and thirty species from world.

Key to species of genus *Carcharhinus* in Korea

- 1a. Second dorsal fin with a conspicuous black tip, other fins plain *Carcharhinus dussumieri*
- 1b. Second dorsal fin never the only fin with a black tip 2
- 2a. Upper anterolateral teeth with bent, hooked, narrow cusps *C. brachyurus*
- 2b. Upper anterolateral teeth variably shaped but never with bent, hooked cusps 3
- 3a. Interdorsal ridges absent *C. limbatus*
- 3b. Interdorsal ridges present 4
- 4a. Second dorsal, pectoral and lower caudal fins with striking black tips; first dorsal fin height much less than half predorsal body length *C. sorrah*
- 4b. Fins plain; first dorsal fin height about half predorsal body length *C. plumbeus*

1. *Carcharhinus brachyurus* (Günther, 1870) 무태상어 (Fig. 1)

Carcharias brachyurus Günther, 1870, p.8: 369. (type locality: New Zealand).

Carcharhinus brachyurus: Bass *et al.*, 1973; Garrick, 1982.

Carcharhinus gangeticus: Chyung, 1977, pl. 10: 1~3.

Material examined. KNUM 1021 (1 specimen), 102 cm TL, off Kunsan, April 28, 1997.

Description. In percentages of total length, head length 23.5, head height 12.6, trunk height 16.2, eye length (diameter) 1.2, pre-first dorsal length 32.4, pre-second dorsal length 63.7, prebranchial length, 17.6, prepectoral length 21.6, prepelvic length 51.5, preanal length 63.7, pectoral-pelvic



Fig. 1. *Carcharhinus brachyurus* (Gunther, 1870): KNUM 1021, 102 mm TL.

space 24.5, anal-caudal space 5.9, interdorsal space 23.0, dorsal-caudal space 7.4, intergill length 5.9, pectoral anterior margin 16.7, pectoral inner margin 4.9, dorsal caudal margin 26.0, preventral caudal margin 11.3, first dorsal length 11.8, first dorsal height, 7.8, second dorsal length 6.9, second dorsal height 2.5, internarial space 5.4.

Body fusiform, fairly slender species. Snout moderately long and narrowly rounded or pointed. Labial furrows small and inconspicuous. First dorsal fin origin over, or just ahead of free rear tips of pectoral fin. Origin of second dorsal fin over, or slightly posterior to anal origin. Pectoral fins moderately large, falcate, with narrowly rounded or pointed apices. Interdorsal ridge usually absent.

Color in formalin. Dorsal surface grey or greyish brownish, Ventral surface creamy white; a pale stripe extending anteriorly on the flank from above the pelvic fins. Fins without distinctive markings, but margins and tips sometimes dusky.

Size. Born at 60-70 cm and attains 295 cm. (Last and Stevens, 1994).

Distribution. South and west sea in Korea. Japan, China, Atlantic, Western Indian Ocean, Pacific, Australia (Compagno, 1984).

2. *Carcharhinus dussumieri* (Valenciennes, 1839) 흰뺨상어(신칭) (Fig. 2)

Carcharias dussumieri: Müller and Henle, 1839, p. 47, pl. 19. (type locality; Pondicherry, India).

Carcharhinus dussumieri: Garrick, 1982.

Material examined. KNUM 1020 (1), 95 cm TL, Cheju Isl. July 10, 1996.

Description. In percentages of total length, head length 23.2, head height 11.6, trunk height 15.3, caudal peduncle height 3.5, eye length (diameter) 1.8, pre-first dorsal length 30.5, pre-second dorsal length 63.5, prebranchial length, 18.9, prepectoral length 20.5, prepelvic length 46.8, preanal length 63.2, precaudal length 74.2, pectoral-pelvic space 21.6, anal-caudal space 6.5, interdorsal space 24.2, dorsal-caudal space 6.8, intergill length 4.2, pectoral anterior margin 16.8, pectoral posterior margin 11.1, dorsal caudal margin 26.8, preventral caudal margin 10.8, upper postventral caudal margin 15.8, first dorsal height 10.3, second dorsal height 2.1. internarial space 5.9.

Body fusiform, and stocky. Snout moderately long and pointed or narrowly rounded. Upper labial furrows short and inconspicuous. First dorsal fin origin over, or somewhat anterior to, pectoral fin free rear tip. Origin of second dorsal fin over, or usually slightly behind anal fin origin. Pectoral fins small, semifalcate, with narrow, angular apices. A low interdorsal ridge present.

Color in formalin. Dorsal surface greyish or brownish, paler white ventrally. Second dorsal fin with



Fig. 2. *Carcharhinus dussumieri* (Valenciennes, 1839): KNUM 1020, 95 cm TL.

a conspicuous black or dark tip; other fins without markings.

Size. Born at 35-40 cm and attains 90 cm.

Distribution. South sea in Korea. Japan, China, Indo-west pacific.

3. *Carcharhinus limbatus* (Valenciennes, 1839) 남방상어 (신칭) (Fig. 3)

Carcharias limbatus Valenciennes, 1839, p. 49, pl. 19 (type locality: Martinique).

Carcharhinus brachyurus; Chyung, 1977, pl. 10, fig. 4.

Material examined. The specimens were not available.

Distinctive features (Chyung, 1977; Last and Stevens, 1994).

Body fusiform; interdorsal ridge absent. Labial furrows small and long. First dorsal fin origin usually over or just behind pectoral fin insertion, exceptionally just in front of pectoral fin free rear tip.

Color in formalin. Dorsal surface bronze, fading to grey after death or in preservative. ventral surface pale. Fin tips (except anal) usually black in juveniles; sometimes pelvic fin plain and anal fin black-tipped; distinctive fin markings lacking in some adults.

Size. Born at 40-70 cm and attains 250 cm.

Distribution. South sea in Korea. China, Atlantic, Pacific, Indian Ocean, Australia.

Remarks. Chyung (1977) described *Carcharhinus brachyurus* with photographs. However, his identification appears to erroneous, and his *C. brachyurus* looks like *Carcharhinus limbatus*.

4. *Carcharhinus plumbeus* (Nardo, 1827) 흉상어 (Fig. 4)

Squalus plumbeus Nardo, 1827, Isis, 20(6): 477, 483. (type locality; Adriatic Sea).

Carcharhinus japonicus; Mori, 1952.

Carcharhinus plumbeus: Bass *et al.*, 1973; Garrick, 1982; Kim and Lee, 1994.

Material examined. The specimens were not available.

Distinctive features (by Chyung, 1977; Last and Stevens, 1994).

Body fusiform; interdorsal ridge present. Labial furrows short and inconspicuous. First dorsal fin high (8.4-16.7% of total length), particularly in adult; origin over, or slightly in front of pectoral fin insertions.

Color in formalin. Dorsal surface greyish brown; ventral surface pale. Dorsal and upper caudal fin margins sometimes with dusky edges; pectoral, pelvic, caudal and sometimes anal fins with pale tips and posterior margins (more pronounced in juveniles).

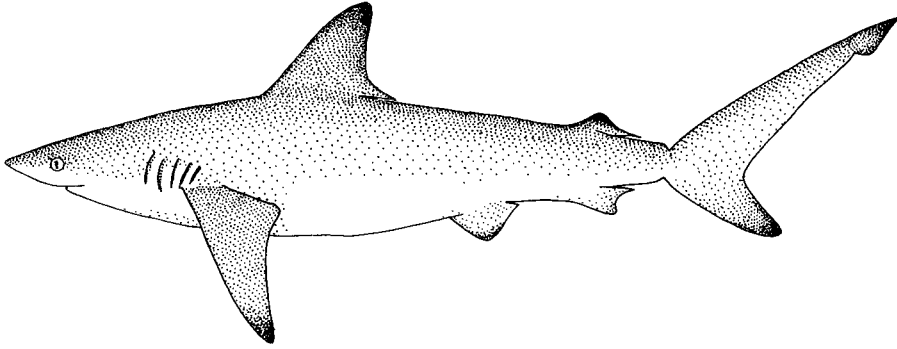


Fig. 3. *Carcharhinus limbatus* (Valenciennes, 1839) (cited from Last and Stevens, 1994).

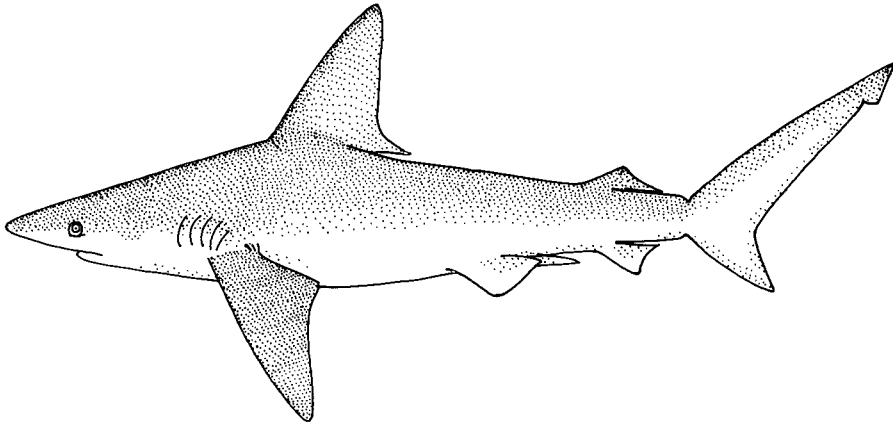


Fig. 4. *Carcharhinus plumbeus* (Nardo, 1827) (cited from Last and Stevens, 1994).

Size. Born at 55-65 cm and attains 240 cm.

Distribution. South sea in Korea. Japan, China, Atlantic, Pacific, Indian Ocean, Australia.

Remarks. *Carcharhinus japonicus* was first reported from Korea by Mori (1952), and it regarded as a synonym of *Carcharhinus gangeticus* by Chyung (1977). However, Chyung (1977)'s *C. gangeticus* is similar to *C. brachyurus*, and *C. japonicus* is regarded as a synonym of *C. plumbeus* (Garrick, 1982; Compagno, 1984).

5. *Carcharhinus sorrah* (Valenciennes, 1839) 검은꼬리상어(신칭) (Fig. 5)

Carcharias sorrah: Müller and Henle, 1839, p. 45, pl. 16. (type locality; Java, Madagascar).

Carcharhinus sorrah: Bass *et al.*, 1973; Garrick, 1982.

Material examined. KNUM 1001 (1), 56 cm TL, Cheju Isl. July 10, 1996.

Description. In percentages of total length, head length 22.1, head height 10.1, trunk height 12.6, caudal peduncle height 3.7, eye length (diameter) 2.3, pre-first dorsal length 26.9, pre-second dorsal length 59.1, prebranchial length, 17.3, prepectoral length 20.1, prepelvic length 46.6, preanal length 59.1, precaudal length 68.3, pectoral-pelvic space 21.3, anal-caudal space 5.5, interdorsal space 22.4, dorsal-caudal space 6.4, intergill length 4.6, pectoral anterior margin 14.9, pectoral posterior margin 10.7, pectoral inner margin 4.3, dorsal caudal margin 31.9, preventral caudal

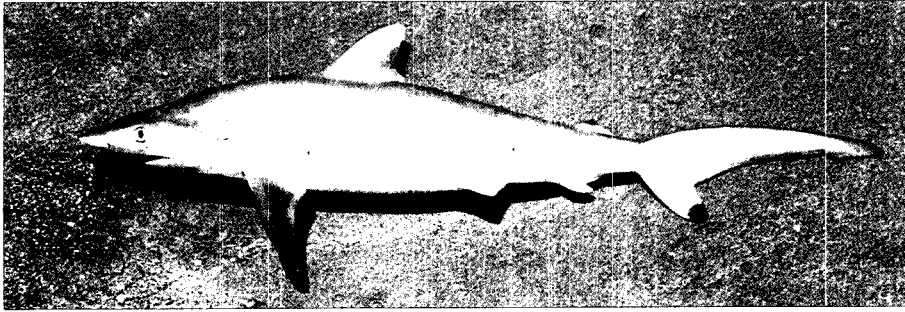


Fig. 5. *Carcharhinus sorrah* (Valenciennes, 1839): KNUM 1001, 56 cm TL.

margin 10.9, upper postventral caudal margin 17.3, terminal caudal margin 5.7, subterminal caudal margin 3.0.

Body fusiform, fairly stocky and spindle-shaped species. Snout moderately long and pointed. Labial furrows small and inconspicuous. First dorsal fin origin varying from just anterior to just behind pectoral fin free rear tips. Second dorsal fin with a long inner margin. Pectoral fins fairly small, falcate, with narrowly rounded or pointed apices. A low interdorsal ridge present.

Color in formalin. Dorsal surface brownish grey or grey, paler white ventrally. Pectoral, second dorsal and lower caudal fins with conspicuous black tips.

Size. Born at 50 cm and attains 160 cm.

Distribution. South sea in Korea. China (including Taiwan Island), Philippines, Australia. Indo-west Pacific.

REFERENCES

- Bass, A.J., J.D. D'Aubrey and N. Kistnasami, 1973. Sharks of the east coast of southern Africa. 1. The genus *Carcharhinus* (Carcharhinidae). Invest. Rep. Oceanogr. Res. Inst., Durban, (33): 1-168.
- Blainville, H.M.D., 1816. De, Prodrome d'une distribution systematique du regne animal. Bull. Soc. Philomat. Paris, **8**: 105-124.
- Compagno, L.J.V., 1984. FAO species catalogue. Vol. 4, Sharks of the world. An annotated and illustrated catalogue of shark species known to date. Part 1 - Hexanchiformes to Lamniformes: viii, 1-250. Part 2- Carcharhiniformes: x, 251-655. FAO fisheries synopsis, **125**: 1-655.
- Chyung, M.K., 1977. The Fishes of Korea. Ilji-sa, Seoul, pp. 63-87. (In Korean)
- Garrick, J.A.F., 1982. Sharks of the genus *Carcharhinus*. NOAA Tech. Rep. NMFS Circ., (445): 194 pp.
- Jordan, D.S. and C.W. Metz, 1913. A catalog of the fishes known from the waters of Korea. Mem. Carnegie Mus., **1**: 2-5.
- Kim, I.K. and W.O. Lee, 1994. Fish fauna from Cheju Island, Korea. Dept. of Biol., Chonbuk Nat. Univ. The Study group of Korean fish fauna, 53 pp.
- Last, P.R. and J.D. Stevens, 1994. Sharks and Rays of Australia. CSIRO Australia, 513 pp., pl. 84.
- Mori, T., 1952. Check list of the fishes of Korea. Mem. Hyogo Univ. Agr., **1**(3): 1-228.
- Muller J. and F.G.J. Henle, 1839. Systematische Beschreibung der Plagiostomen. Berlin, Veit, pp. 39-102.

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한국산 흉상어속 어류의 분류학적 재검토 및 2미기록종

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요 약

1996년부터 1997년까지 서해와 제주도를 비롯한 국내 연안에서 채집된 흉상어속 어류를 재검토한 결과 *Carcharhinus brachyurus*, *C. dussumieri*, *C. limbatus*, *C. plumbeus*, *C. sorrah*의 5종이 분류되었으며, 이 가운데 *Carcharhinus dussumieri* 흰뺨상어와 *C. sorrah* 검은꼬리상어는 미기록종으로 확인되었다. 흰뺨상어는 제2등지느러미만 검은색을 띠고, 검은꼬리상어는 꼬리지느러미 하엽과 제2등지느러미, 가슴지느러미 끝에 뚜렷한 검은색을 띠고 있어서 무태상어, 흉상어 등 국내의 기타 흉상어속 어류와 잘 구분되었다. 한편 정(1977)의 *C. gangeticus*와 *C. bracyurus*는 각각 *C. plumbeus*와 *C. limbatus*임이 명백하였으며, *C. limbatus*에 대해서는 국명을 남방상어로 하였다.