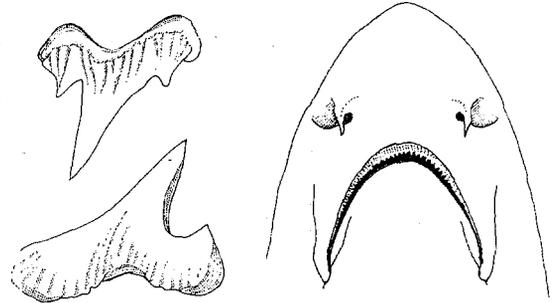


Field Marks: A small, very slender, light grey or grey-brown shark with horizontally oval eyes and internal nictitating eyelids, nostrils with slender barbels but no nasoral grooves, mouth long, arched and reaching past anterior ends of eyes, labial furrows very long, small cuspidate teeth, two small, spineless, equal-sized dorsal fins and an anal fin, the first dorsal fin on the back between pectoral and pelvic fins, no precaudal pits, and the caudal fin without a strong ventral lobe or lateral undulations on its dorsal margin.



upper and lower tooth

underside of head

Diagnostic Features: See family.

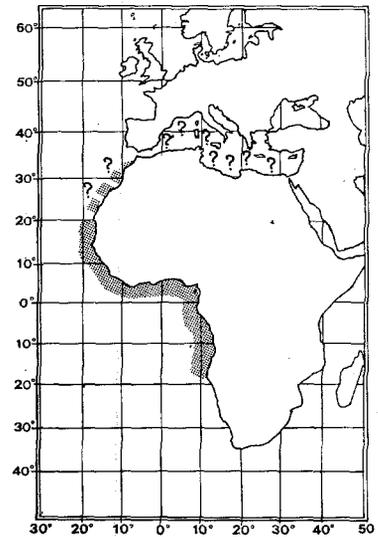
Geographical Distribution : Eastern Atlantic: Mauritania to Angola, possibly north to Morocco and Mediterranean.

Habitat and Biology : This is a small, common, inshore tropical shark of the West African continental shelf, found near the bottom at depths of 10 to 75 m. It is especially abundant off river mouths, prefers muddy bottoms. Water temperatures where it occurs range from 20 to 27^o C; salinities from 35 to 36^o/oo; oxygen from 3 to 4 ppm. Nothing is known of the behaviour of this little shark, which apparently has never been kept in captivity. Its firm skin and muscles, long strong tail, rather short body cavity and small liver all suggest that it is an active swimmer rather like smooth-hounds (Mustelus, Family Triakidae).

Viviparous, with a unique spherical or globular placenta; two females had litters of 7 young. Pregnant females are found with young from July to October off Senegal, with largest fetuses (up to 20 cm) occurring in October. Presumably the gestation period is at least 4 months.

An unusual morphological feature of the barbeled houndshark is pronounced sexual heterodonty or dental sexual dimorphism. Males have greatly enlarged anterior teeth, possibly of use in courtship and copulation.

This species is a generalized feeder on small bottom and littoral organisms with a preference for crustaceans, and eats a variety of small bony fish including sardines, anchovies, snake eels, blennies, gobies, and flatfish, as well as skate and flyingfish eggs, crabs, shrimp, lobsters, octopi and sponges. It occasionally swallows inedible objects such as feathers and vegetable debris (including flowers).



Size : Maximum 82 cm; males probably maturing at about 55 to 60 cm and definitely adult at 56 to 77 cm; females maturing at or above 52 cm and definitely adult at 58 to 82 cm; size at birth probably above 20 cm.

Interest to Fisheries : Probably important to inshore artisanal fisheries in the West African area, where it is taken with hook and line as well as fixed bottom gillnets; also caught by commercial bottom trawlers. Its flesh is utilized fresh, smoked, or dried salted for human consumption and its skin is used for leather.

Literature : Chabanaud (1932); Poll (1951); Cadenat (1957); Maurin & Bonnet (1970); Compagno (1970, 1979, 1981); Cadenat & Blache (1981).

9.5 FAMILY TRIAKIDAE Gray, 1851

TRIAK

Tribe Triakiana Gray, 1851 (Family Squalidae), London, British Museum (Natural History), Pt. 1, Chondropterygii:39.

Synonymy : Subfamily Musteli Bonaparte, 1838 (Family Squalidae; not Family Mustelini Fischer, 1817 or Family Mustelidae Swainson, 1835 in Mammalia); Family Galei Müller & Henle, 1839; Family Scylliodontes Müller & Henle, 1839; Family Galeorhinoidea Gill, 1862; Family Triakidae White, 1936; Family Scylliogaleidae Whitley, 1940, also Smith, 1957; Family Emissolidae Whitley, 1940; Family Eugaleidae Gurr, 1962; Tribe Iagini Compagno, 1973 (Family Triakidae).

FAO Names: En - Houndsharks, Smooth-hounds, Topes, Whiskery sharks; Fr - Emissoles, Hâs; Sp - Cazonos, Tollos.

Field Marks : Small to moderate-sized sharks with horizontally oval eyes, nictitating eyelids, no nasoral grooves, anterior nasal flaps usually not barbel-like except in Furgaleus, a long, angular or arched mouth that reaches past anterior ends of eyes, moderate to very long labial furrows, small to moderately large molariform,

bladelike or cuspidate teeth, two moderate to large-sized, spineless dorsal fins and an anal fin, the first dorsal base well ahead of pelvic bases, no precaudal pits, and caudal fin without a strong ventral lobe or lateral undulations on its dorsal margin.

Diagnostic Features: Head without laterally expanded blades; eyes elongated and fusiform, horizontally oval, or slitlike, with lengths over 1.5 to 2.5 times height; nictitating eyelids external, transitional or internal; spiracles present and small to moderately large; anterior nasal flaps varying from elongated to lobular to vestigial, barbel-like in one genus (*Furgaleus*); internarial width about 0.5 to 3.0 times in nostril width; labial furrows moderately long to very long; teeth small to moderately large, with acute and narrow to moderately large cusps and lateral cusplets in some species, but with these structures reduced or absent in others; teeth with strong basal ledges and grooves; teeth cuspidate and not bladelike, compressed and bladelike, or thickened and molariform; usually similar in both jaws but differentiated in a few species; posterior teeth not comblike; tooth rows 18 to 42/27 to 106. Precaudal pits absent. First dorsal fin moderately large to very large but not keel-like, usually much shorter than caudal fin (except in the genus *Gogolia*); first dorsal base well ahead of pelvic bases, usually closer to pectoral bases than to pelvics but sometimes slightly closer to pelvics; midpoint of first dorsal base always in front of pelvic origins; pectoral fins with radials confined to bases of fins; ventral caudal lobe varying from absent to well-developed; no undulations or ripples in dorsal caudal margin. Neurocranium with supraorbital crests; vertebral centra with strong, wedge-shaped intermedial calcifications. Valvular intestine with a spiral valve of 4 to 11 turns. Some species with variegated colour patterns, most without them.

Habitat, Distribution and Biology : This is one of, the larger families of sharks, with many species found in all warm and temperate coastal seas. Most species occur in continental and insular waters from the shoreline and intertidal to the outermost shelf, often close to the bottom, but a few deepwater species range down the continental slopes to considerable depths, possibly to over 2000 m (*Iago omanensis*). None of the species are oceanic, but many are found in sandy, muddy and rocky inshore habitats, including enclosed bays, and one species occurs on coral reefs. Although a few species have been recorded from up river mouths, none can apparently tolerate fresh water for extended periods. Many houndsharks are fairly strong swimmers and occur in small to large schools or singly. Some very active species, like the tope shark (*Galeorhinus*) may swim more or less continuously, but species of *Mustelus* and *Triakis* can rest on the bottom; some species are more active at night than the day. A few houndsharks may reach 2-m length, but most are smaller and some mature at about 35 cm. Many are more active at night than the day, and many tend to habitually swim close to the bottom. The species are variably ovoviviparous or viviparous, and lack or have a yolk sac placenta; litters of young from 1 or 2 to 52. Houndsharks feed primarily on bottom and midwater invertebrates and bony fishes, with some species taking largely crustaceans, some mainly fishes, and a few primarily cephalopods; none eat mammalian meat or garbage to any extent. None of the species are particularly dangerous to people.

Interest to Fisheries : Genera of especial importance to fisheries include the temperate-water *Galeorhinus* (tope, soupfin, school, and vitamin sharks) and the temperate to tropical *Mustelus* (smooth hounds and gummy sharks), but members of the genera *Triakis*, *Hemistriakis*, *Furgaleus*, and *Iago* are also taken to some extent. Most of these sharks are fairly common to very abundant in coastal waters where they occur, are relatively small, and hence are very important to small commercial and artisanal fisheries that are limited in gear and movement, as well as to sports fisheries. Houndsharks are caught with line gear, bottom and floating gillnets, set bottom nets, bottom trawls, and sportsfishing gear. They are primarily utilized for their meat, but also for liver oil, for processing into fishmeal, and for shark-fin soup base.

Remarks : The arrangement of this family follows the revisions of Compagno (1973b, 1979).

Key to Genera

- 1a. Anterior nasal flaps very large, nearly meeting each other at midline of snout and overlapping mouth posteriorly. Nasoral grooves present (Fig. 1) **Scylliogaleus**
- 1b. Anterior nasal flaps moderately large to very small, well separated from each other and not reaching mouth. No nasoral grooves
 - 2a. First dorsal base about as long as caudal fin and 2.3 to 3.2 times the first dorsal height. Preoral length about 1.6 to 1.7 times mouth width (Fig. 2) **Gogolia**
 - 2b. First dorsal base 0.7 times or less in length of caudal fin and 2 times or less the first dorsal height. Pre-or al length 0.7 to 1.4 times mouth width

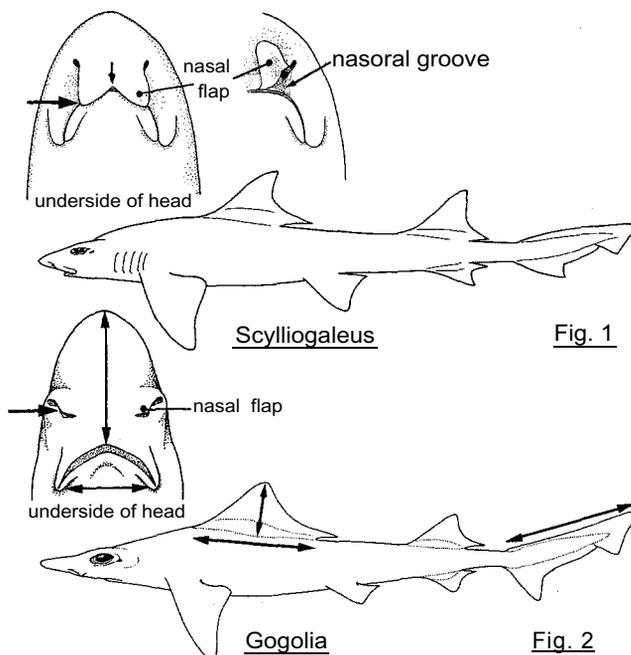


Fig. 1

Fig. 2

3a. Anterior nasal flaps formed into slender barbels (Fig. 3) **Furgaleus**

3b. Anterior nasal flaps not barbel-like

4a. Ventral caudal lobe very long at all stages. Second dorsal fin markedly smaller than first, half its area or less

5a. Mouth angular. Second dorsal fin considerably larger than anal. Terminal lobe of caudal about a third of dorsal caudal margin length (Fig. 4) **Hypogaleus**

5b. Mouth broadly arched. Second dorsal fin about as large as anal. Terminal lobe of caudal about half of dorsal caudal margin length (Fig. 5) **Galeorhinus**

6a. Eyes lateral, subocular ridges obsolete (Fig. 6a). Origin of first dorsal far anterior, over pectoral bases (Fig. 7) **Iago**

6b. Eyes dorsolateral, subocular ridges strong (Fig. 6b). Origin of first dorsal more posterior, over or behind pectoral inner margins (Figs 8,9,10)

7a. Internarial width about 2.5 times the nostril width. Teeth strongly compressed and blade-like, differentiated into medials at symphyses of both jaws and antero-posteriors adjacent to them (Fig. 8) **Hemitriakis**

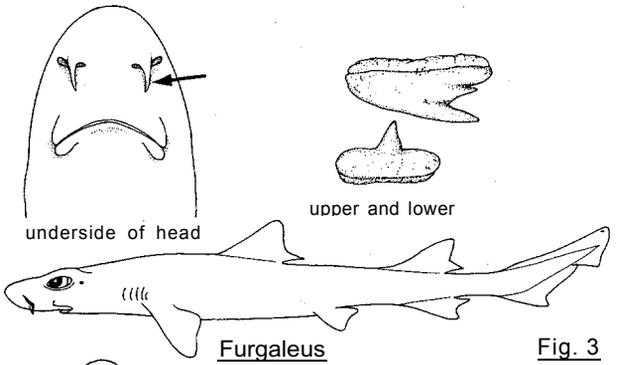


Fig. 3

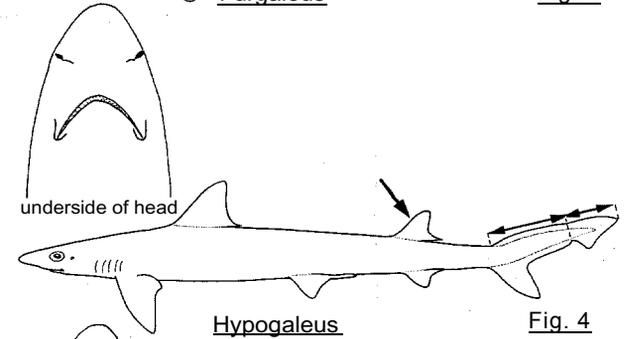


Fig. 4

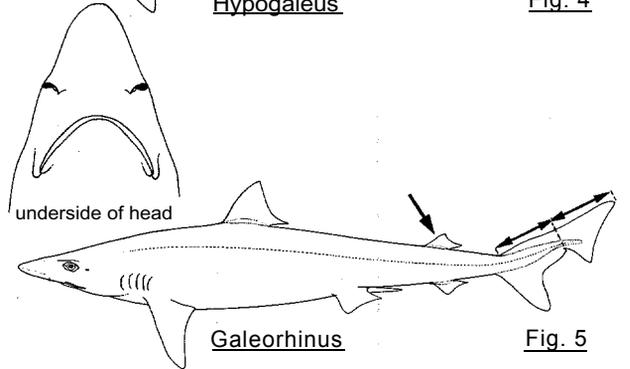


Fig. 5

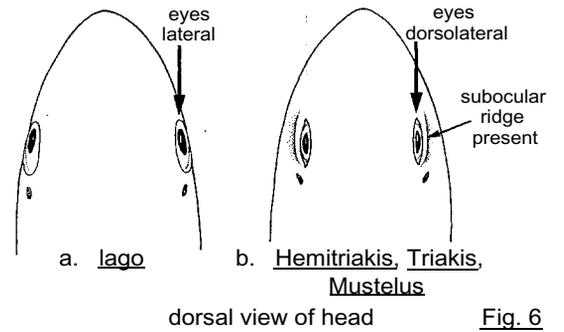


Fig. 6

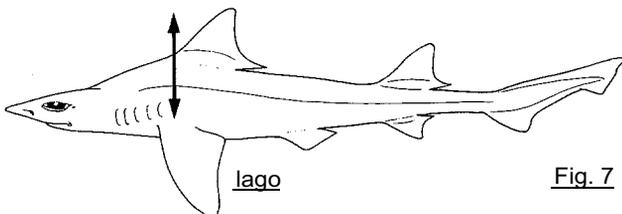


Fig. 7

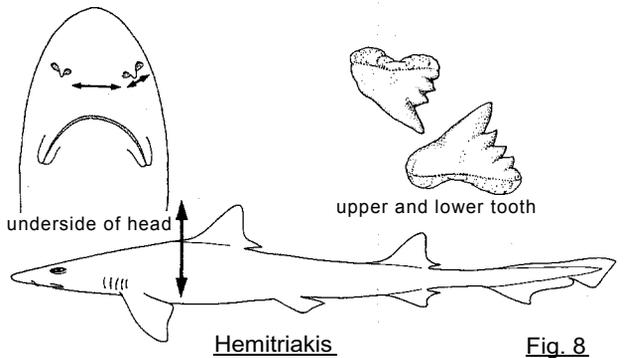
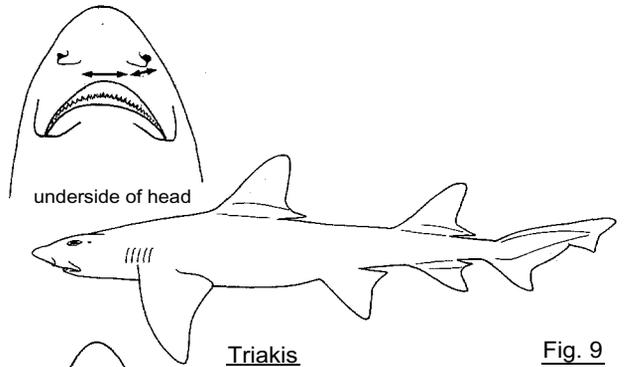


Fig. 8

7b. Internarial width 1 to 2 times nostril width. Teeth broad and blunt to semi-bladelike, not strongly compressed, not differentiated into medials and antero-posteriors

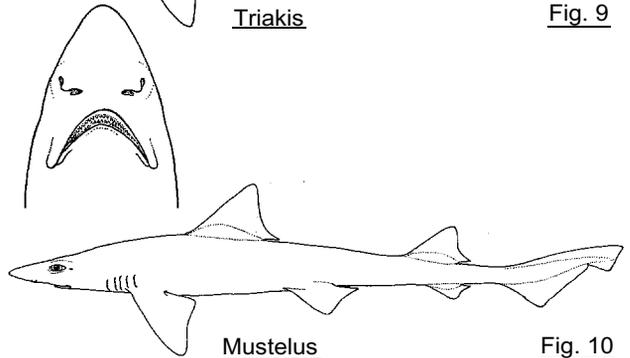
8a. Snout bluntly rounded in dorso-ventral view. Mouth arcuate, lower jaw with convex edges (Fig. 9) **Triakis**

8b. Snout parabolic to subangular in dorsoventral view. Mouth angular, lower jaw with straight or nearly straight edges (Fig. 10) **Mustelus**



Triakis

Fig. 9



Mustelus

Fig. 10

Furgaleus Whitley, 1951

TRIAK Furg

Genus : Furgaleus Whitley, 1951, Proc.Roy. Zool.Soc.New South Wales, (1949-1950):67.

Type Species : Fur macki Whitley, 1943, by original designation.

Synonymy : Genus Fur Whitley, 1943 (junior homonym of Genus Fur Jones, 1940, in Insecta).

Diagnostic Features : Snout short and broadly rounded or wedge-shaped in dorsoventral view, preoral length about equal to mouth width; eyes horizontally elongated and dorsolateral, strong subocular ridges present below eyes; anterior nasal flaps formed as narrow, elongated barbels, well separated from each other and mouth; no nasoral grooves; internarial width 1.3 to 1.7 times nostril width; mouth broadly arched and short; labial furrows moderately long, uppers reaching anteriorly to level of upper symphysis; teeth bladelike, compressed, and cuspidate, well-differentiated in jaws, upper anteroposterior teeth with oblique cusps and cusplets, lowers with erect cusps and without cusplets; small medial teeth differentiated from larger anteroposterior teeth. First dorsal moderately large, base less than 2/3 length of dorsal caudal margin, its origin well behind pectoral free rear tips, midbase closer to pelvic bases than pectorals; second dorsal about as large as first; anal fin much smaller than second dorsal; ventral caudal lobe weak in young but short and strong in adults; terminal lobe of caudal fin short and 2.5 to 4 times in dorsal caudal margin.

Remarks : Furgaleus was proposed as a replacement name for Fur Whitley, 1943. Two species, F. macki and F. ventralis, have been proposed, but these are apparently synonyms (Compagno, 1979).

Furgaleus macki (Whitley, 1943)

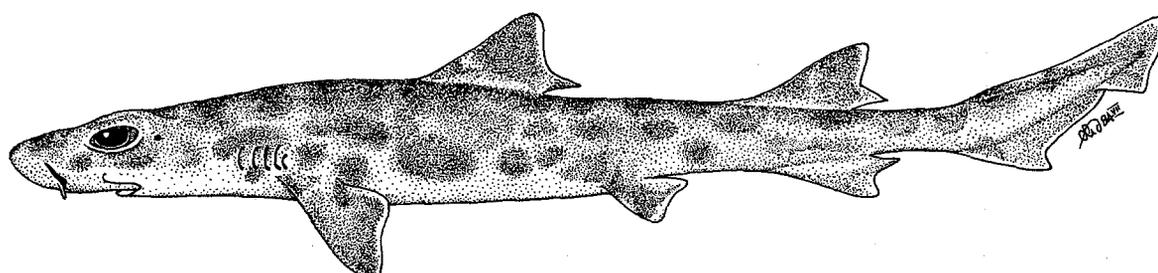
TRIAK Furg 1

Fur macki Whitley, 1943, Aust.Zool. 10(2):168, fig. 1. Holotype: Australian National Museum, Melbourne, R. 13258; 500 mm immature male. Type Locality: Mordialloc, Victoria, Australia.

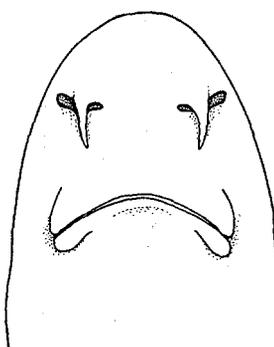
Synonymy : Fur ventralis Whitley, 1943.

Other Scientific Names Recently in Use : Furgaleus ventralis (Whitley, 1943).

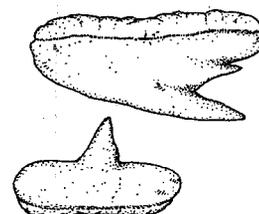
FAO Names: En - Whiskery shark; Fr - Emissole moustachue; Sp - Cazón bigotudo.



Field Marks: A moderate-sized, stocky, almost hump-backed houndshark, with anterior nasal flaps formed into slender barbels, nictitating eyelids, eyes dorsolateral and above prominent subocular ridges, mouth arcuate and very short, labial furrows long and reaching level of upper symphysis, teeth compressed, bladelike but well-differentiated in jaws, uppers with oblique cusps and distal cusplets, lowers with erect cusps and no cusplets, dorsal fins about equal-sized and larger than anal fin, first dorsal much shorter than caudal fin, and colour grey above and light below, with dark saddles in young and some adults.



underside of head



upper and lower tooth

Diagnostic Features : See genus.

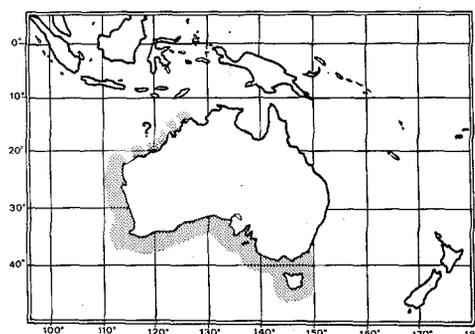
Geographical Distribution : Western South Pacific: Australia (Victoria, Tasmania, South and Western Australia).

Habitat and Biology : A common active shark of the temperate Australian continental shelf, found at moderate depths, on or near bottom; common on rock bottom and kelp beds. Ovoviviparous, without a yolk-sac placenta; number of young 9 to 11, and possibly up to 16 per litter. Eats octopi, squid, bony fishes and lobsters.

Size : Maximum 160 cm, adult males 109 to 135 cm, females 110 to 132 cm, size at birth about 20 cm.

Interest to Fisheries: Regularly fished off Western Australia, using line gear and presumably gillnets, and marketed fresh for human consumption.

Literature : Whitley (1943, 1943a, 1944, 1948, 1967); Stead (1963); Compagno (1979).



Galeorhinus Blainville, 1816

TRIAK Galeo

Genus : Subgenus Galeorhinus Blainville, 1816 (Genus Squalus Linnaeus, 1758), Bull. Soc.Philomat.Paris, 8:121.

Type Species : "Galeorhinus galeus Blainville, 1816", by subsequent designation of Gill (1862:402); a synonym of Squalus galeus Linnaeus, 1758.

Synonymy : Subgenus Galeus Cuvier, 1817 (Genus Squalus Linnaeus, 1758; junior homonym of Galeus Rafinesque, 1810 in Family Scyliorhinidae; and senior homonym of Galeus Leach 1818, which in turn is a junior synonym of Mustelus Linck, 1790); Genus Eugaleus Gill, 1864; Genus Notogaleus Whitley, 1943.

Diagnostic Features : Snout moderately long and parabolic in dorsoventral view, preoral length about equal to mouth width; eyes horizontally oval and lateral, subocular ridges obsolete; anterior nasal flaps vestigial, formed as small, low, angular points, well separated from each other and mouth; no nasoral grooves; internarial width over 2.5 times nostril width; mouth broadly arched and long; labial furrows moderately long, uppers ending well behind level of upper symphysis; teeth bladeliike, compressed, and cuspidate, similar in upper and lower jaws, anteroposteriors with oblique cusps and cusplets; medial teeth well differentiated from anteroposteriors. First dorsal fin moderately large, base half length of dorsal caudal margin or less; its origin over or slightly behind pectoral free rear tips, its midbase slightly closer to pectoral bases than pelvics; second dorsal much smaller than first, less than half height of first; anal fin about as large as second dorsal; ventral caudal lobe strong in young and adults; terminal lobe of caudal fin long and about 2 times in dorsal caudal margin.

Remarks : The scope of this genus follows the revisions of Compagno (1970, 1973b, 1979). Eugaleus omanensis Norman, 1939, Galeus japonicus Müller & Henle, 1839, Eugaleus hyugaensis Miyosi, 1939, and Galeorhinus (Hypogaleus) zanzibariensis Smith, 1957 are here included in the genera Iago (omanensis), Hemitriakis (japonicus), and Hypogaleus (hyugaensis and zanzibariensis). Other than these species, several species of true Galeorhinus have been recognized for different geographic regions: G. rhinophanes (Peron, 1807) or G. australis (Macleay, 1881) from Australia and New Zealand; G. zyopterus (Jordan & Gilbert, 1883) for the eastern North Pacific; G. chilensis (Perez Canto, 1886) for Peru and Chile; G. vitaminicus de Buen, 1950 from the eastern South Atlantic; and G. galeus from the eastern Atlantic. Comparison of accounts and specimens of these regional species of Galeorhinus indicated that they probably are not separable and should be placed in a single species (Compagno, 1979), possibly subdivided into subspecies. The eastern North Pacific Galeorhinus averages slightly more vertebrae and apparently matures at a somewhat larger size than other Galeorhinus, but is otherwise very similar to them. All the nominal species of Galeorhinus are included here under Galeorhinus galeus.

Galeorhinus galeus (Linnaeus, 1758)

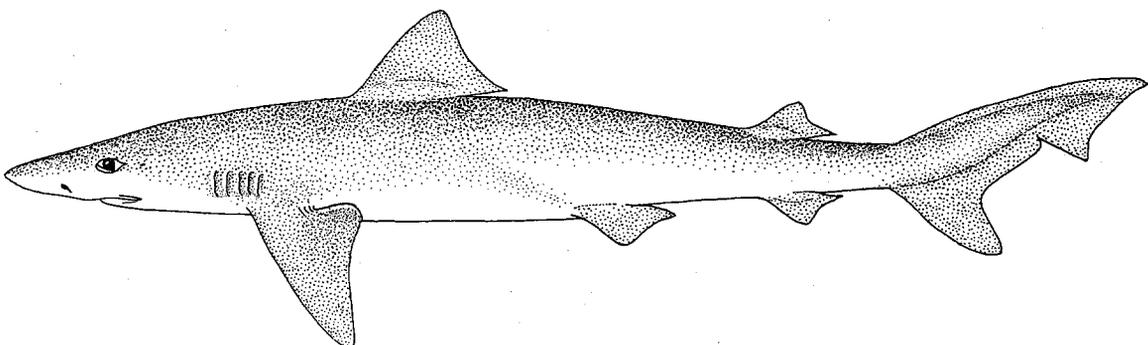
TRIAK Galeo 1

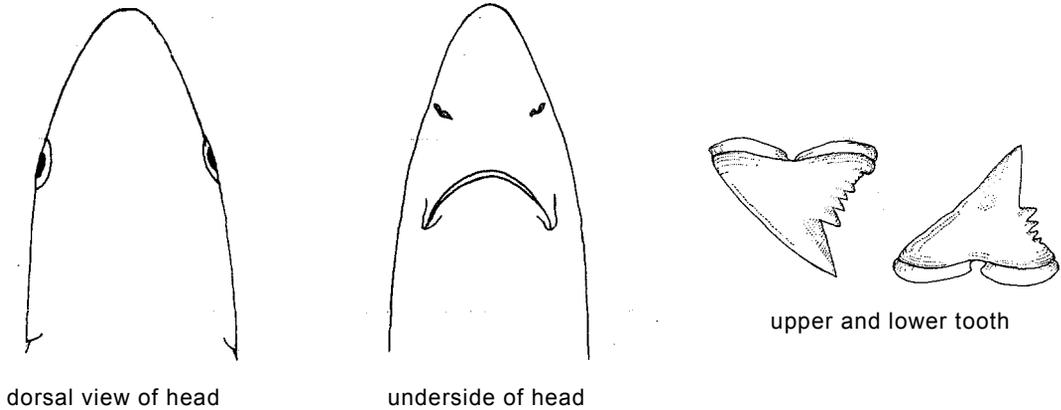
Squalus galeus Linnaeus, 1758, Syst.Nat., ed. 10, 1:234. Holotype: Unknown. Type Locality: "Habitat in Oceano Europae".

Synonymy: ? Squalus rhinophanes Peron, 1807; Galeus vulgaris Fleming, 1828; Galeus canis Bonaparte, 1834 (not Squalus canis Mitchell, 1815, = Mustelus canis); Galeus nilssonii Bonaparte, 1846; Galeus communis Owen, 1853; Galeus linnei Malm, 1877; Galeus australis Macleay, 1881; Galeus zyopterus Jordan & Gilbert, 1883; Galeus chilensis Perez Canto, 1886; Galeus molinae Philippi, 1887; Carcharhinus cyrano Whitley, 1930; Galeorhinus vitaminicus de Buen, 1950.

Other Scientific Names Recently in Use : Notogaleus rhinophanes (Peron, 1807); Galeorhinus australis (Macleay, 1881); Galeorhinus zyopterus (Jordan & Gilbert, 1883); Galeorhinus chilensis (Perez Canto, 1886).

FAO Names: En - Tope shark; Fr - Requin-hâ; Sp - Cazón.

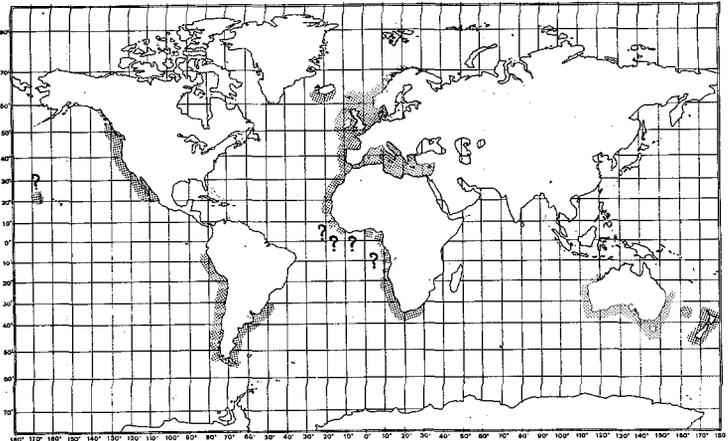




Field Marks: A slender, long-nosed houndshark with vestigial anterior nasal flaps, large horizontally oval eyes with internal nictitating lower eyelids, subocular ridges obsolete, an arched mouth, moderately long upper labial furrows that fall short of lower symphysis, bladeliike compressed teeth with oblique cusps and distal cusplets in both jaws, second dorsal fin much smaller than first and about as large as anal fin, and an extremely long terminal caudal lobe about half the dorsal caudal fin.

Diagnostic Features: See genus.

Geographical Distribution : Western South Atlantic: Southern Brazil to Argentina. Eastern Atlantic: Iceland, Norway, Faeroe Islands, British Isles to Mediterranean and Senegal, ? Ivory Coast, ? Nigeria, ? Gabon to Zaire, Namibia to South Africa. Western Indian Ocean: South Africa. Western South Pacific: Australia (Western and South Australia, Victoria, Tasmania, New South Wales, southern Queensland), Lord Howe Islands, Chatham Islands, New Zealand. ? Central Pacific: Laysan Islands. Eastern Pacific: British Columbia to southern Baja California, Gulf of California; Peru and Chile.



Habitat and Biology : An active, strong-swimming, abundant, coastal-pelagic species of temperate continental and insular waters, often found well offshore (but not oceanic) as well as at the surfline, in shallow bays, and in submarine canyons; often occurs near the bottom, at depths of 2 to 471 m. It is best known and is very abundant in cold to warm temperate continental seas, and tropical records of the species (particularly off West Africa but also Laysan Island) need to be confirmed and may be based on some other species (off East Africa, possibly based on *Hypogaleus hyugaensis*). It apparently occurs in small schools that are highly migratory in higher latitudes in their range, in some places moving poleward during the summer and equatorially in the winter (European waters and the eastern North Pacific, and southern Australia in part), or into deeper offshore waters in winter longitudinally in other areas (southern Australia in part). They can move swiftly, up to 56 km per day, and have been recorded as moving 1600 km at sustained rates of 16 km a day.

At least in some areas there is pronounced partial segregation by size and sex. In Californian waters during the pre-second world war soupfin fisheries there was a gradation from predominance of adult males to predominance of adult females from north to south, with equal numbers of both sexes off central California; exceptions included San Francisco and Tomales Bays in northern California, when used as pupping grounds by adult females along with more important southern California inshore areas. The largest males occurred in northernmost waters. Adult males favour deeper waters while females occur closer inshore. In Australian waters schools have been found to be narrowly size and sex related, with those of yearling juveniles ranging into more estuarine situations than older juveniles and adults (except for pupping females). Off southeastern Australia sharks increase in size frequency from east to west from eastern Bass Strait to South Australia, and also increase off southern Tasmania, indicating a gradation of higher numbers of adults westward and southward.

Population dynamics of the school shark has been studied in great detail off southeastern Australia. These are thought to be a different stock or population from school sharks off Western Australia. In summary, pregnant females move into shallow, partly enclosed bays and estuaries in late spring and early summer, and depart after dropping their young to offshore feeding grounds. Most young of the year depart the pupping grounds in late summer and move offshore, but mostly return to the bays and estuaries of their birth the following spring; some juveniles may switch to adjacent bays and estuaries. Some juveniles may remain in an estuary for up to two years before departing. Juveniles two years old join schools of immature sharks that are inshore or offshore along the coast. Schools of adult sharks in late summer and winter move either to deeper waters at the edge of the

continental shelf in the Bass Straits region, or to warm waters of South Australia and New South Wales; at the edge of the shelf copulation occurs. Adult sharks then travel southward and shoreward in the spring to converge along the coastlines, where they feed in schools that vary their composition of individuals. About half of all adult females in these schools may be pregnant during the breeding season, and these visit the pupping grounds to renew the cycle.

Ovoviviparous, without a yolk-sac placenta; number of young 6 to 52 per litter, increasing with the size of the mother and averaging greater in the eastern North Pacific soupfin (in which the size at maturity and maximum size is greater, mean about 35) than in Australian school sharks (28) or European topes (possibly less than 20). Australian school sharks are recorded as producing litters with more males than females (54:46), but in two-year-old juveniles the ratio of males to females is reversed, apparently from increased mortality of males for unknown reasons. In school sharks the growth rate is regular and apparently does not show much seasonal variation. Male Australian school sharks mature at over 8 years old and mate at about 9 years, while females mature at at least 11 years old and give birth when at least 12 years old; the life expectancy of a large female school shark is at least 22 years.

Preys heavily on bony fishes, taking a wide variety of bottom and schooling midwater fishes including pilchards, herring, sardines and other clupeids, anchovies, salmon, smelt (*Osmeridae*), Australian whitebait (*Aplochitonidae*), hake, cod, ling and other codlike fishes, midshipmen, flyingfish, barracouta (*Gempylidae*), mackerel and small tuna, barracuda (*Sphyrnaenidae*), croakers, wrasses, opaleyes (*Girella*), surf perches (*Embiotocidae*), damselfishes, gobies, kelpfish (*Clinidae*), sole, halibut and other flatfish, rockfish and scorpionfish, sculpins, sablefish, but also cephalopods (most importantly squid, but also octopi), marine snails, crabs, shrimp, lobsters, annelid worms, echinoderms, and uncommonly other chondrichthyans (ratfish, sharks and small stingrays and skates). Although primarily an opportunistic predator on moderate-sized bony fishes (taken alive), this shark readily feeds on some invertebrates; young sharks may take more invertebrate prey than adults, and in some areas crabs and squid may be important prey items: This shark is little inclined to scavenge, however, judging from the virtual absence of garbage and meat from terrestrial and large marine mammals in its reported diet (unlike the largely sympatric spotted sevenshark shark, *Notorynchus cepedianus*, which readily eats such fare), as well as its strong preference for very fresh fish or squid bait over slightly stale or even fresh-frozen bait presented on hooks.

Although moderately large and active, the tope shark has never been reported to attack people. It will, however, snap when captured and has sufficiently large teeth to invite respect. On the other hand, the main enemy of this shark is undoubtedly *Homo sapiens*, particularly through wanton slaughter of juvenile sharks by misguided sports and commercial fishermen and killing of pregnant females. Natural predators of this shark include more powerful predatory sharks found in temperate waters, such as the great white shark (*Carcharodon carcharias*) and possibly the spotted sevenshark shark (*Notorynchus cepedianus*), and probably marine mammals. If not badly traumatized in capture this shark will readily survive in large aquaria as in the Port Elizabeth Oceanarium, South Africa.

Size : Maximum 195 cm (large females of the eastern North Pacific form); males maturing between about 120 and 170 cm and reaching a maximum of 155 to 175 cm, females maturing between about 130 and 185 cm and reaching a maximum of 174 to 195 cm (combined figures for Californian, South African and Australian *G. galeus*); young born at about 30 to 40 cm long.

Data from California soupfin sharks (Ripley, 1946) indicates that there is an allometric change in length/weight relationships in adult females but possibly not for males. Logarithmic length/weight curves given by Ripley (1946) indicate $\log Wt \text{ (lbs)} = -5.573 + 3.2.70 \log \text{ total length (cm)}$ for female soupfin 40 to 149 cm but jumping to $\log Wt \text{ (lbs)} = -7.490 + 4.156 \log \text{ total length (cm)}$ for females 150 cm and larger ($N = 869$); for males ($N = 42$) this is $\log Wt \text{ (lbs)} = -5.411 + 3.186 \log \text{ total length (cm)}$. For males and immature females, weight increases at slightly more than the cube of the length, indicating a retention of the slim build of young sharks, but as females mature they become relatively stockier and grow at over the 4th power of their length. Olsen (1954), with a smaller sample (254) for females and larger one for males (278) suggested that for the Australian school shark there was no such change in females, but his plot of female length/weight relations (Olsen, 1954, fig. 3), suggests that females above 135 cm may be departing the curve calculated for all females (which is almost the same for that of males, $Wt \text{ (lbs)} = 4.86 \times 10^{-6} \text{ total length exp } 3.18$; males, $Wt \text{ (lbs)} = 4.80 \times 10^{-6} \text{ total length exp } 3.17$).

Interest to Fisheries : This species is an important shark for fisheries, especially off Uruguay and Argentina, California, and southern Australia, but it is also fished elsewhere where it occurs. Its meat is excellent for human consumption and is eaten fresh, fresh frozen, or dried salted; its liver contains oil that is extremely high in vitamin A; and its fins are used for sharkfin soup. It is caught with bottom and pelagic gillnets, bottom and pelagic longlines, bottom and pelagic trawls, and with hook-and-line. A large fishery for this species existed off California in the thirties and forties, which peaked at 4186 tons landed in 1939 but declined with overfishing and the substitution of synthetic vitamin A for that extracted from shark liver oil. A very similar fishery existed off South Africa at about the same time as the Californian fishery, and went through a similar cycle of growth and collapse. Currently these sharks are the object of an expanding commercial and sports fishery for human food off California, but stocks are already showing some signs of depletion there. It is doubtful whether stocks off California have in recent years attained the size of those exploited before the second world war. Fisheries in Australia and New Zealand have been restricted or have collapsed due to findings of high mercury levels in school sharks caught there. Topes figure prominently in a South African fishery centred in Gans Bay, and are processed for vitamin oil, fins, and "biltong" or dried meat.

Tope are also a common and popular catch of sports anglers, being commonly taken by rod and reel particularly in the British Isles, off South Africa and California. This shark will fight actively when hooked, but is currently not considered a game fish by the International Game Fish Association.

Important Regional Names : Tope shark (British Isles); Vitamin shark (Uruguay and Argentina; Tiburón vitaminico); Soupfin shark (California to British Columbia, also South Africa); School shark (Australia and New Zealand).

Literature : Ripley (1946); Roedel & Ripley (1950); Olsen (1953); Compagno (1970, 1979); Miller & Lea (1972); Hart (1973); Bass, D'Aubrey & Kistnasamy (1975a); Wheeler (1978); Ayling & Cox (1982).

Gogolia Compagno, 1973

TRIAK Gog

Genus : Gogolia Compagno, 1973b, Proc.Calif.Acad.Sci., 39(19):383.

Type Species : Gogolia filewoodi Compagno, 1973, by original designation.

Synonymy : None.

Diagnostic Features : Snout very long and bell-shaped in dorsoventral view, preoral length 1.6 to 1.7 times the mouth width; eyes horizontally oval and dorsolateral, subocular ridges strong; anterior nasal flaps vestigial, formed as small, low, angular points, well separated from each other and mouth; no nasoral grooves; internarial width about 2 times nostril width; mouth very broadly arched and short; labial furrows moderately long, uppers reaching level of upper symphysis; teeth blade-like, compressed, and cuspidate, moderately differentiated in jaws, anteroposteriors with oblique cusps and cusplets, uppers with slenderer cusps and more cusplets than lowers; medial teeth well differentiated from anteroposteriors. First dorsal fin very large and sail-like, its base almost equal to length of dorsal caudal margin; its origin over or somewhat anterior to pectoral insertions, and its midbase equidistant between pectoral and pelvic bases or somewhat closer to pectorals; second dorsal smaller than first, about 2/3 as high as first; anal fin considerably smaller than second dorsal; ventral caudal lobe hardly developed in young but short and strong in adults; terminal lobe of caudal fin moderately long and about 3.1 to 3.8 times in dorsal caudal margin.

Remarks: See Compagno (1973b, 1979) for detailed accounts of the morphology and systematics of this genus.

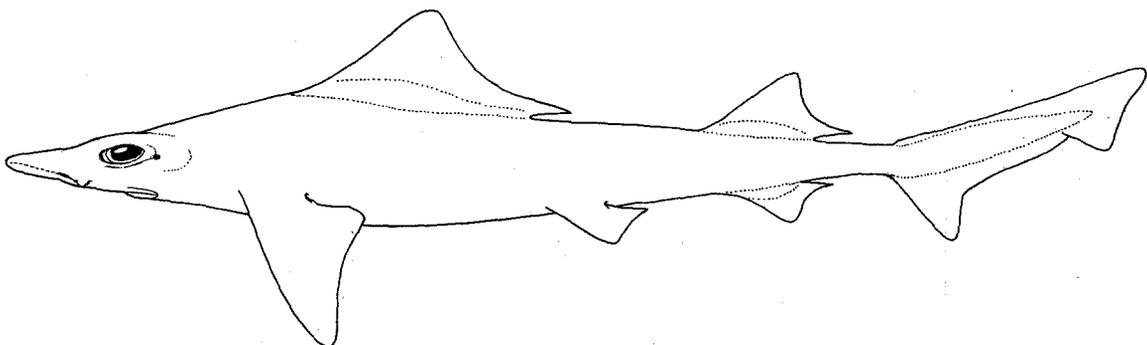
Gogolia filewoodi Compagno, 1973

TRIAK Gog 1

Gogolia filewoodi Compagno, 1973b, Proc.Calif.Acad.Sci., 39(19):394, figs 1-7. Holotype: Australian Museum, Sydney, AMS 1.16858-001, 739 mm adult female with two fetuses (one in California Academy of Sciences, CAS-27588). Type Locality: Astrolabe Bay, northern New Guinea, about 1 mile north of the Gogol River mouth, ca. 5°18'S, 145°50'E, 73 m depth.

Synonymy : None.

FAO Names : En - Sailback houndshark; Fr - Requin-hâ voile; Sp - Cazón velero.



Field Marks : The huge, triangular, sail-like spineless first dorsal fin about as long as the caudal fin, the nictitating eyelids, the presence of an anal fin, and the long preoral snout 1.6 to 1.7 times the mouth width distinguish this small, grey-brown houndshark from all other species.

Diagnostic Features: See genus.

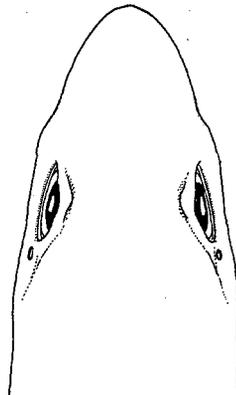
Geographical Distribution : Western South Pacific: Northern New Guinea.

Habitat and Biology : A little-known shark of the New Guinea continental shelf, the only specimen of which was taken at 73 m depth, probably near the bottom. Ovoviviparous, number of young 2 per litter.

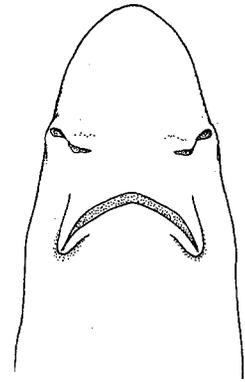
Size : Maximum 74 cm (adult female); size at birth at or near about 22 cm (fetuses of holotype full-term or nearly so).

Interest to Fisheries: None.

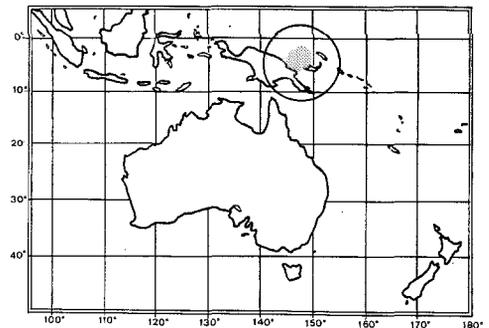
Literature : Compagno (1973b, 1979); Cadenat & Blache (1982).



dorsal view of head



underside of head



Hemitriakis Herre, 1923

TRIAK Hem

Genus : Hemitriakis Herre, 1923, Philipp.J.Sci., 23(1):70.

Type Species : Hemitriakis leucoptera Herre, 1923, by original designation.

Synonymy : None.

Field Marks : Slender houndsharks with rather long, parabolic snouts, dorsolateral eyes and strong subocular ridges, arched mouths, short anterior nasal flaps, small, wide-set nostrils, differentiated medial and bladelike anteroposterior teeth in both jaws, and second dorsal nearly as large as first.

Diagnostic Features : Snout moderately long and parabolic dorsoventral view, preoral length less than 1.3 times the mouth width; eyes horizontally elongated and dorsolateral, subocular ridges strong; anterior nasal flaps moderately elongated and lobate, well separated from each other and mouth; no nasoral grooves; internarial width about 2.5 to 2.8 times the nostril width; mouth broadly arched and moderately long; labial furrows moderately long, uppers nearly or quite reaching level of upper symphysis; teeth bladelike, compressed, cuspidate, and similar in both jaws, anteroposteriors with oblique cusps and cusplets; medial teeth well differentiated from anteroposteriors. First dorsal fin moderately large, its base less than 2/3 of dorsal caudal margin; its origin over pectoral inner margins or slightly behind their free rear tips, its midbase about equidistant between pectoral and pelvic bases or closer to pectoral bases; second dorsal nearly as large as first, height about 3/4 as high as first; anal fin considerably smaller than second dorsal; ventral caudal lobe hardly developed in young but short and strong in adults; terminal lobe of caudal fin moderately long and about 2.6 to 2.8 times in dorsal caudal margin.

Remarks : This genus was revived and revised by Compagno (1970, 1979). Previously Hemitriakis and H. leucoptera had been included in Triakis by Fowler (1941), which was followed by various writers. However, H. japonica had been placed in the genus Galeorhinus or its synonyms.

There may be a third species of Hemitriakis in Philippine waters, sympatric with H. leucoptera, but differing from it in coloration and fin proportions (Compagno, 1970, 1979). Additionally, a Hemitriakis very like H. leucoptera in shape but differing in having higher vertebral counts like H. japonica has been collected off northwestern Australia. This may be identical to leucoptera or new, but is certainly not H. japonica.

Key to Species

- 1a. First dorsal origin about over or posterior to free rear tips of pectorals. Distance from pectoral free rear tips to pelvic origins greater than first dorsal length from origin to free rear tip. Total vertebral counts 154 to 165 H. japonica
- 1b. First dorsal origin over pectoral inner margins, anterior to their free rear tips. Distance from pectoral free rear tips to pelvic origins about as long as first dorsal. Total vertebral counts 133 to 146..... H. leucoperiptera

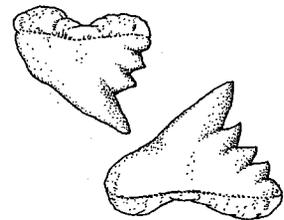
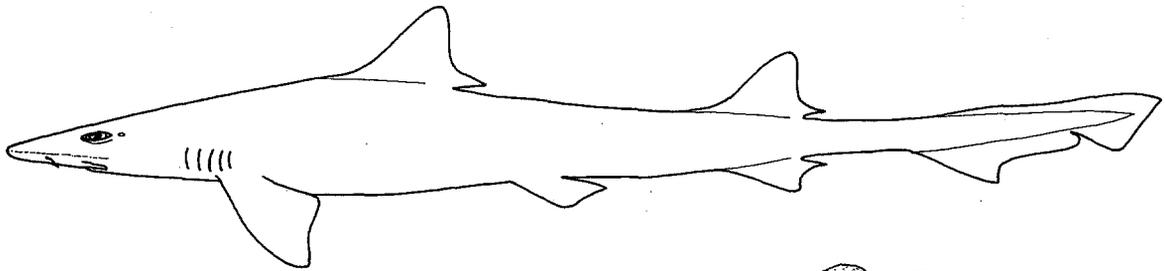
Hemitriakis japonica (Müller & Henle, 1839)

TRIAK Hem 1

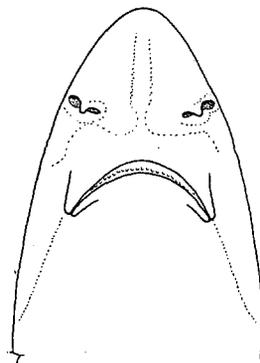
Galeus japonicus Müller & Henle, 1839, Syst.Beschr.Plagiost., pt. 2:58, pl. 22. Holotype: In Rijksmuseum van Natuurlijke Historie, Leiden? Type Locality: Japan.

Synonymy : None.

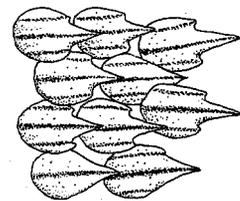
FAO Names : En - Japanese topeshark; Fr - Requin-hâ dochizame; Sp - Cazón japonés.



upper and lower tooth



underside of head



dermal denticles

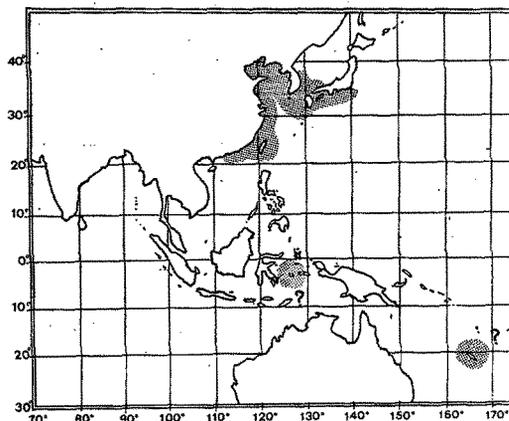
Field Marks: A houndshark with a moderately long parabolic snout, broadly arched mouth, eyes narrow, slitlike and dorsolateral, subocular ridges prominent, external nictitating lower eyelids present, nostrils with short, truncated anterior nasal flaps, internarial space over 2.5 times the nostril width, compressed teeth with oblique cusps and distal cusplets in both jaws, first dorsal somewhat longer than second but much shorter than caudal, first dorsal origin usually behind pectoral rear tips (except in newborn individuals), anal fin much smaller than first dorsal, fins with conspicuous white edges.

Diagnostic Features: Eyes slitlike and narrowly elongated. Fins moderately falcate; first dorsal origin about over or posterior to free rear tips of pectoral; distance from pectoral free rear tips to pelvic origins greater than first dorsal length from origin to free rear tip. Total vertebral counts 154 to 165, monospondylous precaudal counts 39 to 43.

Geographical Distribution: Western Pacific: China, including Taiwan Island, the Korea and Japan, and with some doubt from Amboina (Indonesia) and New Caledonia.

Habitat and Biology : A common continental temperate to subtropical shark in the western North Pacific, occurring close inshore and offshore down to at least 100 m depth.

Ovoviviparous, without a yolk-sac placenta. Number of young per litter 8 to 22 (mean 10), with about equal numbers per uterus and with the number increasing with size of female. In aggregates the sex ratio of embryos is 1:1, but individuals may have more of one sex than the other in left and right uteri and between one another. In the East China Sea mating takes place from June to September (mostly June to August) and birth season from June to August (mainly in June), with a gestation period of 10 months.



Presumably eats small fishes, cephalopods and crustaceans.

Size : Maximum size about 120 cm, males maturing at about 85 cm and reaching 110 cm, females maturing between 81 and 102 cm and reaching at least 120 cm; size at birth about 20 to 21 cm.

Interest to Fisheries: A common catch in Japanese, Korean, Taiwanese and probably Chinese waters. Caught with gillnets, bottom longlines, bottom trawls and set nets; meat used for human consumption.

Literature : Fowler (1941); Compagno (1970, 1979); Fourmanoir & Rancurel (1972); Chen & Mizue (1973).

Remarks : Records of this species from Amboina (Fowler, 1941) and New Caledonia (Fourmanoir & Rancurel, 1972) need confirmation, as an H. leucoperiptera-like shark has been taken off northwestern Australia and could very well be the basis of such records.

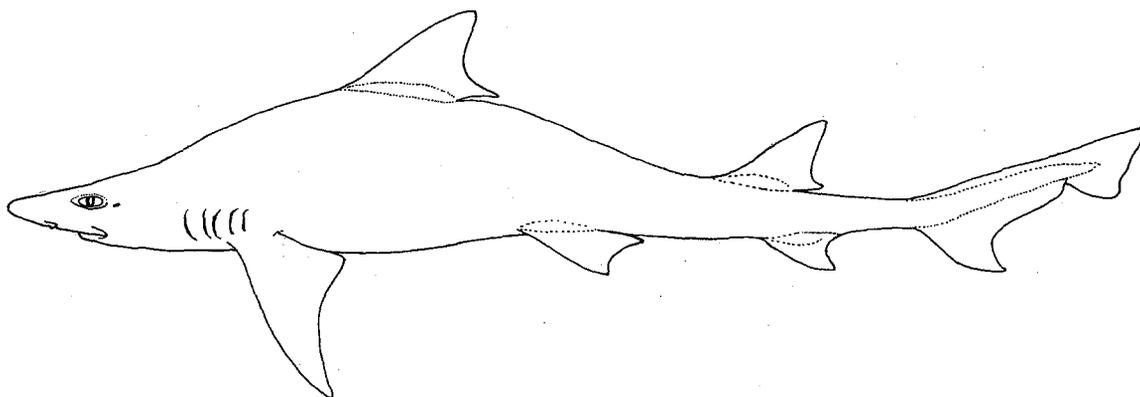
Hemitriakis leucoperiptera Herre, 1923

TRIAK Hem 2

Hemitriakis leucoperiptera Herre, 1923, Philipp.J.Sci., 23(1):71, pl. 1. Holotype: Pregnant female of 955 mm, lost?. Type Locality: Dumaguete, Negros, The Philippines.

Synonymy : None.

FAO Names: En - Whitefin topeshark; Fr - Requin-hâ aile blanche; Sp - Cazón de aleta blanca.



Field Marks: A houndshark with a moderately long parabolic snout, broadly arched mouth, eyes moderately elongated and dorsolateral, subocular ridges prominent, external nictitating lower eyelids present, nostrils with short, truncated anterior nasal flaps, internarial space over 2.5 times the nostril width, compressed teeth with oblique cusps and distal cusplets in both jaws, first dorsal somewhat larger than second but much shorter than caudal, first dorsal origin over pectoral inner margins, anal fin much smaller than first dorsal, fins with conspicuous white edges.