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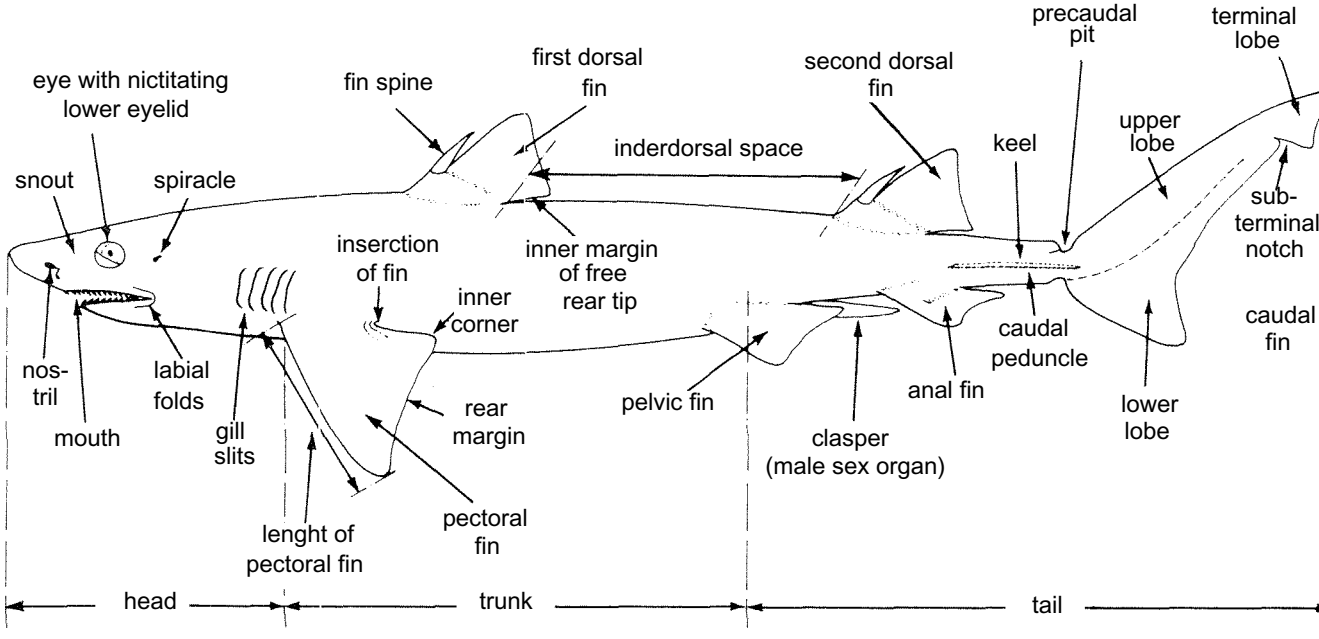
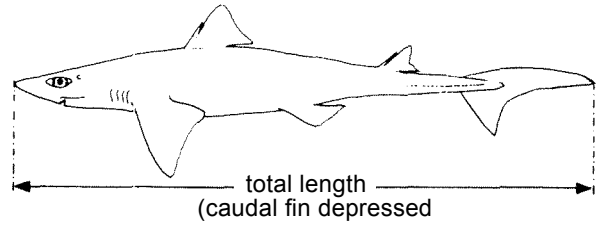
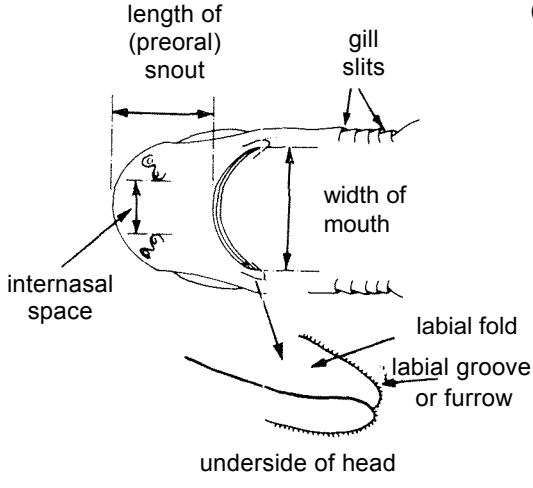
SHARKS

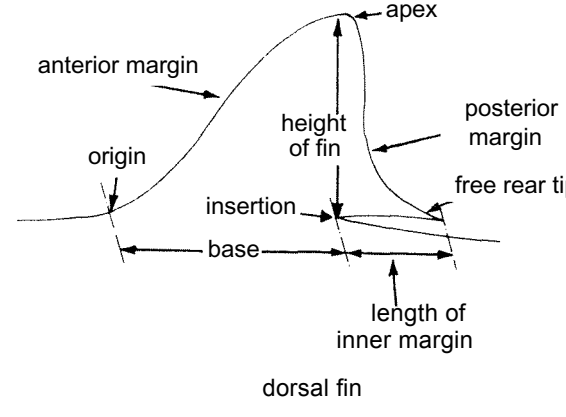
TECHNICAL TERMS AND PRINCIPAL MEASUREMENT USED

(Straight-line distances)









GENERAL REMARKS

Sharks include a variety of usually cylindrical, elongated, or moderately depressed fishes which differ from the closely related rays or batoids in having lateral gill openings (or gill slits) and pectoral fins not fused to the sides of the head over the gill openings. The greatly depressed angel sharks (Family Squatinidae) might he mistaken for rays at first sight; they have large, broad, raylike pectoral fins that extend as triangular lobes alongside the gill openings, but are not connected to the head above them. Sharks have eyes on the dorsal surface or sides of the head and spiracles (when present) on its dorsal or dorsolateral surfaces. The tail and caudal fin are always well developed and serve to propel the animal by lateral undulations; the pectoral fins are not used for propulsion through the water but aid in stabilizing and steering the shark. There are usually 5 gill openings on each side of the head, rarely 6 or 7. The mouth is usually ventral or subterminal on the head, but terminal or nearly so in a few species. Most sharks have two (rarely one) dorsal fins, sometimes with spines on their front edges; an anal fin is usually present, but, missing in several families. The teeth on the jaws are se: in numerous transverse rows and are constantly replaced from inside the mouth. All shark species are more or less covered by small (occasionally enlarged) toothlike placoid scales or dermal denticles. Male sharks have cylindrical copulatory organs or claspers on their pelvic fins, used for internal fertilization of eggs in females; about 1/4 of the species of sharks have females that deposit eggs in rectangular or conical capsules, formed of a hornlike material, on bottom (oviparity); the remainder are livebearers. Some livebearing sharks, including some houndsharks (Triakidae), most requiem sharks (Carcharhinidae), and all weasel sharks (Hemigaleidae) and hammerheads (Sphyrnidae) are viviparous (placental viviparous), with yolk sacs of fetuses forming a placenta with the maternal uterus for nutrient. transfer; other livebearing sharks are ovoviviparous (aplacental viviparous), without a placenta. Ovoviviparous sharks of the families Odontaspididae, Alopiidae, Lamnidae, Pseudocarchariidae, and presumably also the Mitsukurinidae practice uterine cannibalism, in which one or more fetuses in each uterus resorb their yolk sacs and then devour eggs passed down the oviducts for nutriment and grow to considerable size before birth.

Mature sharks vary in total length from about 15 to 19 cm (dwarf species of Squalidae and Proscylliidae) to 12.1 m or more (whale shark, Family Rhiniodontidae) and in weight from between 10 and 20 g to several metric tons. Most sharks are of small or moderate size; about 50 percent are small, between 15 cm and 1 m: 32 percent 1 or 2 m; 14 percent between 2 to 4 m: and 4 percent over 4 m in total length.

All sharks are predators, with their prey ranging widely, from planktonic crustaceans and benthic invertebrates to pelagic cephalopods, small to large bony fishes, other sharks and rays, marine mammals, and other vertebrates. They are primarily marine, but a few requiem sharks (Carcharhinidee) have broad salinity tolerances, and one species (bull shark, Carcharhinus leucas) is wide-ranging in tropical lakes and rivers with sea access as well as shallow inshore waters. Sharks are widely distributed in all oceans, from the Arctic to subantarctic islands, and from close inshore on reefs, off beaches, and in shallow, enclosed bays to the lower continental slopes, possibly to abyssal plains, and the high seas. They are most diverse in continental waters of tropical and warm-temperate seas, from inshore waters down to upper continental slopes, but are less so in colder waters, at greater depths, in the open ocean and off oceanic islands. The richest shark faunas occur in the Indo-West Pacific from South Africa and the Red Sea to Australia and Japan (including FAO Fishing Area 51).

The Western Indian Ocean and Red Sea have an extremely diverse shark fauna, including 23 families, 62 genera, and at least 115 species. Worldwide there are 30 families, 96 genera, and abort 350 species of sharks. Many genera and families are poorly known and require further taxonomic study. New species have been commonly collected in deep-water habitats in the past thirty years, and more undoubtedly will be discovered with further collecting in poorly known areas. Knowledge of the coastal shark fauna of the Area 51 beyond the Red Sea and its southwestern corner (tropical South Africa, southern Mozambique, and the west coast of Madagascar) is very sketchy, and many maritime countries need further surveys to determine which species occur there. The deep-water shark fauna is very poorly known, except locally (e.g., Aldabra Island). Basic knowledge of the biology of many species is often very deficient or entirely lacking, and can be supplemented by new information gathered by fisheries workers in the Area.

The shark attack hazard has been grossly exaggerated in recent years. Large carcharhinids, sphyrnids and lamnids, and less frequently other sharks, pose a potential threat to people in the water or boats. Measures to reduce the number of potentially dangerous sharks in the vicinity of popular bathing beaches in South Africa have been successful in reducing shark attacks; the Natal Anti-Shark Measures Board has used large gillnets set opposite beaches for many years as attack prevention devices following Australian practice. About 9 percent of known shark species are definitely known to be dangerous, and about 10 percent more are large enough and sufficiently well-armed to be potentially so; the rest are mostly too small and poorly armed to be a hazard to people.

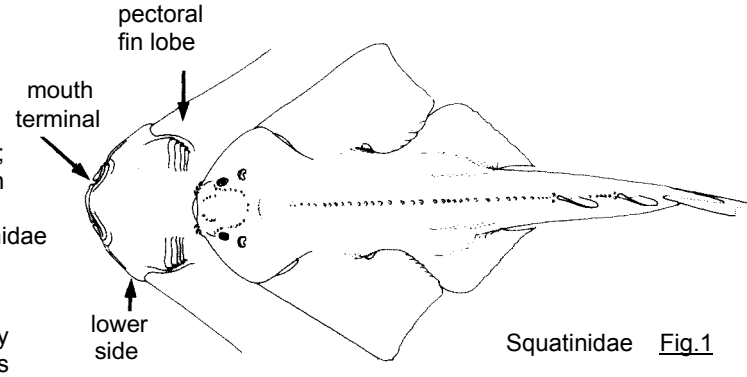
In the Western Indian Ocean and Red Sea sharks are used mainly for human food; shark meat is marketed fresh, frozen and especially dried-salted: sharks are also processed at sea and their meat is canned. Sharks are utilized on the oriental market for fins; also for liver oil, fishmeal, and Dossibly for leather, although details of

utilization in the area are sketchy. The total catch of sharks reported from Fishing Area 51 in 1980 was 50 745 metric tons; the actual landings of sharks in the area are doubtlessly much higher. Data on gear used in the area is sketchy, but line gear (including pelagic longlines), fixed and floating gillnets, bottom trawls, and purse seines are used to catch sharks. Sharks are taken in artisanal fisheries, by local inshore and offshore commercial fisheries, and by large fishing fleets in offshore waters. Requiem sharks (Carcharhinidae) are especially important, but considerable numbers of threshers (Alopiidae) are fished offshore, and a number of other families, including sand tiger sharks (Odontaspididae), longtailed carpetsharks (Hemiscylliidae), zebra sharks (Stegostomatidae), weasel sharks (Hemigaleidae), and hammerheads (Sphyrnidae) are commonly taken in inshore fisheries.

KEY WITH PICTURE GUIDE TO FAMMES OCCURRING IN THE AREA

1a. No anal fin (Figs 1 to 4)

2a. Body strongly depressed and raylike; pectoral fins greatly enlarged, with anterior triangular lobes that overlap gill slits; mouth terminal (Fig.1) ..... Squatinidae

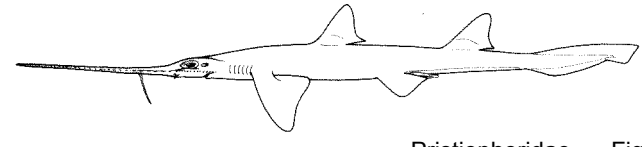


Squatinidae Fig.1

2b. Body cylindrical, compressed, or slightly depressed, not raylike; pectoral fins small, without anterior lobes; mouth ventral

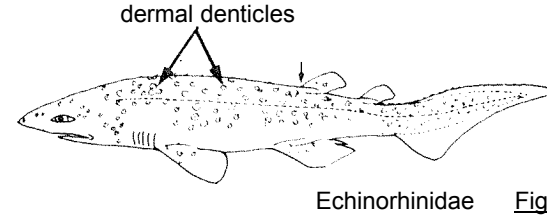
3a. Snout flattened and elongated, sawlike (Fig.2) ..... Pristiophoridae

3b. Snout normal, not sawlike



Pristiophoridae Fig.2

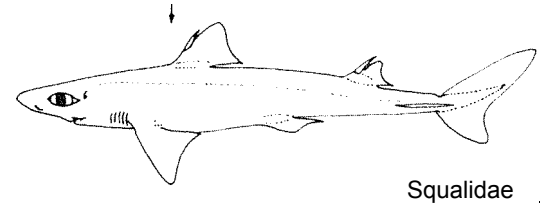
4a. First dorsal fin behind pelvic fin origins; dermal denticles expanded as large plates * (Fig.3) ..... Echinorhinidae



Echinorhinidae Fig.3

4b. First dorsal fin partial.ly or entirely in front of pelvic fin origins (Fig.4); dermal denticles not expanded as large plate ..... Squalidae

1b. Anal fin present



Squalidae Fig.4

* Character applying to Western Indian Ocean representatives only

5a. Only one dorsal fin, far posterior on back; 6 or 7 gill slits on each side (Figs 6,7,9,10)

6a. Mouth nearly terminal (Figs.6,7); teeth alike in both jaws, 3-cusped, not formed as cutting blades (Fig.5); body slender and eel-shaped (Fig.6); a fold of skin uniting lower ends of first pair of gill slits across throat (Fig.7) ..... Chtamydoselachidae

6b. Mouth ventral (Fig.10); teeth unlike in both jaws, uppers with a strong cusp and cusplets, lowers formed as large, comb-like, cutting blades with a cusp and several cusplets (Fig.8); body stouter, not eel-shaped (Fig.9); no fold of skin across throat (Fig.10) ..... Hexanchidae

5b. Two dorsal fins*; 5 gill slits on each side

7a. A strong spine on each dorsal fin (Fig.11) ..... Heterodontidae

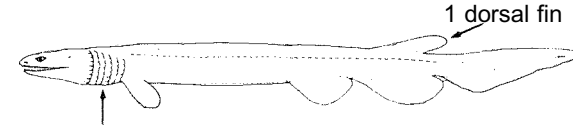
7b. Dorsal fins without spines

8a. Head with lateral expansions or blades, like a double-edged ax (Fig.12) ..... Sphyrnidae

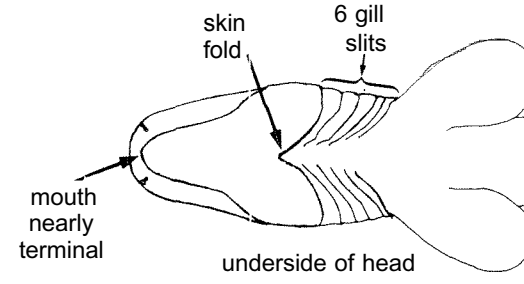
8b. Head normal, not expanded laterally

teeth

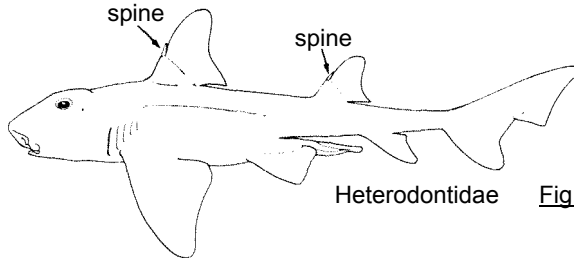
Chtamydoselachidae Fig.5



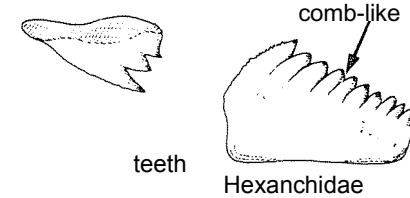
Chtamydoselachidae Fig.6



Chtamydoselachidae Fig.7

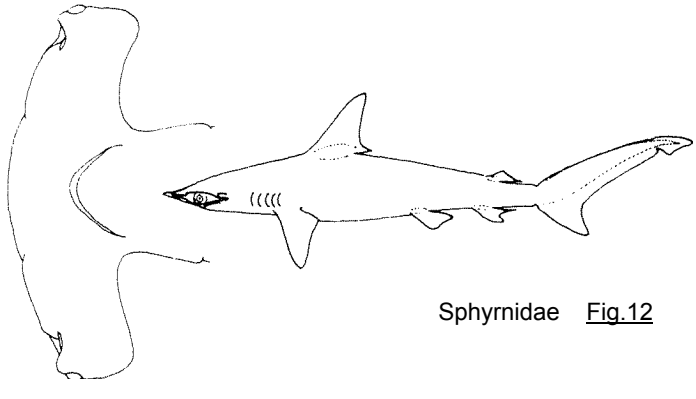


Heterodontidae Fig.11



teeth

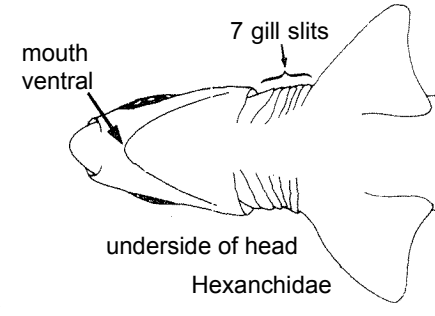
Hexanchidae Fig.8



Sphyrnidae Fig.12

enlarged underside of head

Hexanchidae Fig.9



Hexanchidae Fig.10

*Character applying to Western Indian Ocean representatives only

9a. Eyes behind mouth; deep nasoral grooves connecting nostrils and mouth (Fig.13a)

10a. Caudal fin about as long as rest of shark (Fig.14) ..... Stegostomatidae

10b. Caudal fin less than half the length of rest of shark

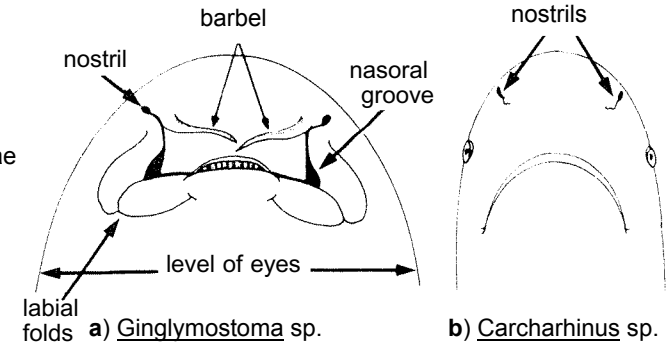
11a. Mouth huge and terminal, head strongly depressed; gill slits very large, internal gill slits with filter screens; lowest ridge on sides of body ending in a strong keel on caudal peduncle; ventral caudal lobe string (Fig.15); a checker-board pattern of light spots and stripes on head and body ..... Rhiniodontidae

11b. Mouth small subterminal, head cylindrical or moderately depressed; gill slits small, internal gill slits without filter screens; ridges either absent from body or not forming a strong keel on caudal peduncle when present; ventral caudal lobe absent. or weak; body plain or spotted, but without a checkerboard pattern of light stripes and spots

12a. A lobe and groove around outer edge of each nostril (Fig.16a); spiracles large; precaudal tail long, subequal or greater than snout-vent length; anal fin low and keel-like (Fig.17) ..... Hemiscylliidae

12b. No lobe and groove around outer edge of nostril (Fig. 16b); spiracles small; pre-caudal tail shorter, its length from vent to lower caudal origin much less than distance from snout tip to vent; anal fin high and subangular (Fig.18) ..... Ginglymostomatidae

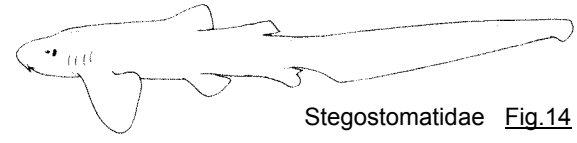
9b. Eyes partly or entirely over mouth; nasoral grooves usually absent (Fig.13b), when present (Haploblepharus and Atelomycterus in Family Scyliorhinidae and Scylliogaleus in Family Triakidae) broad and shallow



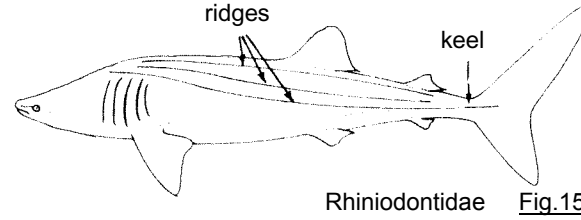
a) Ginglymostoma sp. **b**) Carcharhinus sp.

underside of head

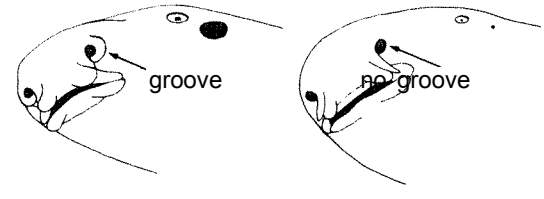
Fig.13



Stegostomatidae Fig.14



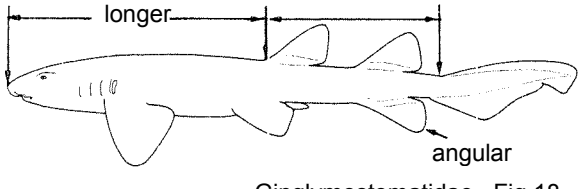
Rhiniodontidae Fig.15



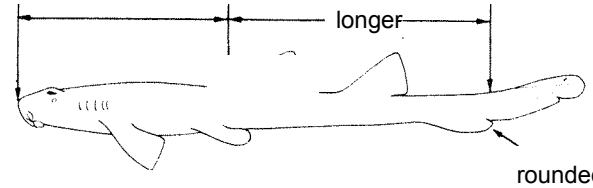
underside of snout

a) Hemiscylliidae **b**)Ginglymostomatidae

Fig.16



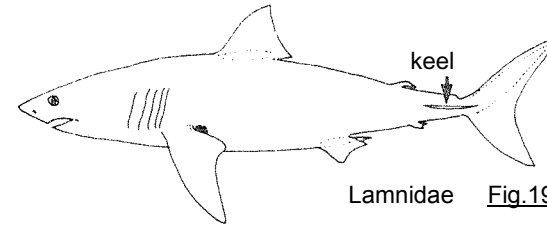
Ginglymostomatidae Fig.18



Hemiscylliidae Fig.17

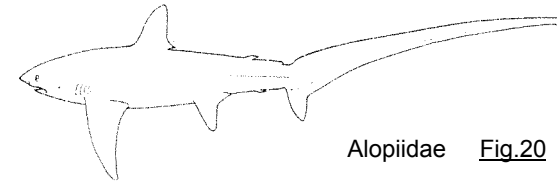
13a. A strong keel present on each side of caudal peduncle; caudal fin crescentic and nearly symmetrical, with a long lower lobe (Fig.19)..... Lamnidae

13b. No keels on caudal peduncle, or weak ones (Pseudocarcharias in Pseudocarchariidae, Caleocerdo and Prionace in Carcharhinidae ; caudal fin asymmetrical, not crescentic, with ventral lobe relatively short or absent



Lamnidae Fig.19

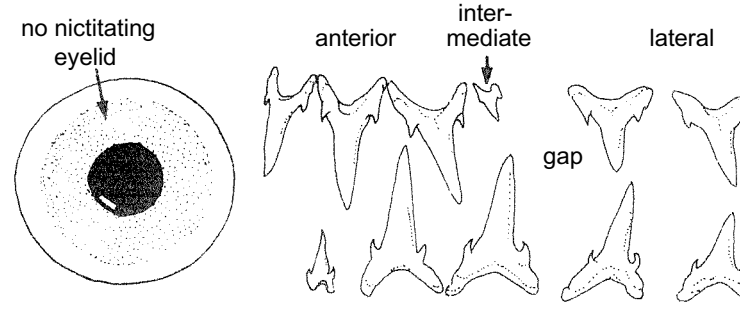
14a. Caudal fin about as long as rest of shark (Fig.20) ..... Alopiidae



Alopiidae Fig.20

14b. Caudal fin less than half the length of rest of shark

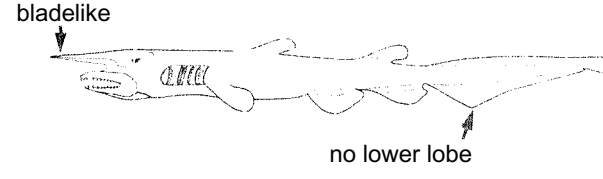
15a. No nictitating eyelids (Fig. 21a), largest teeth in mouth are 2 or 3 rows of anteriors on either side of symphysis (anterior junction of lower jaws); upper anteriors separated from large lateral teeth at sides of jaw by a gap that may have one or more rows of small intermediate teeth (Fig.21b); all gill slits in front of pectoral fins (Figs 22 to 24)



a) eye level of symphysis **b**) upper and lower teeth of one side Fig.21

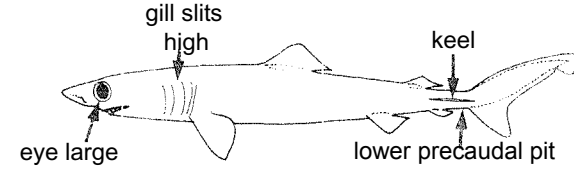
16a. Snout greatly elongated, flattened and bladelike; pectoral, pelvic, dorsal and anal fins with broadly rounded apices; no precaudal pits; no lower caudal fin lobe (Fig.22) ..... Mitsukurinidae

16b. Snout moderately elongated, conical or moderately flattened, not bladelike; pectoral, pelvic, dorsal and anal fins with narrowly rounded apices; precaudal pits present: lower caudal fin lobe present (Figs 23.24)



Mitsukurinidae Fig.22

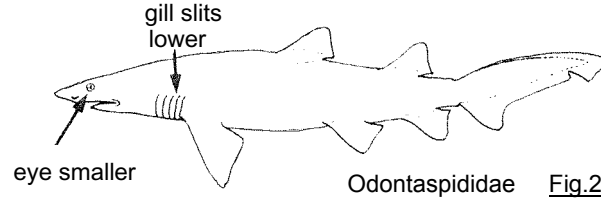
17a. Eyes very large; gill slits extending onto upper surface of head; both upper and lower precaudal pits present; a low keel on each side of caudal peduncle (Fig.23) .... Pseudocarchariidae



Pseudocarchariidae Fig.23

17b. Eyes smaller; gill slits not extending onto upper surface of head; lower pre-caudal pits absent; no keels on caudal peduncle (Fig.20) ..... Odontaspididae

15b. Nictitating eyelids present (Fig.25a); largest teeth in mouth are well lateral on dental band, not on either side of symphysis; no gap or intermediate teeth separating large anterior teeth from still larger lateral teeth in upper jaw (Fig.25b); last one or two gill slits over pectoral fin bases

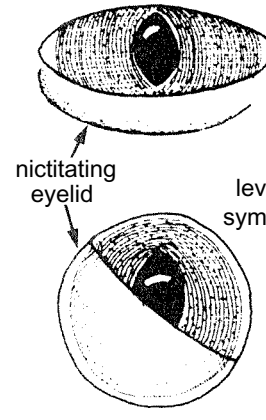


Odontaspididae Fig.24

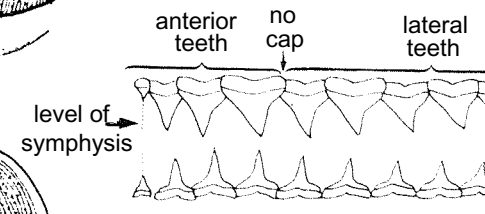
18a. Origin of first dorsal fin over or behind pelvic fin bases (Fig.26) ..... Scyliorhinidae

18b. Origin of first dorsal fin well ahead of pelvic fin bases

19a. No precaudal pits, dorsal caudal fin margin smooth (Fig.27)



a) eyes

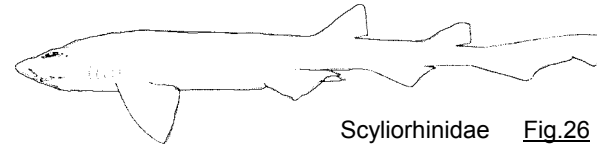


b) Upper and lower teeth of one side far back

Fig.25

20a. First dorsal fin long, about the length of caudal fin, and formed as a low, rounded keel; adults with over 200 rows of teeth in each jaw; spiracles nearly or quite as long as eyes (Fig.28) ..... Pseudotriakidae

20b. First dorsal fin short, about two-thirds of caudal fin or less*, sub-triangular in shape; adults with less than 110 rows of teeth in each jaw; spiracles much smaller than eyes



Scyliorhinidae Fig.26

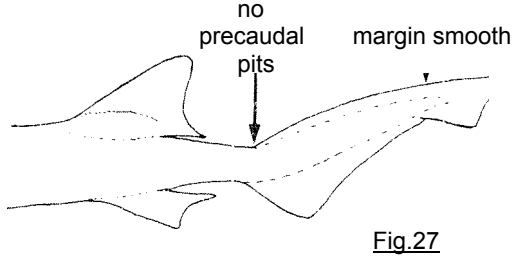
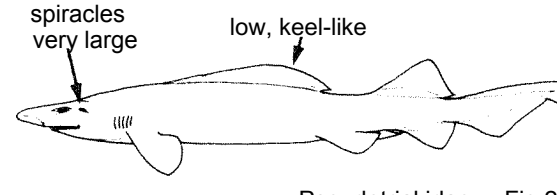


Fig.27



Pseudotriakidae Fig.28

*Character applying to Western Indian Ocean representatives only

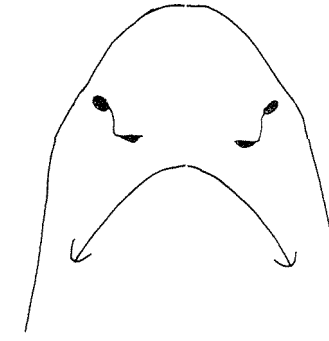
21 a. Labial furrows very short or absent, confined to extreme mouth corners; palate and gill arches with papillae*; posterior teeth comblike; base of first dorsal fin closer to pelvic fin bases than to pectoral fin bases (Fig.29) ..... Proscylliidae

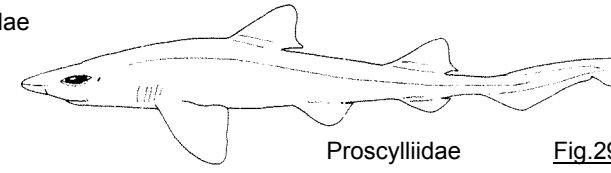
21 b. Labial furrows longer, extending anteriorly for a greater or lesser distance on lips; palate and gill arch without papillae; posterior teeth not comblike; base of first dorsal fin either equidistant between pectoral and pelvic bases or closer to pectoral fin bases (Fig.30) ..... Triakidae

19b. Precaudal pits and rippled dorsal caudal margin present (ripples sometimes irregular in Scoliodon and Triaenodon of Family Carcharhinidae)(Fig.31

22a. Intestine with a spiral valve (Fig.32a) having 4 to 6 turns ..... Hemigaleidae (Fig.33)

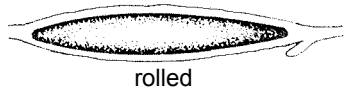
22b. Intestine with a scroll valve (Fig.326) ..... Carcharhinidae (Fig.34)





Proscylliidae Fig.29

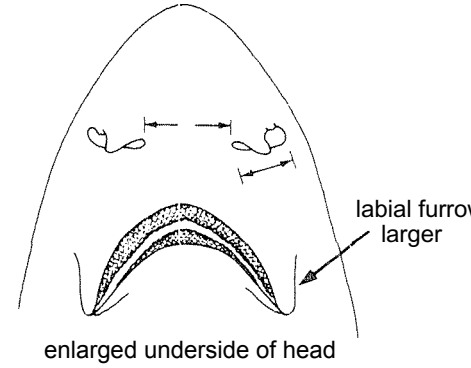
a) spiral valve



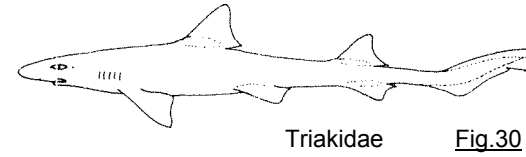
rolled

unrolled
b) scroll valve

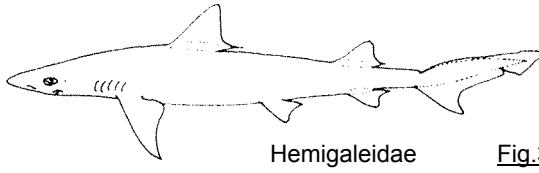
Fig.32



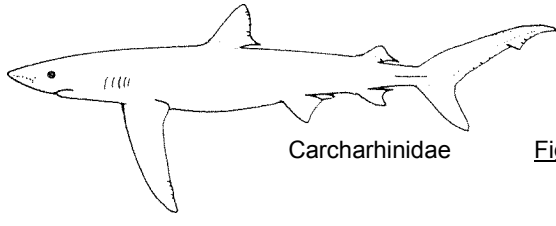
enlarged underside of head



Triakidae Fig.30



Hemigaleidae Fig.33



Carcharhinidae Fig.34

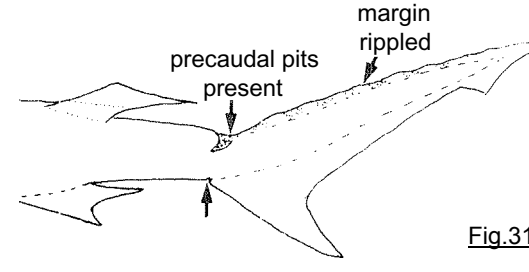


Fig.31

*Character applying to Western Indian Ocean representatives only