

characters: a lower first dorsal fin (height equal to preorbital space, versus much greater in C. limbatus; or height greater than 2.2 times in interdorsal space, versus about equal to or less than 2.2 times in interdorsal space), with a more rounded apex and vertical posterior margin (more pointed and falcate in C. limbatus) and its origin more posterior in adults (and probably large juveniles; over or behind the pectoral rear tips, versus about opposite the pectoral insertions in C. limbatus); a longer snout, with prenarial space 1.1 to 1.4 times distance from front of nostrils to mouth (0.7 to fin C. limbatus); higher tooth row counts with some overlap (usually 16 rows of upper anteroposterior teeth in C. brevipinna, usually 15 in C. limbatus, with the two respectively varying from 15 to 18 and 14 to 16 rows of these teeth; Meckel's cartilage without a posterior notch just below the mandibular joint (present in C. limbatus); and anal fin black-tipped (even in sharks a few months old in the Gulf of Mexico, but possibly not attained until a greater age and size in the western Indian Ocean). In sorting out piles of small sharks in the field in India, the writer found that the long diagonal upper labial furrows of this species were very useful in separating spinner sharks from other species, including C. limbatus, as was its slender body, long gill slits, long narrow snout, small fins and small teeth.

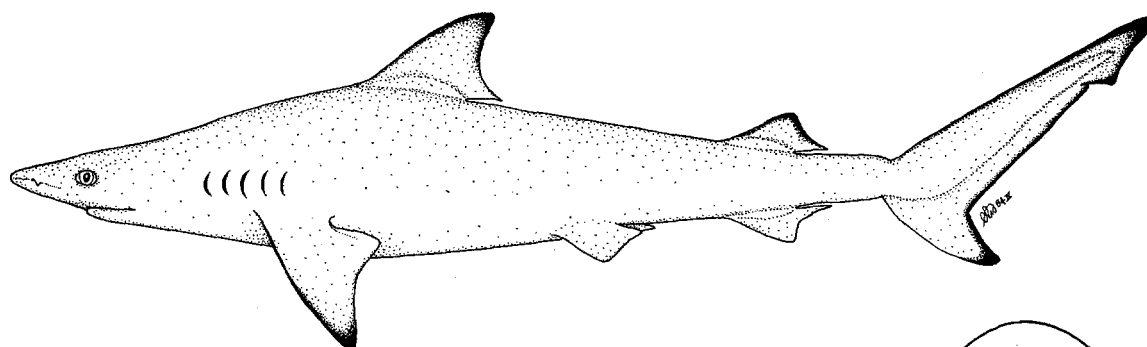
Carcharhinus cautus (Whitley, 1945)

CARCH Carch 28

Galeolamna greyi cauta Whitley, 1945, Aust.Zool., 11(1):2, fig. 2. Holotype: Australian Museum, Sydney, IB. 1622, 918 mm female (skin and teeth only). Type Locality: Shark Bay, Herald Bight, Western Australia.

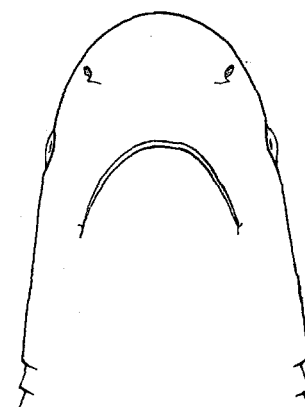
Synonymy : None.

FAO Names: En - Nervous shark; Fr - Requin nerveux; Sp - Tiburón nervioso.



Field Marks : A moderate-sized, greyish or brownish 'grey shark' with a short, bluntly rounded snout, horizontally oval eyes, anteroposterior tooth rows usually 12 to 13/12 to 13 in each jaw half, no interdorsal ridge, a moderately large second dorsal with a short rear tip, and black edges on the dorsal fins and caudal and black tips on the upper and lower caudal lobe and pectoral fin.

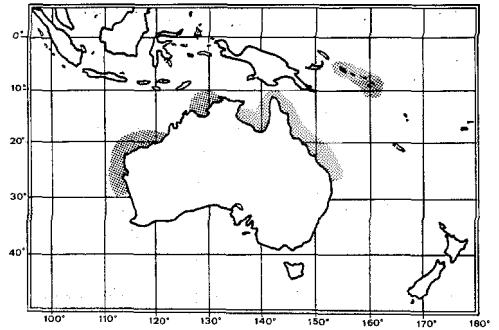
Diagnostic Features: A moderate-sized, fairly stocky species (to 1.5 m). Snout short and bluntly rounded; internarial width 1.1 to 1.2 times in preoral length; eyes horizontally oval and fairly large, their length 1.9 to 3.3% of total length; anterior nasal flaps moderately elongated and expanded as nipple-shaped lobes; upper labial furrows short and inconspicuous; hyomandibular line of pores just behind mouth corners not conspicuously enlarged; gill slits moderate-sized, the third 2.9 to 3.4% of total length and less than a third of first dorsal base; usually 12 to 13/12 to 13 rows of anteroposterior teeth in each jaw half but varying from 12 to 14/11 to 13; upper teeth with narrow, strongly serrated, oblique, moderately high cusps, and crown feet with coarser serrations and cusplets; lower teeth with erect to oblique, narrow serrated cusps and transverse roots. No interdorsal ridge. First dorsal fin large and falcate, with a narrowly rounded or pointed apex and posterior margin curving ventrally from fin apex; origin of first dorsal fin over or somewhat in front of pectoral free rear tips; inner margin of first dorsal short, less than a third of dorsal base; second dorsal fin large and high, its height 3.1 to 4.1% of total length, its inner margin short and 1 to 1.1 times its height; origin of second dorsal about over anal origin; pectoral fins moderately large, narrow and falcate, with narrowly rounded or pointed apices, length of anterior margins about 17 to 19% of total length; 160 to 171 total vertebral centra, 86 to 90 precaudal centra. Colour grey or light brown above, white below; dorsal, caudal and pectoral fins with black margins, expanded apically to black tips on caudal lobes and pectorals; probably a conspicuous white band on flank.



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Geographical Distribution : Eastern Indian Ocean and western South Pacific: Australia (Queensland, western and northern Australia), Ugi and Solomon Islands.

Habitat and Biology : The nervous shark is a little-known South Pacific reef shark that may have a wider distribution. It apparently lives in shallow water on the continental and insular shelves, but may range in deeper water. According to Whitley (1940), they are rather skittish and timid when accosted by people, hence the name he bestowed on them. Presumably viviparous. Eats small fishes, including lizardfish and smelt-whiting (Sillago), and crabs. Probably harmless or minimally hazardous to people.



Size : Maximum about 150 cm, adult females 120 to 150 cm; size at birth between 35 and 39 cm.

Interest to Fisheries: Unknown.

Literature : Whitley (1940, 1945); Garrick (1982).

Remarks : This species is rather similar to the blacktipped reef shark, Carcharhinus melanopterus, but lacks the conspicuous highlighted black blotch on its first dorsal fin, and has lower vertebral counts.

Carcharhinus dussumieri (Valenciennes, 1839)

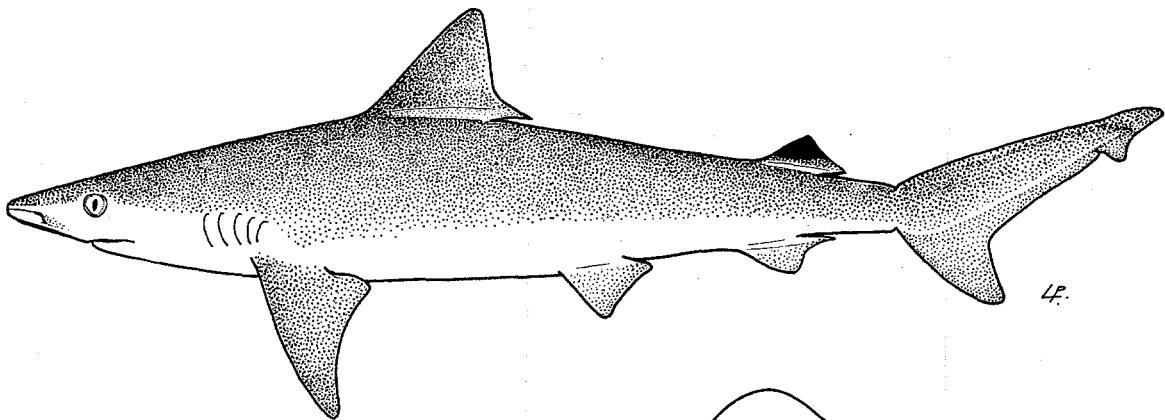
CARCH Carch 20

Carcharias (Prionodon) dussumieri Valenciennes, in Müller & Henle, 1839, Syst.Beschr.Plagiost., (2):47, pl. 19. Lectotype: Museum National d'Histoire Naturelle, Paris, MNHN 1135, 370 mm immature male, designated by Garrick (1982). Type Locality: Pondicherry, India.

Synonymy : Carcharias (Prionodon) tjujot Bleeker, 1852; Carcharias (Prionodon) javanicus Bleeker, 1852; Carcharias malabaricus Day, 1873.

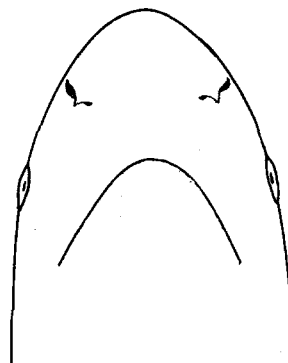
Other Scientific Names Recently in Use : Carcharhinus menisorrah (Valenciennes, in Müller & Henle, 1839) = C. falciformis (Bibron, in Müller & Henle, 1839) as restricted by Garrick (1982).

FAO Names : En - Whitecheek shark; Fr - Requin à joues blanches; Sp - Tiburón cariblanco.

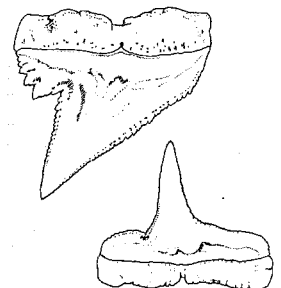


Field Marks: A small grey shark with moderately long rounded snout, fairly large horizontally oval eyes, a black spot on the second dorsal fin but no other markings, oblique-cusped serrated teeth in both jaws, upper teeth with strong, serrated cusplets, usually 13/13 to 14 rows of anterolateral teeth, small semifalcate pectoral fins, a small triangular first dorsal with a short rear tip and a moderately large second dorsal with a short rear tip.

Diagnostic Features : A small, slender to slightly stocky species (up to about 1 m). Snout moderately long and moderately pointed or narrowly rounded; internarial width 1.1 to 1.6 times in preoral length; anterior nasal



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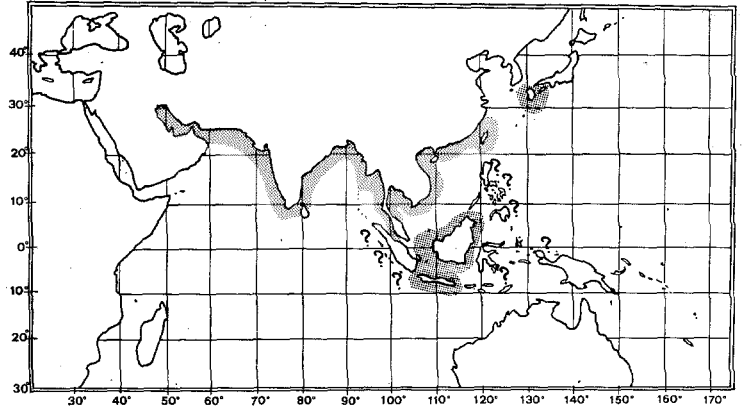


upper and lower tooth

flaps elongated and triangular; eyes usually horizontally oval, moderately large, their length 2 to 2.2% of total length in specimens over 50 cm long; upper labial furrows short and inconspicuous; hyomandibular line of pores just behind mouth corners not conspicuously enlarged; usually 13/13 to 14 rows of anteroposterior teeth in each jaw half but varying from 12 to 14/11 to 15; upper teeth with narrow to moderately broad, strongly serrated, strongly oblique cusps, and crown feet with strong, serrated, distal cusplets; lower teeth with oblique, narrow serrated cusps and transverse roots. Interdorsal ridge present. First dorsal fin small, broadly triangular, not strongly falcate, with pointed or narrowly rounded apex and posterior margin that slopes posteriorly from apex; origin of first dorsal fin over posterior half of pectoral inner margins; second dorsal fin large and high, its height 2.6 to 4% of total length, its inner margin short and 1 to 1.5 times its height; origin of second dorsal over or slightly behind anal fin origin; pectoral fins small, semifalcate, with narrow, angular apices, length of anterior margins about 15 to 17% of total length in large (over 60 cm) individuals; 109 to 150 total vertebral centra, 54 to 74 precaudal centra. Colour grey, or grey brown; black or dusky tip present on second dorsal fin only, other fins with pale trailing edges; light stripe on flank not conspicuous.

Geographical Distribution : Indo-West Pacific: The "Gulf" and Arabian Sea between Gulf of Oman and Pakistan, India, Singapore, Malaysia, Java, Thailand, Borneo, Viet Nam, China, Japan.

Habitat and Biology: A small, very common, but little-known inshore shark of the continental and insular shelves, with its biology scantily known because of general confusion with its sibling species *C. sealei* under the name *C. menisorrh* (as restricted by Garrick, 1982, properly a synonym of *C. falciformis*).



Viviparous, with a yolk-sac placenta. Litter size normally 2 but exceptionally up to 4. Off northwestern Borneo and off Taiwan

Island (Province of China), there is no apparent birth season, as gravid females with full-term young occur all year, but with a peak in July and August; most of the mature females caught off Borneo were gravid (Teshima & Misue, 1972).

A harmless species, probably feeding on small fishes, cephalopods and crustaceans.

Size : Maximum about 100 cm, males maturing at 65 to 70 cm and reaching at least 82 cm, females maturing at 70 to 75 cm and reaching at least 83 cm. Size at birth 37 to 38 cm.

Interest to Fisheries : This is a very common, small inshore shark where it occurs, that is readily available to artisanal and smallscale commercial fisheries and is commonly marketed for meat for human consumption.

Literature : Fowler (1941); Teshima & Misue (1972); Garrick (1982).

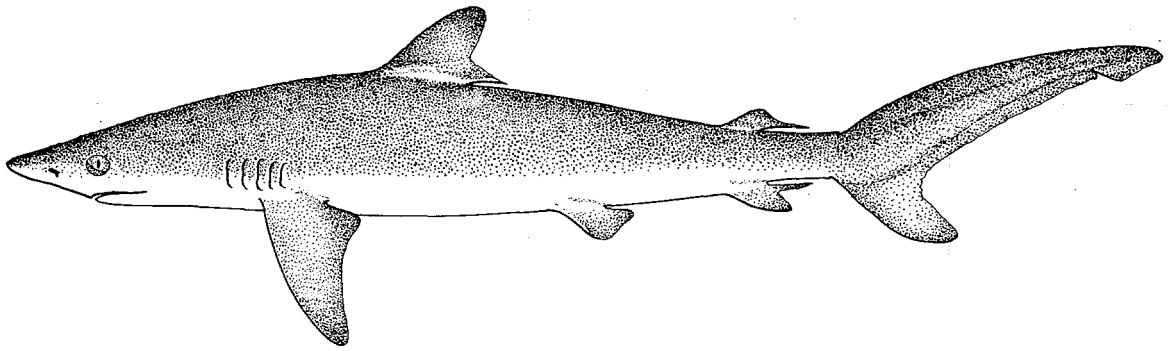
Carcharhinus falciformis (Bibron, 1839)

CARCH Carch 4

Carcharias (*Prionodon*) *falciformis* Bibron, in Müller & Henle, 1839, *Syst.Beschr.Plagiost.*, (2):47. Holotype: Museum National d'Histoire Naturelle, Paris, MNHN 1134, 528 mm female fetus. Type Locality: Cuba.

Synonymy : ? *Carcharias falcipinnis* Lower, 1839 (see Garrick, 1982); *Carcharias* (*Prionodon*) *menisorrh* Valenciennes, in Müller & Henle, 1839; *Squalus* or *Prionodon tiburo* Poey, 1860 (not *Squalus tiburo* Linnaeus, 1758 = *Sphyrna tiburo*; *Gymnorhinus* or *Gymnorhinus pharaonis* Hemprich & Ehrenberg, 1899; *Aprionodon sitankaiensis* Herre, 1931; *Carcharhinus floridanus* Bigelow, Schroeder & Springer, 1943; *Eulamia malpeloensis* Fowler, 1944; *Carcharhinus atrodorsus* Deng, Xiong & Zhan, 1981.

FAO Names : En.- Silky shark; Fr - Requin soyeux; Sp - Tiburón jaquetón.

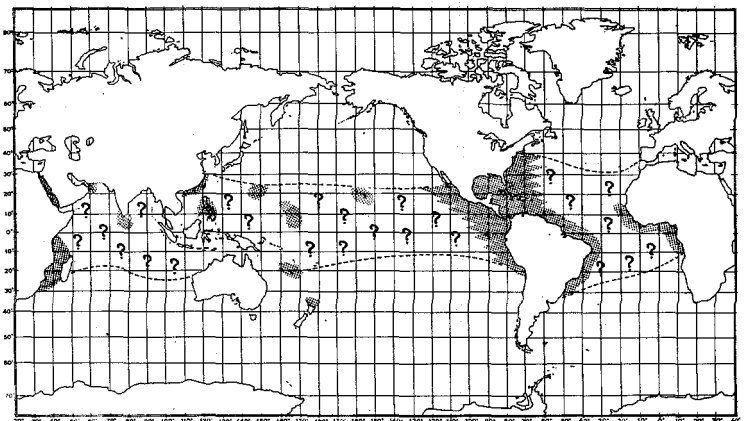
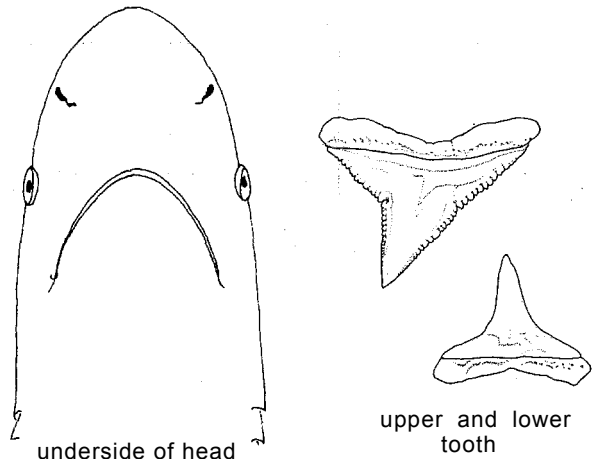


Field Marks : A large, dark, slim, oceanic grey shark with moderately long rounded snout, moderately large eyes, oblique-cusped serrated teeth in the upper jaw, upper teeth with basal cusplets or very strong serrations, usually 15/15 rows of anteroposterior teeth, an interdorsal ridge, long narrow pectoral fins, a moderate-sized first dorsal with its origin behind the pectoral rear tips, a low second dorsal with a greatly elongated inner margin and rear tips, and no conspicuous markings.

Diagnostic Features : A large, fairly slender species (up to about 3.3 m). Snout moderately long and rounded; internarial width 1.2 to 1.6 times in preoral length; eyes circular and moderately large, their length 1.2 to 2.7% of total length; upper labial furrows short and inconspicuous; hyomandibular line of pores just behind mouth corners not conspicuously enlarged; gill slits moderate-sized, the third 2.9 to 3.6% of total length and

less than 2/5 of first dorsal base; usually 15/15 rows of anteroposterior teeth in each jaw half but varying from 14 to 16/13 to 17; upper teeth with fairly narrow, strongly serrated, erect to moderately oblique cusps, well-delimited from crown feet, feet with heavy serrations or small cusplets; lower teeth with erect, narrow, smooth-edged cusps and transverse roots. A narrow interdorsal ridge present. First dorsal fin moderate-sized and falcate, with narrowly to broadly rounded apex and posterior margin curving ventrally from fin apex; origin of first dorsal fin behind pectoral free rear tips; inner margin of first dorsal long, about half dorsal base or slightly more or less; second dorsal fin very small and low, its height 1.3 to 2.2% of total length, its inner margin long and 1.6 to 3 (usually over 2) times its height; origin of second dorsal over or slightly behind anal origin; pectoral fins large (especially in adults, shorter in young), narrowly falcate, with narrowly rounded or pointed apices, length of anterior margins about 14 to 22% of total length; 199 to 215 total vertebral centra, 98 to 106 precaudal centra. Colour dark grey or grey brown above, sometimes nearly blackish, white below; tips of fins other than first dorsal dusky but not black-tipped; an inconspicuous white band on flank.

Geographical Distribution : Oceanic and coastal, circumtropical. Western Atlantic: Massachusetts to southern Brazil, including Gulf of Mexico and Caribbean Sea. Central Atlantic from St. Paul's Rocks. Eastern Atlantic: Madeira, Atlantic Spain, Senegal to northern Angola. Indian Ocean: Madagascar, Mozambique, Tanzania, Comores and Aldabra Island, between Somalia and Maldive Islands, Oman, Red Sea, Sri Lanka. Western Pacific: Thailand, the Philippines, New Caledonia, New Zealand and China (including Taiwan Island). Central and eastern Pacific: Caroline, Hawaiian, Phoenix and Line Islands, westward to Cocos, Revillagigedo, Clipperton and Malpelos Islands, southern Baja California to Peru.



Habitat and Biology : An abundant offshore, oceanic and epipelagic and littoral, tropical shark, found near the edge of continental and insular shelves but also far from land in the open sea. It occasionally occurs inshore where the water is as shallow as 18 m; in the open ocean it occurs from the surface down to at least 500 m depth.

The silky shark is often found over deepwater reefs and near insular slopes. Water temperatures of 23^o to 24^oC have been recorded where it occurs. It is an active, quick-moving, aggressive shark in the water, but defers to the more sluggish but stubbornly persistent oceanic whitetip shark. When approached by divers individuals have been seen to perform a "hunch" display, with back arched, head raised and caudal fin lowered, possibly as a defensive threat display.

Population dynamics and structure are poorly known. Longline sampling in the eastern and central Pacific shows this shark to be much more abundant offshore near land than in the open ocean, unlike the blue shark (*Prionace glauca*) and the oceanic whitetip shark (*Carcharhinus longimanus*), which occur with it. One is tempted to speculate that this shark is perhaps less well-adapted to oceanic life than the whitetip and blue sharks, and that its greater activity is best supported in offshore areas close to land masses that have higher productivity of prey species than the open ocean. The sluggishness, opportunistic feeding habits, and long pectoral fins of the blue and whitetip sharks may be energy-saving adaptations for life in the open sea; the blue shark additionally has gillraker papillae that apparently adapt it to preying on small pelagic animals. Sketchy data shows no strong tendency for sexual segregation in the silky shark, but this may very well occur. There is size segregation, with young occurring on offshore nursery areas and adults seaward from them. This is one of the three most common oceanic sharks, along with the blue and oceanic whitetip sharks, and one of the more abundant large marine organisms.

Viviparous, with a yolk-sac placenta; number of young 2 to 14 per litter. There seems to be no pronounced seasonality in birth of young. The gestation period is not known. In the western North Atlantic nursery areas for the young of this shark occur along the outer edge of the continental shelf and on oceanic banks in the Caribbean.

Primarily a fish-eater, eating pelagic and inshore teleosts including sea catfish, mullets, mackerel, yellowfin tuna, albacore, and porcupine fish, but also squid, paper nautilus, and pelagic crabs. Associated with schools of tuna, and earning the ire of tuna purse seiners for the damage it does to nets and catches, it is called the 'net-eater shark' in the tropical eastern Pacific.

The silky shark is generally regarded as dangerous or potentially dangerous to people, particularly because of its size and abundance offshore, although no attacks have been attributed to it. Because of its lesser aggressiveness and apparently more restricted diet, it may very well be less dangerous than the oceanic whitetip shark.

Size : Maximum about 330 cm, males maturing at about 187 to 217 cm and reaching 270 to 300 cm; females maturing at 213 to 230 cm and reaching at least 305 cm; size at birth about 70 to 87 cm.

A length-weight curve for Cuban sharks is:

$$WT = 0.8782 \times 10^{-5} \text{ total length}^{3.091} \text{ (Guitart Manday, 1975).}$$

Interest to Fisheries : This species is very commonly taken by pelagic longline fisheries but is also taken in fixed bottom nets. Important fisheries exist in the Gulf of Mexico and Caribbean Sea, but probably also elsewhere. Its meat is utilized fresh and dried salted for human consumption; its hide for leather; its fins for shark-fin soup; and its liver is extracted for oil, which has high vitamin A content.

Literature : Bigelow & Schroeder (1948); Cadenat (1957); Rosenblatt & Baldwin (1958); Springer (1960, 1967); Fourmanoir (1961); Garrick & Schultz (1963); Garrick, Backus & Gibbs (1964); Kato (1964); Gilbert & Schlernitzauer (1965); Bane (1966); Kato & Carvallo (1967); Garrick (1967, 1982); Kato, Springer & Wagner (1967); Bass, D'Aubrey & Kistnasamy (1973); Guitart Manday (1975); Compagno & Vergara (1978); Cadenat & Blache (1981); Compagno (1981a).

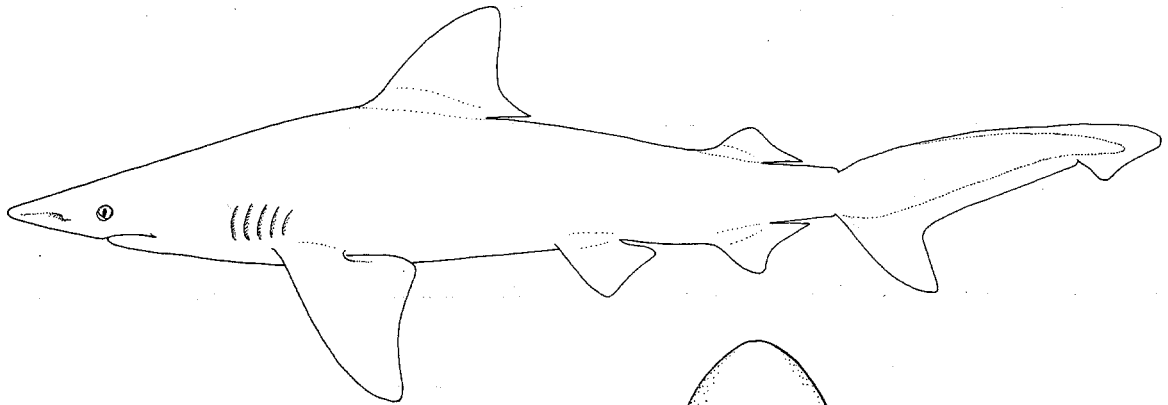
Carcharhinus fitzroyensis (Whitley, 1943)

CARCH Carch 29

Galeolamna (Uranganops) fitzroyensis Whitley, 1943, *Proc.Linn.Soc.N.S.W.*, 68(1):117, fig. 2. Holotype: Australian Museum, Sydney, AMS IB. 1229, 1174 mm female. Type Locality: Fitzroy River Estuary, Connor's Creek, Queensland, Australia.

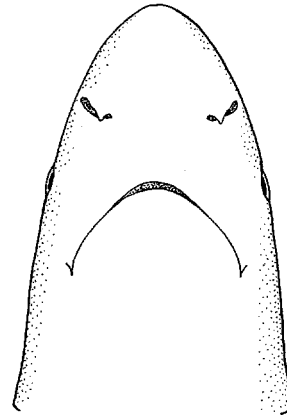
Synonymy : None.

FAO Names : En - Creek whaler; Fr - Requin baleinier; Sp - Tiburón ballenero.

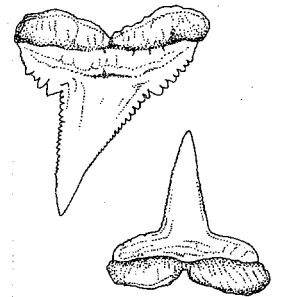


Field Marks: A moderately large, broad- and triangular-finned grey shark with short labial furrows, lobate anterior nasal flaps, short gill slits, 14/13 to 14 rows of anteroposterior teeth in each jaw half, somewhat oblique, narrow cusped, upper teeth with serrations and basal cusplets, no interdorsal ridges, moderately large second dorsal fin with origin about over anal origin, and no conspicuous markings.

Diagnostic Features: A fairly stocky species (up to about 1.5 m). Snout long and parabolic; internarial width 1.7 to 1.8 times in preoral length; eyes circular and moderately large, their length about 1.4% of total length; anterior nasal flaps moderately low and produced as a nipple-like lobe; upper labial furrows short and inconspicuous; hyomandibular line of pores just behind mouth corners not conspicuously enlarged; gill slits short, third 3% of total length and less than a third of first dorsal base; usually 14/13 to 14 rows of anteroposterior teeth in each jaw half; upper teeth with narrow, strongly serrated, semierect and oblique, high cusps, and crown feet with coarse serrations and small cusplets; lower teeth with erect, narrow, partly serrated cusps and transverse roots. No interdorsal ridge. First dorsal fin large and semifalcate, with a pointed or narrowly rounded apex and posterior margin curving ventrally from fin apex; origin of first dorsal fin over or somewhat anterior to pectoral free rear tips; inner margin of first dorsal short, a third of dorsal base or somewhat more; second dorsal fin large and high, its height 3.2% of total length, its inner margin short and 1.5 times its height; origin of second dorsal over or slightly behind anal origin; pectoral fins moderately large, triangular, with narrowly rounded apices, length of anterior margins about of 17 to 19% of total length; 125 total vertebral centra, 58 precaudal centra. Colour grey above, light below, without conspicuous markings on fins; no conspicuous white band on flanks.



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upper and lower tooth

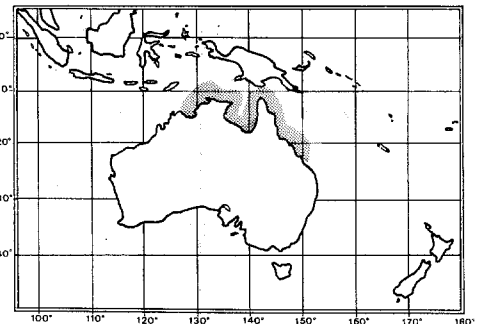
Geographical Distribution : Western Pacific: Australia (Queensland, northern and northwestern Australia).

Habitat and Biology : A little-known tropical shark of the Australian littoral, found inshore and offshore on the continental shelves.

Size : Maximum probably not exceeding 150 cm, largest known specimen the holotype.

Interest to Fisheries : Apparently taken in some numbers by Taiwanese fishermen off Australia, and used for human consumption and probably for the oriental sharkfin trade.

Literature : Garrick (1982); J.D. Stevens (pers. comm.).



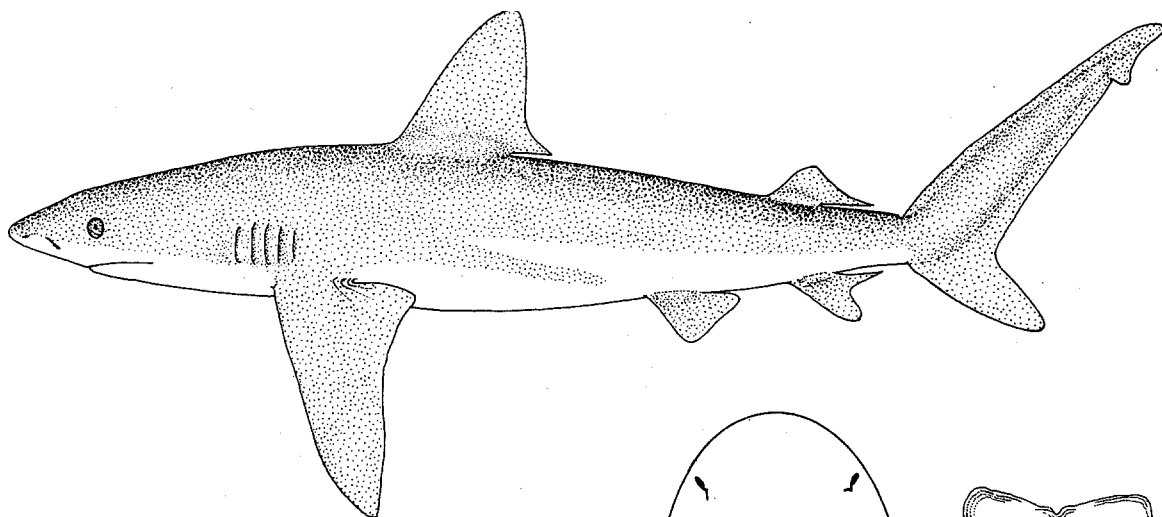
Carcharhinus galapagensis (Snodgrass & Heller, 1905)

CARCH Carch 16

Carcharias galapagensis Snodgrass & Heller, 1905, *Proc. Washington Acad. Sci.*, 6:343. Holotype: Stanford University Natural History Museum, SU 12324, 650 mm fetus, apparently lost. Type Locality: Galapagos Islands.

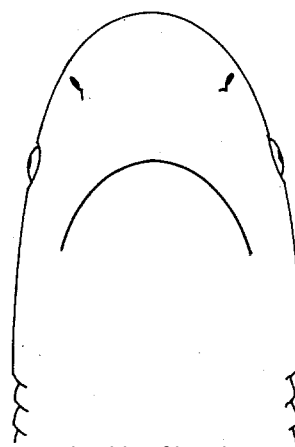
Synonymy : None.

FAO Names: En - Galapagos shark; Fr - Requin des Galapagos; Sp - Tiburón de Galápagos.

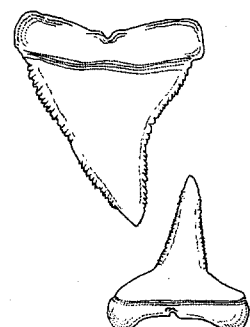


Field Marks: A large grey shark with moderately long broadly rounded snout, low anterior nasal flaps, fairly large eyes, broad, triangular, high, erect and semioblique-cusped serrated anterolateral teeth without cusplets in upper jaw, lower teeth erect and narrow-cusped, usually 14/14 rows of anteroposterior teeth, a low interdorsal ridge, large, semifalcate pectoral fins, a moderately large first dorsal with a short rear tip and origin about opposite mid-lengths of pectoral fins and no conspicuous markings on fins.

Diagnostic Features : A very large, fairly slender species (up to between 3 and 4 m) Snout moderately long and broadly rounded; internarial width 1 to 1.3 times in preoral length; eyes circular and moderately large, their length 1.3 to 2.4% of total length; anterior nasal flaps low and poorly developed; upper labial furrows short and inconspicuous; hyomandibular line of pores just behind mouth corners not conspicuously enlarged; gill slits moderately long, third 2.7 to 4% of total length and less than a third of first dorsal base; usually 14/14 rows of anteroposterior teeth in each jaw half but varying from 13 to 15/13 to 15; upper teeth with broad, triangular, strongly serrated, fairly high erect to slightly oblique cusps that smoothly merge into crown feet, which have slightly coarser serrations but no cusplets; lower teeth with erect, moderately broad, serrated cusps and transverse or slightly arched roots. A low interdorsal ridge present. First dorsal fin moderately large and falcate, with pointed or narrowly rounded apex and posterior margin curving ventrally or anteroventrolaterally from fin apex; origin of first dorsal fin over midlengths of pectoral inner margins; inner margin of first dorsal moderately short, 2/5 of dorsal base or less; second dorsal fin moderately high, its height 2.6 to 2.8% of total length, inner margin fairly short and 1.3 to 1.7 times its height; origin of second dorsal about over anal origin; pectoral fins large and semifalcate, with narrowly rounded or pointed apices, length of anterior margins about 18 to 23% of total length; 200 to 215 total vertebral centra, 103 to 109 precaudal centra. Colour brownish-grey above, white below; tips of most fins dusky but not black or white; an inconspicuous white band on flank.

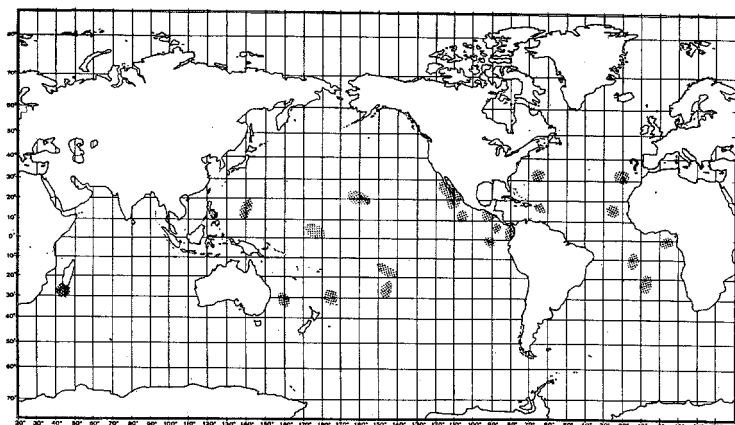


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upper and lower tooth

Geographical Distribution : Circum-tropical but generally associated with oceanic islands. Western North Atlantic: Bermuda, Virgin Islands. Central and eastern Atlantic: Madeira, possibly off Spain or Portugal, Cape Verde, Ascension, St. Helena and Sao Thome Islands. Southwestern Indian Ocean: Walter's Shoal, south of Madagascar. Western central Pacific: Middleton & Elizabeth Reefs (off eastern coast of Australia), Lord Howe Island, Marianas, Marshall, Kermadec, and Tubai Islands (Raga), Tuamotu Archipelago (Pitcairn and Ducie Islands), Hawaiian group (Hawaiian and low islands, including Laysan and Pearl & Hermes Reefs). Eastern Pacific: Galapagos, Cocos, Revillagigedo, Clipperton, and Malpelo Islands, also coasts of southern Baja California, Guatemala and Colombia.



Habitat and Biology : A common but habitat-limited tropical shark that occurs close inshore to well offshore near or on the insular or continental shelves; occurs in water 2 m deep but ranges to the open ocean adjacent to islands, from the surface to at least 180 m. Not oceanic but coastal pelagic and capable of crossing considerable distances of open ocean between islands (at least 50 km). Although occurring off the coasts of continental land masses in a few places (mostly in the tropical eastern Pacific, but possibly also Spain in the eastern Atlantic), this shark is mostly known from around islands, where it can be the most abundant of local sharks. Juveniles seem to be restricted to shallower water, in 25 m or less, which they apparently use as nursery grounds, while the adults range well offshore. This shark seems to favour clear water and rugged coral and rocky bottoms, and often swims a few metres above the substrate, but will come readily to the surface to feed or investigate disturbances. They are found in aggregations but apparently do not form coordinated schools. They are aggressive but at equal sizes defer to the silvertip shark, C. albimarginatus while being dominant to the blacktip shark, C. limbatus. Galapagos sharks perform a "hunch" display, with arched back, raised head, and lowered caudal and pectoral fins, while swimming in a conspicuous twisting, rolling motion, like the grey reef shark (C. amblyrhynchos); this is interpreted as a threat display, liable to be followed by an attack.

Viviparous, with a yolk-sac placenta; number of young 6 to 16 in Hawaiian waters.

Feeds primarily on bottom fishes, including eels, sea bass, flatfish, flatheads, and triggerfish, but also flyingfish, squid, octopi, and occasional garbage. Fresh baits presented to these sharks suggests that they definitely prefer fish to crab, mollusc and bird meat; they may be repelled by decayed shark and fish. Definitely known to be dangerous to people, as one was positively identified as the perpetrator of a fatal attack on a swimmer in the Virgin Islands, and possibly another was responsible for a nonfatal attack on a swimmer off Bermuda. In waters where they are abundant they often closely attend divers, and may show attraction to their swimfins and hands. Off Clipperton Island in the eastern Pacific, Limbaugh (1963) found small Galapagos sharks very abundant and aggressive, and a hindrance to diving operations. Continued diving activities tended to excite the sharks further, so that these had to be suspended. Aggressive actions by divers had a minimal deterring effect to sharks, but startled sharks would circle back and bring other excited sharks in their wake. Fish collecting by rotenone and blasting brought in numerous sharks, which went into a feeding frenzy. With many sharks, feeding stimuli, and social facilitation, the chances of an attack occurring are considerable, and the presence of large numbers of aggressive Galapagos sharks should be good reason to limit diving activity or to use passive protective gear such as shark cages, small submersibles, or anti-shark armor. Use of anti-shark weapons such as powerheads under such circumstances could further arouse uninjured sharks, and might start a feeding frenzy that could lead to attacks.

Size : Maximum possibly 370 cm, males maturing between 170 and 236 cm, adult males up to at least 292 cm, females maturing at about 235 cm, reaching over 300 cm; size at birth 57 to 80 cm.

Interest to Fisheries : No information on utilization or fishing methods for this shark are available, but likely to figure in shark fisheries where it occurs because of its abundance in habitats it prefers.

Literature : Beebe & Tee-Van (1941); Rosenblatt & Baldwin (1958); Garrick & Schultz (1963); Limbaugh (1963); Kato (1964); Kato, Springer & Wagner (1967); Garrick (1967, 1982); Bass, D'Aubrey & Kistnasamy (1973); Myrberg & Gruber (1974); Edwards & Lubbock (1982).

Remarks : This shark closely resembles the largely allopatric dusky shark, Carcharhinus obscurus, but differs in having usually taller dorsal fins (first dorsal height 9.1 to 12.1% of total length, versus 5.8 to 9.9% of total length in C. obscurus; second dorsal height 2.1 to 3.3% of total length, versus 1.5 to 2.3 in C. obscurus; and second dorsal inner margin 1.3 to 1.7 times second dorsal height, versus 1.6 to 2.1 in C. obscurus), less falcate pectoral fins, a slightly more anterior first dorsal fin (usually over midlengths of pectoral inner margins, versus usually over their free rear tips in C. obscurus), higher upper anterolateral teeth, and more vertebral centra (86 to 97 precaudals and 173 to 194 total centra). Bass, D'Aubrey & Kistnasamy (1973) give a "discriminant function" for separating the two species, here modified as $DF = (607 D1H + 2308 D2H + 875 ANH - 353 IDS)/TOT$, where DF = discriminant function, D1H = first dorsal height, D2H = second dorsal height, ANH = anal height, IDS = interdorsal space, TOT = total length. Values of this function were calculated as 80 to 110 for this species but 32 to 67 for C. obscurus.

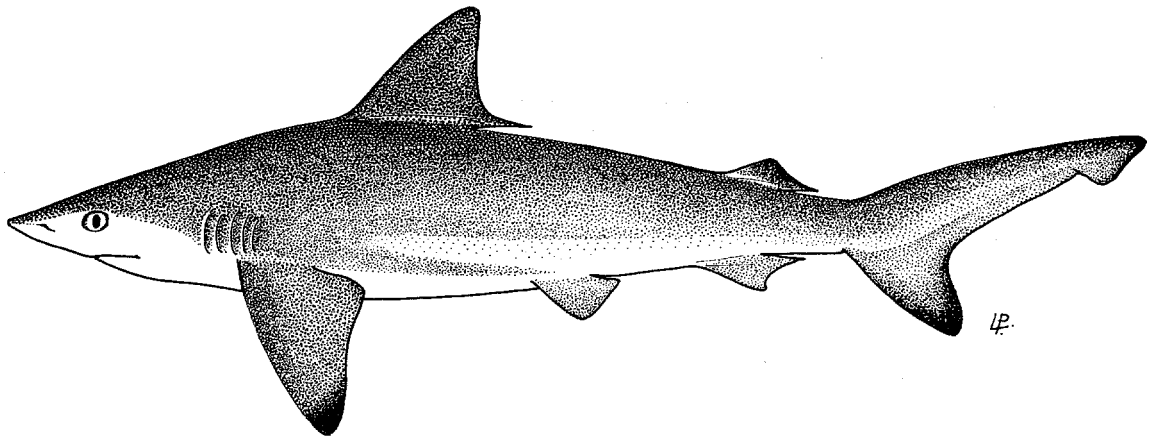
Carcharhinus hemiodon (Valenciennes, 1839)

CARCH Carch 21

Carcharias (Hypoprion) hemiodon Valenciennes, in Müller & Henle, 1839, Syst.Beschr.Plagiost., (2): 35, pl. 19 (teeth only). Holotype: Museum National d'Histoire Naturelle, Paris, MNHN 1040, 470 mm immature male. Type Locality: Pondicherry, India.

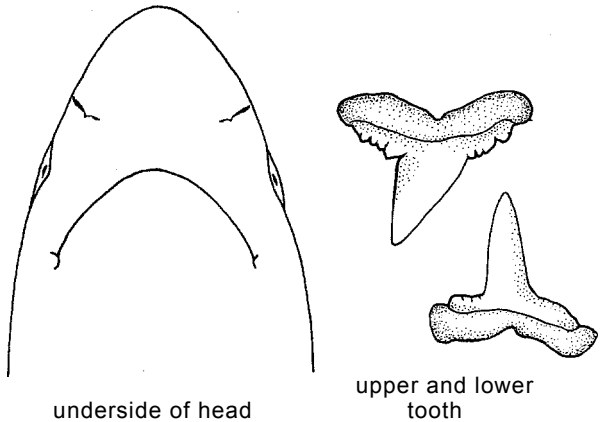
Synonymy : ? Carcharias watu Setna & Sarangdhar, 1946 (see Garrick, 1982); ? Hypoprion atripinna Chu, 1960.

FAO Names : En - Pondicherry shark; Fr - Requin baliaï; Sp - Tiburón de Pondicherry.



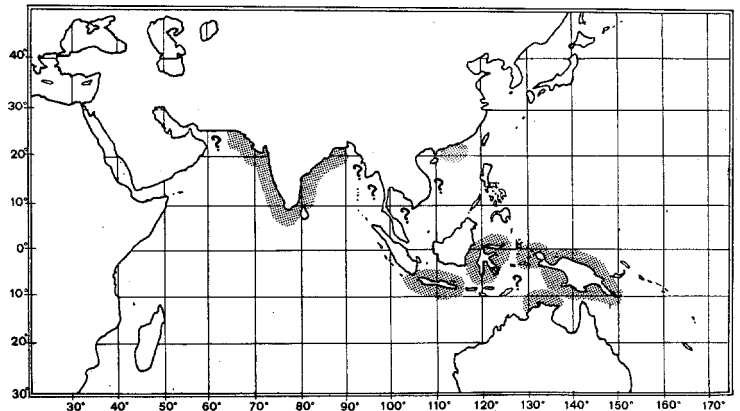
Field Marks: A small (?) grey shark with moderately long and narrowly rounded or pointed snout, fairly large eyes, oblique-cusped weakly serrated upper anterolateral teeth with strong cusplets, 14 to 15/13 to 14 rows of anteroposterior teeth, an interdorsal ridge, small pectoral fins, a fairly large first dorsal with a short rear tip and a moderately large second dorsal with a short rear tip, and black markings on the pectorals, second dorsal, dorsal and ventral caudal lobes.

Diagnostic Features : A fairly stocky and possibly small species (known specimens less than 1 m). Snout moderately long and moderately pointed; internarial width 1 to 1.4 times in preoral length; eyes circular and moderately large, their length between 2 and 3% of total length; anterior nasal flaps expanded as narrow, nipple-shaped lobes; upper labial furrows short and inconspicuous; hyomandibular line of pores just behind mouth corners not conspicuously enlarged; gill slits short, the third 3.1 to 3.6% of total length and less than a third of first dorsal base; 14 to 15/13 to 14 rows of anteroposterior teeth in each jaw half; upper teeth with narrow, weakly and partially serrated, oblique, high cusps, and crown feet with strong distal cusplets; lower teeth with semierect, narrow smooth cusps and transverse roots. An interdorsal ridge present. First dorsal fin large and falcate, with pointed or narrowly rounded apex and posterior margin curving ventrally from fin apex; origin of first dorsal fin over pectoral inner margins just behind their insertions; inner margin of first dorsal moderately long, half of dorsal base or less; second dorsal fin fairly large and high, its height 2.7% of total length, its inner margin short and 1.4 to 1.6 times its height; origin of second dorsal over or slightly posterior to anal origin; pectoral fins moderately large, falcate, with narrowly rounded or pointed apices, length of anterior margins about 17 to 18% of total length; 154 total vertebral centra. Colour grey above, white below; fairly conspicuous (in fresh specimens, less so in old preserved material) black tips present on pectorals, second dorsal, and dorsal and ventral caudal lobes; a conspicuous white band on flank.



Geographical Distribution : Indo-West Pacific: Nominal from Oman to Viet Nam, Indonesia (Sulawesi, Java, Waigeo), New Guinea, and northern Australia, but uncertain beyond India, Pakistan and China.

Habitat and Biology : A little-known, wide-ranging, possibly common grey shark of the continental and insular shelves of the Indo-West Pacific. This species has been reported from river mouths and fresh water up rivers, including the Hooghly River in India and the Saigon River in Viet Nam, but these old records require confirmation and might have been based on some other species. Almost nothing is known of the biology of this shark.



Size : Maximum uncertain, probably not over 1.5 to 2 m.

Interest to Fisheries : A poorly known species apparently fished regularly in the waters of the Arabian Sea off Pakistan, India and possibly China.

Literature : Müller & Henle (1839); Day (1878); Garman (1913); Fowler (1941); Compagno (1979); J.A.F. Garrick (pers comm.).

Remarks: Judging from its description and illustration in Chu *et al.* (1962), *Hypoprion atripinna* is a probable junior synonym of this species, and is tentatively placed here. This species has sometimes been confused with other species. Day (1878, pl. 184, fig. 2) illustrated it as *Carcharias limbatus*, but its identity as *C. hemiodon* was confirmed by examining the illustrated specimen in the Zoological Survey of India, Calcutta.

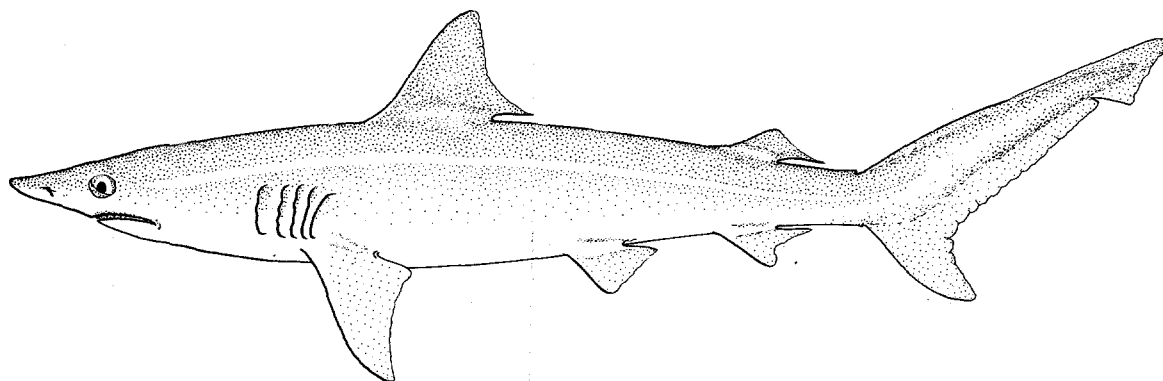
Carcharhinus isodon (Valenciennes, 1839)

CARCH Carch 5

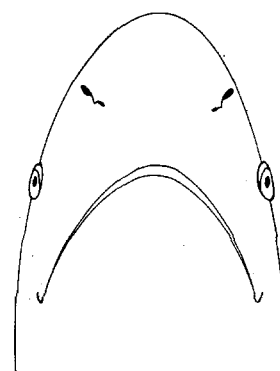
Carcharias (*Aprion*) *isodon* Valenciennes, in Muller & Henle, 1839, *Syst.Beschr.Plagiost.*, (2):32. Holotype: Museum National d'Histoire Naturelle, MNHN 1037, 650 mm immature male. Type Locality: Probably coast of New York, USA.

Synonymy : *Aprionodon punctatus* Gill, 1861, 1862, 1864.

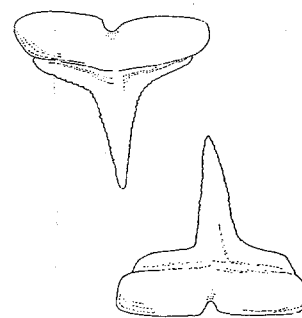
FAO Names : En - Finetooth shark; Fr - Requin à petites dents; Sp - Tiburón dentiliso.



Field Marks: A small grey shark with moderately long pointed snout, fairly large eyes, snout tip, very long gill slits about half length of dorsal base, erect-cusped smooth or irregularly serrated teeth in both jaws, upper teeth without cusplets, 12 to 15/13 to 14 rows of antero-lateral teeth, no interdorsal ridge, small pectoral fins, a small first dorsal with a short rear tip and a moderately large second dorsal with a short rear tip, and no prominent markings on fins.



underside of head



upper and lower tooth

Diagnostic Features : A fairly slim species (up to about 2 m, but most smaller). Snout fairly long and moderately pointed; internarial width 1.3 times in preoral length; eyes circular and moderately large, their length 1.8 to 1.9% of total length; anterior nasal flaps low and broadly angular, not expanded; upper labial furrows short and inconspicuous; hyomandibular line of pores just behind mouth corners not conspicuously enlarged; gill slits very long, the third 4.8 to 5.7% of total length and about half of first dorsal base; 12 to 15/13 to 14 rows of anteroposterior teeth in each jaw half; upper teeth with narrow, weakly serrated or smooth, erect to slightly oblique cusps, and crown feet with weak serrations or none and no cusplets; lower teeth with erect, smooth cusps and transverse roots. No interdorsal ridge. First dorsal fin large and somewhat falcate, with a pointed or narrowly rounded apex and posterior margin curving ventrally from fin apex; origin of first dorsal fin over or only slightly posterior to pectoral insertions; inner margin of first dorsal moderately short, about a third of dorsal base; second dorsal fin large and high, its height 2.8 to 2.9% of total length, its inner margin short and 1.4 times its height; origin of second dorsal over or slightly posterior to anal origin; pectoral fins small, falcate, with narrowly rounded or pointed apices, length of anterior margins about 13% of total length in small individuals; 163 to 166 total vertebral centra, 77 to 81 precaudal centra. Colour plain, dark grey above, white below; no conspicuous markings on fins; an inconspicuous white band on flank.