

FISHES

1. *Clupea harengus* L.
2. *Merluccius merluccius* L.
3. *Gadus morhua* L.
4. *Urophycis regia* (Günther)
5. *Urophycis regia* (Günther)
6. *Urophycis regia* (Günther)
7. *Urophycis regia* (Günther)
8. *Urophycis regia* (Günther)
9. *Urophycis regia* (Günther)
10. *Urophycis regia* (Günther)

Class ELASMOBRANCHII

Subclass SELACHII

Endoskeleton cartilaginous, sometimes partly hardened by calcification. Endocranium covered with a layer of perismatic calcifications. Skull hyostylic or amphistylic. Skin covered with placoid scales or sometimes naked. Five to seven gill arches; gill openings separate, slit-like and without gill covers. Olfactory organs are paired blind sacs with a single external aperture. No air bladder or lungs. Males usually with external sexual organs (claspers) derived from the ventral fins.

1. Gill openings on sides. Pectoral fins not attached to head. Body spindle shaped. Anal fin present Order LAMNIFORMES
Gill openings on lower surface. Pectoral fins attached to head. Body dorso-ventrally depressed. No anal fin 2
2. Electric organs absent Order RAJIFORMES
Electric organs present Order TORPEDINIFORMES

Order LAMNIFORMES

Cartilaginous fishes with two dorsal fins and one anal fin. Five lateral gill slits, jaws hyostylic. Palatoquadrate generally not articulated with the skull. Notochord constricted. Right and left halves of the pectoral girdle dorsally separated, neither united together nor attached to the vertebral column.

1. Eyes without nictitating membrane 2
Eyes with nictitating membrane 5
2. First dorsal over or behind ventrals 3
First dorsal in advance of ventrals 4
3. No keels on caudal peduncle. A tentacle present on border of nostril ORECTOLOBIDAE
Keels present on each side of caudal peduncle. Nostril without a tentacle RHINEODONTIDAE
4. Caudal peduncle with lateral keels. Tail not as long as body ISURIDAE
Caudal peduncle without lateral keels. Tail as long as body ALOPIIDAE
5. Head normal GALEIDAE
Head hammer-shaped SPHYRNIDAE

Family ORECTOLOBIDAE

Body somewhat cylindrical to depressed. Snout wide. Mouth with labial folds around angles of both jaws. Teeth long. Spiracles present. Eyes small, without nictitating membrane. Teeth compressed, sometimes tricuspid. First dorsal over or behind ventrals.

Anal fin separate from caudal, its origin behind that of second dorsal. Spiracles very small. Sandy brown, back slightly darker *Nebrius concolor*

Anal fin terminating just near caudal. Spiracles large. Head, body and fins with dark brown spots *Stegostoma varium*

1. *Nebrius concolor* Rüppell

Nebrius concolor Rüppell, Neue Wirbelt. Fische Rothen Meeres, p. 62, 1835. Munro, Fishes of Ceylon, p. 3, pl. 1, fig. 3, 1955. Smith and Smith, Fishes of Seychelles, p. 6, pl. 46, F, 1963. Jones, Bull. cent. mar. Fish. Res. Inst., 8, p. 1, 1969 (Cat. No. CMFRI-LA-F. 1/1).

Nebrius doldi Smith, Fishes of Southern Africa, ed. 3, p. 512, fig. 30a, 1953.

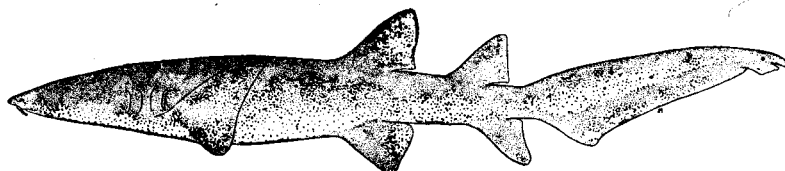


FIG. 1. *Nebrius concolor* Rüppell, 530 mm.

Specimens studied: Agathi (1), 530 mm. Bangaram (1), 485 mm. Minicoy (3), 430 to 1600 mm.

Body moderately elongate, depressed anteriorly, compressed posteriorly. Head broad, snout short and obtuse. Mouth wide and slightly curved. Front nasal valves reaching mouth. Spiracle very small. Head 4.5-5.1 to subcaudal origin. Depth of body 6-7 to subcaudal origin. Interorbital space 1.3-1.5 in head. Snout about 2.2-2.3 in head. Eye small, 12-14 in head. Teeth small, in three series in jaws, each with 3 to 5 cusps. Fourth and fifth gill openings close together, over pectoral. Gill openings about half length of snout. Predorsal distance 1.5 to subcaudal origin. Origin of second dorsal nearer to subcaudal origin than to origin of first dorsal. Anal origin somewhat below middle of second dorsal. Height of first dorsal slightly shorter than head. Height of second dorsal and anal almost equal, 1.4 in head. Pectoral longer than head. Skin with coarse denticles. Colour: Sandy brown, back slightly darker.

Local names: *Nidammiyar* (Minicoy). *Moron* (other islands).

Distribution: Red Sea and Seychelles to the Laccadives, Ceylon, Indonesia and eastwards to Queensland.

2. *Stegostoma varium* (Seba)

Squalus varius Seba, Thesaurus, 3. p. 105, pl. 34, fig. 1, 1761.

Stegostoma fasciatum Smith, Fishes of Southern Africa, p. 51, fig. 30, 1949. Munro, Fishes of Ceylon, p. 3, pl. 1, fig. 2, 1955.

Stegostoma tigrinum Day, Fishes of India, p. 725, pl. 187, fig. 4, 1878.

Stegostoma varium Jones, Bull. cent. mar. Fish. Res. Inst., 8, p. 1, 1969 (Cat. No. CMFRI-LA-F. 1/2).

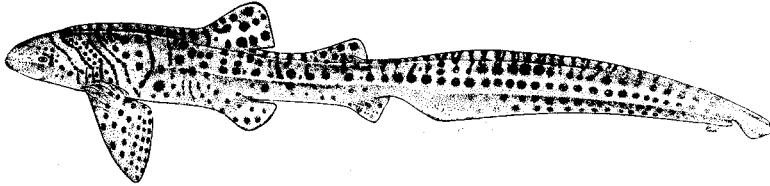


FIG. 2. *Stegostoma varium* (Seba), 450 mm.

Specimen studied: Kalpeni (1), 450 mm.

Elongate; caudal very long and compressed, about 2.2 in total length. Head short and wide; snout obtuse. Head about 5.1, depth of body 4.8, both to subcaudal origin. Interorbital space almost equal to head. Mouth with labial folds round angles of both jaws. Teeth in jaws small, tricuspid. Spiracle large, close behind eye. Nictitating membrane absent. Oronasal grooves present. Origin of first dorsal before a vertical from origin of ventral, its height equal to head length. Origin of anal almost below second dorsal. Pectoral about $1\frac{1}{2}$ length of head. A low median ridge on back and another on each side. Colour: Creamy yellowish; head, body and caudal with transverse rows of dark brown spots and streaks; dorsal fins, pectorals and ventrals spotted.

Local name: *Pochasurav* (Kalpeni).

Distribution: Red Sea and east coast of Africa to Madagascar, Laccadives, coasts of India, Ceylon, Indonesia, Philippines, China and Japan.

Family RHINEODONTIDAE

Body massive; snout very broad. Mouth wide, horizontal, terminal. Eyes very small, without nictitating membrane. Numerous small teeth in bands in jaws. Caudal peduncle with lateral keels.

3. *Rhineodon typus* Smith

Rhineodon typus Smith, A. Zool. Jour., 4, p. 443, 1829 (*Rhincodon* by misprint).

Rhincodon typus Smith, Fishes of Southern Africa, p. 50, fig. 29, 1949. Munro, Fishes of Ceylon, p. 3, pl. 2, fig. 5, 1955. Smith and Smith, Fishes of Seychelles, p. 6, pl. 2, I, 1963.

Specimens studied: Agathi (1), 1350 cm. Minicoy (1), 1650 cm.

Body massive, snout broad, short and depressed. Head 4.5, depth of body about 5, both to subcaudal origin. Mouth at the end of snout, very wide, transverse. Teeth small, conical. Eyes small, without nictitating membrane. Nasal cirri absent. First dorsal origin nearer to eye than to caudal base and

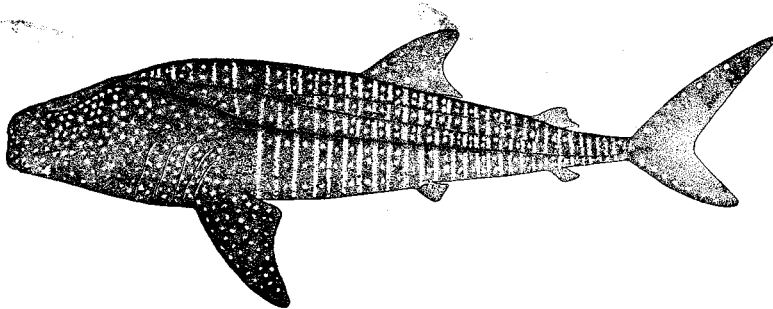


FIG. 3. *Rhineodon typus* Smith, A. 1350 cm.

in front of a level from ventral origin. A median ridge along the back and two each on either side. Caudal base with a notch above and lateral keels on caudal peduncle. Colour: Brownish with numerous whitish spots and vertical stripes on sides. Fins with whitish spots.

Local names: *Fevurehi* (Minicoy). *Vybedu* (Agathi).

Distribution: All warm seas. South Africa, Seychelles, Laccadives to the coasts of India, Ceylon, Indonesia, Thailand, Philippines, Japan, Gulf of California and Gulf of Mexico.

Family ISURIDAE

Body torpedo-shaped, tapering to a slender, somewhat depressed caudal peduncle. Teeth lanceolate with sharp edges or triangular and serrated. A single keel on each side of tail. Snout sharply pointed. Gill openings moderately wide, before pectoral. Spiracles small. No nictitating membrane. Notch at base of caudal.

4. *Isurus glaucus* (Müller and Henle)

Oxyrhina glauca Müller and Henle, *Plagiost.*, p. 69, pl. 29, 1838.

Isurus glaucus Smith, *Fishes of Southern Africa*, p. 50, pl. 1, fig. 28, 1949. Jones, *Bull. cent. mar. Fish. Res. Inst.*, 8, no. 1, 1969 (Cat. No. CMFRI-LA-F. 184/4).

Lamna spallanzanii Day, *Fishes of India*, p. 722, pl. 186, fig. 2, 1878 (not of Le Seuer).

Specimen studied: Minicoy (1), 1005 mm.

Robust fusiform body with sharply pointed snout and depressed caudal peduncle. Head about 4 to subcaudal origin. Depth of body 6.7 to subcaudal origin. Eye about 12 in head. Mouth as long as wide. Angle of mouth midway between tip of snout and second gill opening. No nictitating membrane. Labial folds present. Teeth lanceolate, 22 in each jaw, edges sharp and entire, no

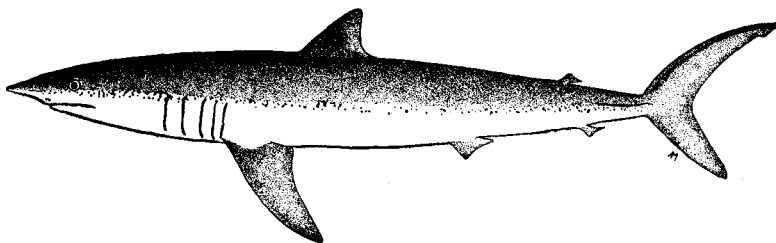


FIG. 4. *Isurus glaucus* (Müller and Henle), 1005 mm.

cusps. Gill openings before pectoral. Gill openings shorter than snout. Spiracles small. A notch at caudal base above and a strong keel on each side of caudal peduncle. First dorsal insertion midway between tip of snout and second dorsal. Height of first dorsal slightly more than snout and eye. Length of pectoral 1.7 times the height of first dorsal fin. Ventral nearer to caudal base than to pectoral insertion. Second dorsal and anal small. Anal nearer to base of caudal than to ventral and behind vertical from second dorsal. Lower caudal lobe $\frac{2}{3}$ of upper lobe. Colour: Dark blue above, white below, the two colours sharply contrasted. Dorsal fins, caudal and pectoral dark blue; ventral and anal bluish grey.

Local name: *Vorimasmiyaru* (Minicoy).

Distribution: Red Sea and east coast of South Africa to the Laccadives, coasts of India, Indonesia, Indo-China, Japan, Australia and eastwards to the Pacific Coast of North America.

Family ALOPIIDAE

Body torpedo-shaped; snout partly conic, blunt. Teeth compressed, edges smooth. Eyes without nictitating membrane. First dorsal somewhat in advance of ventrals. Tail very long, more than half of total length.

5. *Alopias vulpinus* (Bonnaterre)

Squalus vulpinus Bonnaterre, Tableau Encyclop. Ichth., p. 9, pl. 85, fig. 389, 1788.

Alopias vulpes Day, Fauna Brit. India, Fish., 1, p. 28, fig. 9, 1889.

Alopias vulpinus Smith, Fishes of Southern Africa, p. 47, fig. 22, 1949. Munro, Fishes of Ceylon, p. 4, pl. 2, fig. 6, 1955. Jones, Bull. cent. mar. Fish. Res. Inst., 8, p. 1, 1969 (Cat. No. CMFRI-LA-F. 183/3).

Specimen studied: Minicoy (1), 150 cm.

Body fusiform; snout partly conic, blunt. Caudal peduncle compressed. Head 4.3, depth of body 4.5, both to subcaudal origin. Width of mouth about 1.2 in preoral length. Eye without nictitating membrane. Teeth compressed, triangular, edges smooth. Origin of dorsal midway between pectoral insertion and ventral insertion and nearer to tip of snout than to subcaudal origin. Pectoral falcate, 1.4 times head. Upper lobe of caudal fin greatly enlarged, longer than head and body. Colour: Uniform dark brown, lower side white.

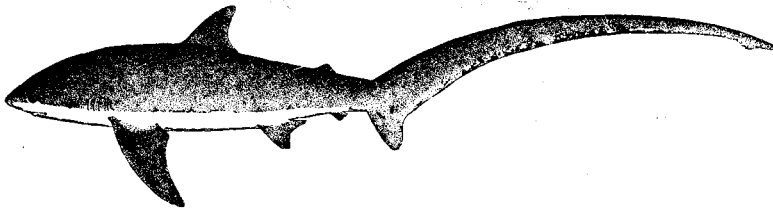


FIG. 5. *Alopias vulpinus* (Bonnaterre), 150 cm.

Local name: *Nigudigumiyaru* (Minicoy).

Distribution: Almost all warm seas: East coast of Africa, Arabia, Laccadives, coasts of India, Ceylon, Indonesia, China, Japan, Korea, Australia, California, Chile and Mediterranean sea.

Family GALEIDAE

Body elongate; head depressed; snout rounded to pointed and projecting beyond the mouth. Spiracle small or absent. Eyes with nictitating membrane. The first dorsal fin elevated and situated before ventrals; the second small, opposite to anal. Teeth triangular, compressed or tricuspid. No keel on caudal peduncle.

- 1. Small spiracle present 2
- No spiracle 3
- 2. Teeth in both jaws, oblique and serrated. First dorsal insertion nearer to eye than to second dorsal *Galeocerdo cuvieri*
- Teeth subtriangular; those on upper jaw oblique and serrated at base. First dorsal origin nearer to base of second dorsal than to eye *Hemigaleus balfouri*
- 3. Teeth smooth, oblique, bases not swollen; lower jaw with an unpaired tooth at symphysis. Tip of pectoral reaching beyond front of first dorsal. Second dorsal partly behind base of anal *Scoliodon walbeehmi*
- Teeth serrated on cusps or bases at least in one jaw 4

4. Teeth tricuspid, the central cusp larger; backwardly directed; all dorsal and caudal lobes white tipped *Triaenodon obesus*
Teeth not tricuspid; serrated on both cusps and bases; lobes of dorsal and anal not white tipped 5
5. Head 4.2-4.5 to subcaudal origin. Tips of both dorsals, anal, pectoral and lower lobe of caudal black, posterior margin of caudal black edged *Eulamia melanoptera*
Head about 4 to subcaudal origin. Tips of fins dusky .. *Eulamia limbatus*

6. *Galeocerdo cuvieri* (Le Seuer)

Squalus cuvier Le Seuer, Jour. Acad. Nat. Sci. Philadelphia, **2**, p. 351, 1822.

Galeocerda cuvieri Munro, Fishes of Ceylon, p. 5, pl. 1, fig. 9, 1955. Jones, Bull. cent. mar. Fish. Res. Inst., 8, p. 1, 1969 (Cat. No. CMFRI-LA-F. 5/5).

Galeocerdo cuvier Smith, Fishes of Southern Africa, p. 44, pl. 1, fig. 14, 1949.

Galeocerdo Rayneri Day, Fishes of Ind'a, p. 718, pl. 187, fig. 3, 1878.

Galeocerdo tigrinus Day, Fishes of India, p. 718, 1878.

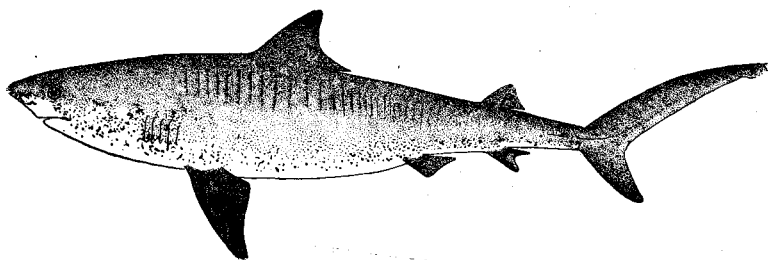


FIG. 6. *Galeocerdo cuvieri* (Le Seuer), 1830 mm.

Specimens studied: Minicoy (2), 980 and 1830 mm. Laccadive Sea (1), 2230 mm.

Snout short and bluntly rounded. Body rather elongate, tapering; deepening with age. Mouth crescentic. Head depressed. Head 4.2-4.6 to subcaudal origin. Depth of body 4.7-5.2 to subcaudal origin. Snout about 3 in head. Interorbital space 1.55 in head. Eye 9.8-10.0 in head. Small spiracles present. Nictitating membrane present. Gill openings about half length of snout. Inclined, somewhat triangular teeth with serrated edges in both jaws. Caudal with notch at base, both above and below. First dorsal origin midway between tip of snout and second dorsal origin. Second dorsal and anal moderate, of equal size and situated approximately opposite. Second dorsal twice nearer to base of caudal than to first dorsal. Pectoral 1.2-1.3 times height of first dorsal. Colour: Slaty grey above becoming dull white below. Pectoral, dorsal fins and caudal slaty grey; ventral and anal dull white. Young whitish in colour with blackish blue stripes and spots on sides.

Local names: *Vorimiyaru* (Minicoy). *Valiyasurav* (other islands).

Distribution: Widely distributed in all tropical and temperate waters; occasionally caught as far north as Iceland.

7. *Hemigaleus balfouri* Day

Hemigaleus Balfouri Day, Fishes of India, p. 717, pl. 185, fig. 4, 1878.

Hemigaleus balfouri Munro, Fishes of Ceylon, p. 5, pl. 1, fig. 10, 1955. Jones, Bull. cent. mar. Fish. Res. Inst., 8, p. 1, 1969 (Cat. No. CMFRI-LA-F. 5/6).

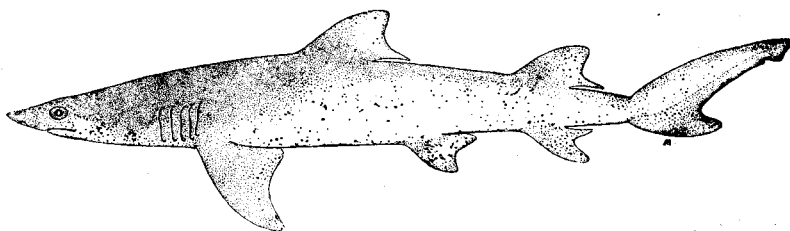


FIG. 7. *Hemigaleus balfouri* Day, 475 mm.

Specimen studied: Minicoy (1), 475 mm.

Body slender, elongate. Head depressed, snout obtusely pointed. Head 4.3 to subcaudal origin. Depth of body 6.8 to subcaudal origin. Eye 9.4 in head. Snout about 3 in head. Mouth with labial folds, crescentic, broader than long. Teeth in jaws oblique, subtriangular, notched externally; those of upper jaw denticulate at base. Nictitating membrane present. Spiracle minute, less than an eye diameter behind eye. Nostrils nearer to mouth than to tip of snout. Cleft of mouth as long as preoral length of head. Gill openings about 1.4 in snout. Dorsal and ventral side of base of caudal notched. Dorsal origin nearer to base of second dorsal than to eye. Ventral insertion nearer to anal insertion than to base of pectoral. Anal origin somewhat behind that of second dorsal. Height of first dorsal less than $\frac{1}{4}$ of head. Pectoral longer than height of first dorsal. Height of second dorsal about half length of head. Height of anal slightly less than that of second dorsal. Colour: Top of head and back slaty grey, lighter below. Fins grey; second dorsal, anal and caudal slightly darker distally.

Local name: *Miyaru* (Minicoy).

Distribution: Known only from Waltair on the east coast of India, Ceylon and Minicoy Island in the Laccadives.

•8. *Scoliodon walbeehmi* (Bleeker)

Carcharias (Scoliodon) walbeehmi Bleeker, Nat. Tijds. Ned.-Ind., 10, p. 353, 1856.

Carcharias walbeehmi Day, Fishes of India, p. 712, pl. 185, fig. 2, 1878.

Scoliodon walbeehmi Smith, Fishes of Southern Africa, p. 43, fig. 12, 1949. Munro, Fishes of Ceylon, p. 6, pl. 1, fig. 13, 1955. Jones, Bull. cent. mar. Fish. Res. Inst., 8, p. 1, 1969 (Cat. No. CMFRI-LA-F. 5/7).

Specimen studied: Agathi (1), 185 mm.

Body slightly compressed, snout moderately pointed and depressed. Head 3.7, depth of body 6.2, both to subcaudal origin. Snout 2.4 in head. Eye 6.5 in head. Width of mouth about 1.3 in preoral length. Teeth in jaws outwardly inclined, triangular and with smooth edges; lower jaw with a median unpaired tooth. Labial folds extend to upper jaw. Nictitating membrane present. Spiracles absent. Tip of pectoral reaching beyond front of first dorsal. First dorsal origin nearer to pectoral origin than to anal origin. Second dorsal partly behind base of anal. Base of anal about twice base of second dorsal. Colour: Brownish grey above, dull yellowish below. Fins grey with light outer edges.

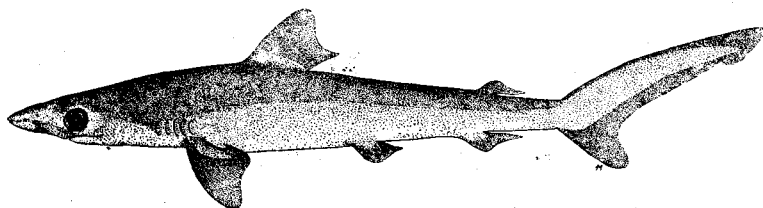


FIG. 8. *Scoliodon walbeehmi* (Bleeker), 185 mm.

Distribution: East coast of Africa to the Laccadives, coasts of India and Ceylon, Indonesia, Malaysia, Philippines, Taiwan, China and Japan.

9. *Triaenodon obesus* (Rüppell)

Carcharias obesus Rüppell, Neue Wirbelt. Fische Rothen Meeres, p. 64, pl. 18, fig. 2, 1835.
Triaenodon obesus Smith, Fishes of Southern Africa, ed. 3, p. 511, fig. 13 a, 1953. Smith and Smith, Fishes of Seychelles, p. 5, pl. 1, G, 1963. Jones Bull. cent. mar. Fish Res. Inst., 8, p. 1, 1969 (Cat. No. CMFRI-LA-F. 5/8).

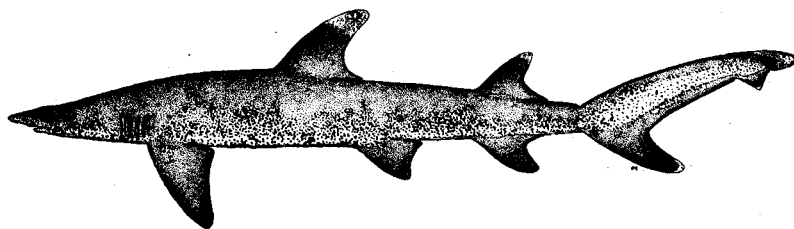


FIG. 9. *Triaenodon obesus* (Rüppell), 530 mm.

Specimen studied: Bitra (1), 530 mm.

Body slender, tapering to head and caudal peduncle. Head wide, bluntly rounded and depressed. Head 5.1, depth 7.4, both to subcaudal origin. Snout about 3 in head. Eye 7.2 in head and 4.7 in almost flat interorbital space. Angle of mouth midway between tip of snout and fourth gill opening. Mouth greatly

arched, broader than long. Nictitating membrane present. Labial folds rudimentary. Teeth of moderate size, backwardly directed, each with three acute cusps, central cusp larger. Spiracles absent. Nasal flap extending a little past nasal opening. No keel on sides of caudal peduncle. Base of caudal with a notch above and below. Last gill opening just behind front edge of pectoral insertion. First dorsal origin nearer to end of base of second dorsal than to tip of snout. Height of first dorsal and pectoral equal, shorter than head. Height of second dorsal equal to that of anal, slightly shorter than $2/3$ of that of first dorsal. Lower caudal lobe half length of upper lobe. Second dorsal nearer to base of caudal than to base of first dorsal. Pelvic insertion behind vertical from hind edge of base of first dorsal. Colour: Slightly brownish grey on back, becoming whitish with pinkish tinge below. First and second dorsal dusky grey with whitish tips. Caudal with dusky grey edges except tips of lobes which are whitish. Pectoral, ventral and anal dusky grey towards margin.

Local name: *Kallasurav* (Bitra).

Distribution: Widely distributed from the Red Sea and east coast of Africa to Seychelles, Laccadives, Indonesia, Philippines, Tahiti, Hawaii and Cocós Island off Costa Rica.

10. *Eulamia melanoptera* (Quoy and Gaimard)

Carcharias melanopterus Quoy and Gaimard, Voy. *Uranie*, Zool., p. 194, pl. 43, figs. 1 and 2, 1824.

Eulamia melanoptera Munro, Fishes of Ceylon, p. 7, pl. 1, fig. 17, 1955. Jones, Bull. cent. mar. Fish. Res. Inst., 8, p. 1, 1969 (Cat. No. CMFRI-LA-F. 5/9).

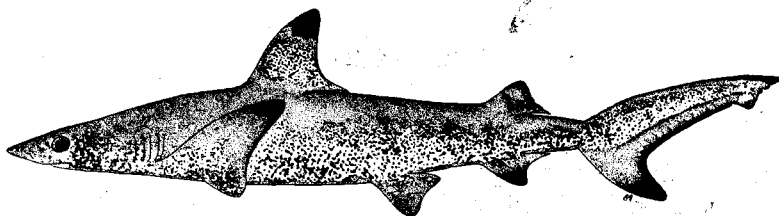


FIG. 10. *Eulamia melanoptera* (Quoy and Gaimard), 340 mm.

Specimens studied: Agathi (3), 340 to 450 mm. Minicoy (2), 375 and 395 mm.

Fusiform body, snout moderately pointed. Head 4.2-4.5 to subcaudal origin. Depth of body 5.8-6.0 to subcaudal origin. Snout 2.6-2.8 in head. Interorbital space about 1.45-1.60 in head. Eye 7.2-7.5 in head. Spiracle absent. Nasal opening with a small dermal flap. Teeth in upper jaw acutely triangular with denticulate edges; teeth in lower jaw narrower than in upper. Preoral length 1.3 in width of mouth. Last gill slit behind a level from pectoral insertion. A

notch at base of caudal above and below. Dorsal origin behind base of pectoral. Anal origin below second dorsal origin. Pelvic insertion notably behind first dorsal. Height of first dorsal about $\frac{3}{4}$ of head. Pectoral equal to head, reaching almost below hind edge of base of first dorsal. Height of second dorsal and anal almost equal. Colour: Brownish on back, lighter below. Tips of both dorsals, anal, pectoral and lower lobe of caudal black; posterior margin of caudal black edged; distal margin of ventral black.

Local name: *Kattafulimiyaru* (Minicoy).

Distribution: Widespread from the east coast of Africa to the Laccadives, coasts of India and Ceylon, Andamans, Indonesia, north to Japan, south to Australia and east to Society and Marquesas Islands.

11. *Eulamia limbatus* (Müller and Henle)

Carcharias (*Prionodon*) *limbatus* Müller and Henle, *Plagiost.*, p. 49, pl. 19, fig. 9, 1838.

Carcharinus limbatus Smith, *Fishes of Southern Africa*, p. 40, pl. 104, fig. 5, 1949.

Eulamia limbatus Jones, *Bull. cent. mar. Fish. Res. Inst.*, 8, p. 1, 1969, (Cat. No. CMFRI-LA-F. 5/10).

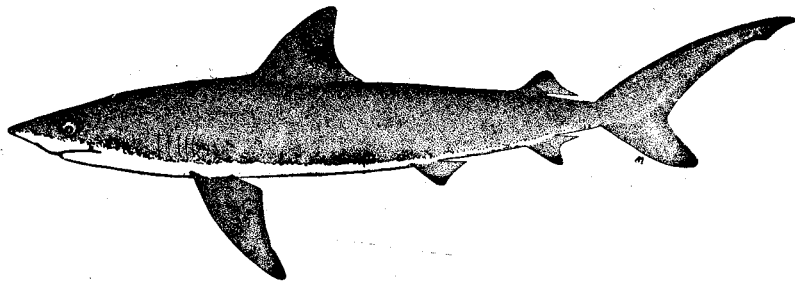


FIG. 11. *Eulamia limbatus* (Müller and Henle), 790 mm.

Specimen studied: Minicoy (1), 790 mm.

Snout moderate, rather pointed and narrowly rounded from above. Head 3.9 to subcaudal origin. Depth of body 5.6 to subcaudal origin. Snout 2.6 in head. Eye about 9.5 in head. Spiracles absent. Nictitating membrane present. Mouth wider than long. A short groove on each side of mouth. Teeth in upper jaw serrated, oblique, triangular, broad based and notched on outer edges; teeth in lower jaw smaller, almost erect and coarsely denticulate. First dorsal origin slightly behind base of pectoral. Height of first dorsal slightly more than post-orbital length of head and eye together. Second dorsal smaller than anal, the origins of both fins opposite. Colour: dark grey above, whitish below; tips of fins dusky.

Local name: *Miyaru* (Minicoy)...

Distribution: Circumtropical.

Note: This species is frequently caught in appreciable numbers in other islands. Rare in Minicoy.

Family SPHYRNIDAE

Greatly flattened and expanded lobe on each side of head, the eyes situated at the extremities of the lobes. Mouth ventral; teeth oblique, outer edges nearly straight, notched. Nictitating membrane present.

12. *Sphyrna zygaena* (Linnaeus)

Squalus zygaena Linnaeus, Syst. Nat., ed. 10, 1, p. 234, 1758.

Zygaena malleus Day, Fishes of India, p. 719, pl. 186, fig. 4, 1878.

Sphyrna zygaena Smith, Fishes of Southern Africa, p. 46, fig. 21, 1949. Munro, Fishes of Ceylon, p. 8, pl. 2, fig. 21, 1955.

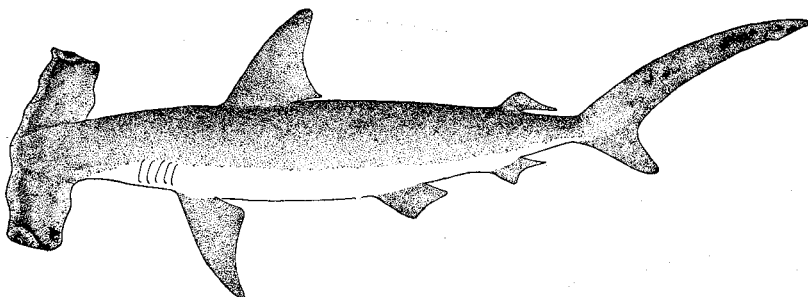


FIG. 12. *Sphyrna zygaena* (Linnaeus) (after Day).

Body rather long and slender; head depressed and produced to a lobe on each side; eyes situated at the lateral extremities of the expanded lobes. Length of hind edge of lateral expansion of the head slightly shorter than its width near the eye and has a groove along almost its entire anterior border. Mouth large, its length more than half its width. Teeth alike in jaws, oblique, outer edges almost straight, notched. Spiracles absent. Eyes with nictitating membrane. Inner narial groove extending more than half way to middle of snout. First dorsal high, inserted nearer to the tip of snout than to origin of second dorsal. Pectoral smaller than first dorsal. Colour: Slaty grey above, whitish below. Fins slightly dark terminally.

Local name: *Kombansurav* (other islands).

Distribution: All warm seas.

Order RAJIFORMES

Body dorsoventrally flattened, sometimes disc-shaped. Five gill slits on the ventral surface. Spiracles generally large. No anal fin. Pectoral fin fused with sides of body or head. The two halves of the pectoral girdle united either to each other or to the vertebral column.

1. Body rather elongate, snout usually pointed. Tail stout . . . RHINOBATIDAE
Body not elongate, either rounded or angular, laterally expanded. Tail slender 2
2. Snout produced as a fleshy flap on each side MOBULIDAE
Snout normal 3
3. Snout not elevated; eye on top of head. Pectoral fins rounded
. DASYATIDAE
Head raised above the disc; eyes on sides of head. Pectoral fins acute
. MYLIOBATIDAE

Family RHINOBATIDAE

Head and body depressed, snout tapering. Spiracles very large, close to the eye with or without folds on hind margin. Gill slits on the lower surface of head. Teeth small, numerous, in pavement like rows. Body covered with denticles and middle of the back with tubercles.

- Snout broad, semicircular. Mouth deeply undulated. Dark brown cross bands on top of head, dark brown patches on back and light spots on sides of body *Rhina ancylostoma*
- Snout long, pointed. Mouth not deeply undulated. Scattered whitish spots on sides and pectorals; generally a blackish spot on the scapular region surrounded by whitish spots *Rhynchobatus djiddensis*

13. *Rhina ancylostoma* Bloch and Schneider

Rhina ancylostomus Bloch and Schneider, Syst. Ichth., p. 352, pl. 72, 1801.

Rhina ancylostoma Munro, Fishes of Ceylon, p. 10, pl. 2, fig. 23, 1955. Jones, Bull. cent. mar. Fish. Res. Inst., 8, p. 2, 1969 (Cat. No. CMFRI-LA-F. 7/11).

Rhynchobatus ancylostomus Day, Fishes of India, p. 730, pl. 193, fig. 3, 1878.

Specimen studied: Agathi (1), 380 mm.

Body depressed, snout very broad and semicircular in outline, caudal portion elongated. Head from tip of snout to spiracle 4.8 to subcaudal origin. Disc length 1.25 in its width. Spiracles large, without posterior folds and situated close behind eye. Teeth rounded, dental plates with median and lateral undulations. First dorsal opposite to ventrals and nearer to eyes than to caudal base. Origin of second dorsal midway between insertion of first dorsal and caudal base. Longitudinal rows of tubercles above eyes; a median row of tubercles

along the back between spiracles and front of dorsal insertion and two short lateral rows of smaller tubercles on either side of the median row and a few small tubercles in front of eyes and below spiracles. Colour: Dull brown with four dark brown cross bands on top of head, dark brown patches on back and light spots on sides of body.

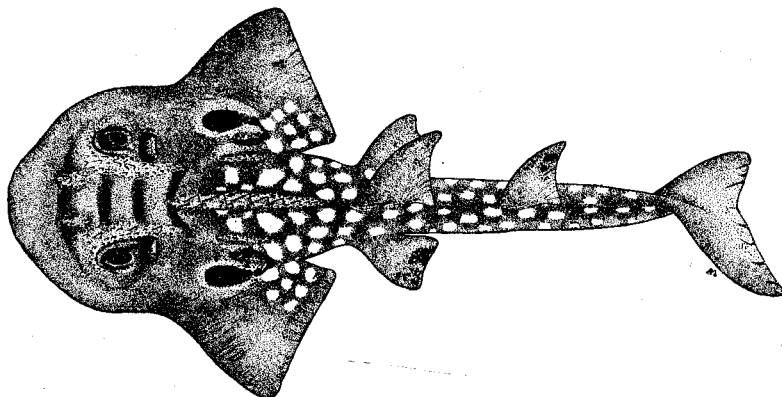


FIG. 13. *Rhina ancylostoma* Bloch and Schneider, 380 mm.

Distribution: Red Sea and east coast of Africa to Seychelles, Laccadives, coasts of India, Ceylon, Malaysia, Indonesia, Philippines, China, Japan and Australia.

14. *Rhynchobatus djiddensis* (Forskål)

Raja djiddensis Forskål, Descript. Animal., p. 18, 1775.

Rhynchobatus djiddensis Day, Fishes of India, p. 730, pl. 192, fig. 1, 1878. Smith, Fishes of Southern Africa, p. 63, fig. 60, 1949. Smith and Smith, Fishes of Seychelles, p. 6, pl. 3, A, 1963.

Rhynchobatus djiddensis Munro, Fishes of Ceylon, p. 10, pl. 2, fig. 24, 1955. Jones, Bull. cent. mar. Fish. Res. Inst., 8, p. 2, 1969 (Cat. No. CMFRI-LA-F. 7/12).

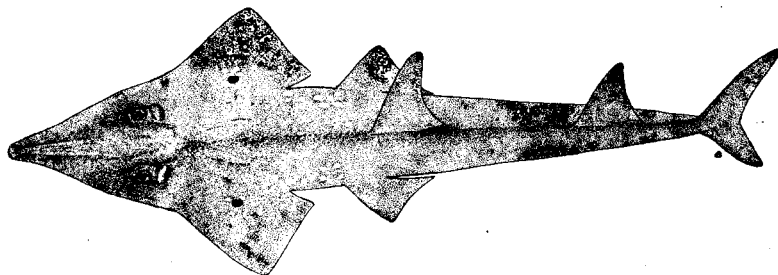


FIG. 14. *Rhynchobatus djiddensis* (Forskål), 1275 mm.

Specimen studied: Minicoy (1), 1275 mm.

Body depressed, snout elongate and pointed. Disc longer than wide. Head to hind margin of spiracle edge 4.3, snout 5.5, both to subcaudal origin. Spiracles large with two folds on hind margin. First dorsal origin opposite middle of base of ventral and nearer to base of caudal than to tip of snout. Second dorsal origin about twice nearer caudal than to insertion of first dorsal. A row of large tubercles directed backwards in front of eye, continued backwards near eye and spiracle; a median row of tubercles before dorsal and two short rows of tubercles on either side. Colour: Brownish grey with scattered whitish spots on sides and pectorals; a blackish spot on the scapular region surrounded by whitish spots.

Distribution: Red Sea and east coast of Africa to Seychelles, Laccadives, coasts of India and Ceylon, Indonesia, Malaysia, Philippines, north to Japan, south to Australia.

Family DASYATIDAE

Disc flattened, pectoral fins rounded. Tail long and tapering, usually with a serrated spine behind its base and sometimes with dorsal and ventral cutaneous folds. Teeth small in the form of pavement. Spiracles large, close behind eye. Dorsal fin absent. Median line of back variably granular.

1. No serrated caudal spine. Body and tail covered with osseous tubercles, outer part of disc with erect spines *Urogymnus africanus*
At least one serrated caudal spine present. Body not completely covered with osseous tubercles and spines 2
2. No cutaneous folds on tail. Tail about 2.5 times width of disc
..... *Dasyatis uarnak*
Cutaneous folds present on tail 3
3. Dorsal and ventral cutaneous folds very narrow. Tail shorter than disc
..... *Dasyatis imbricatus*
Only a very broad ventral cutaneous fold. Tail much longer than disc
..... *Dasyatis sephen*

15. *Urogymnus africanus* (Bloch and Schneider)

Raja Africana Bloch and Schneider, Syst. Ichth., p. 367, 1801.

Urogymnus africanus Smith, Fishes of Southern Africa, ed. 3, p. 514, fig. 82a, 1953.
Munro, Fishes of Ceylon, p. 13, pl. 3, fig. 33, 1955. Smith and Smith, Fishes of Seychelles, p. 7, pl. 3, F, 1963. Jones, Bull. cent. mar. Fish. Res. Inst., 8, p. 2, 1969 (Cat. No. CMFRI-LA-F. 9/13).

Specimens studied: Minicoy (4), 980 to 1100 mm. and one embryo, 280 mm.

Body almost circular, snout scarcely projecting. Length of disc equal to its width. Head to hind margin of spiracle about 3.5-3.7 in length of disc.

Spiracle equal to or slightly more than twice eye diameter. Dental plates with undulations. Preoral length equal to snout. Tail about 1.2-1.3 times length of disc, without spine and covered with tubercles. Middle part of body from before eyes to tail densely covered with rounded or polygonal osseous tubercles; outer part of disc including snout with numerous erect spines. Colour: Sandy grey with greenish tinge; whitish on tubercles; ventral side white.

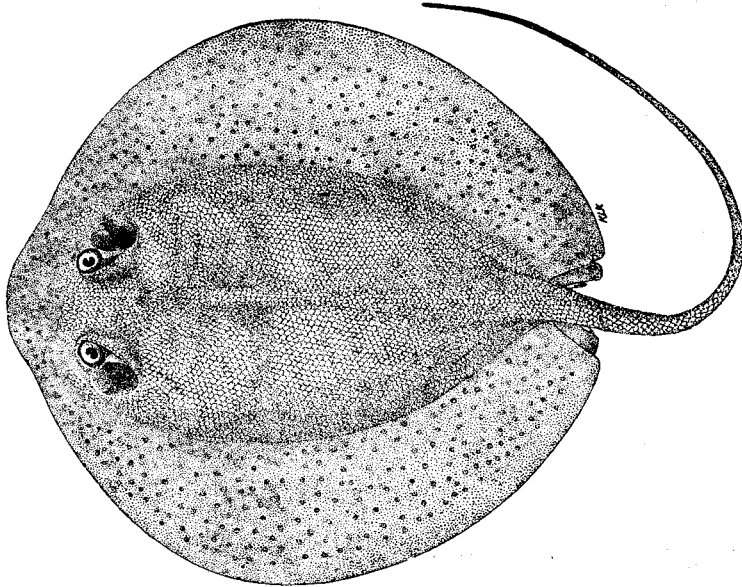


FIG. 15. *Urogymnus africanus* (Bloch and Schneider), embryo 280 mm.

Local name: *Karimadi* (Minicoy).

Distribution: Red Sea and east coast of Africa to the Laccadives, coasts of India, Ceylon, Indonesia, Philippines, Gilbert Islands, Australia and eastern Atlantic.

16. *Dasyatis uarnak* (Forskål)

Raja uarnak Forskål, Descript. Animal., p. 18, 1775.

Dasyatis uarnak Smith, Fishes of Southern Africa, p. 70, pl. 4, fig. 79, 1949. Jones, Bull. cent. mar. Fish. Res. Inst., 8, p. 2, 1969 (Cat. No. CMFRI-LA-F. 9/14).

Himantura uarnak Munro, Fishes of Ceylon, p. 14, pl. 3, fig. 42, 1955.

Trygon uarnak Day, Fishes of India, p. 737, pl. 194, fig. 1, 1878.

Specimens studied: Kalpeni (1), 425 mm. Minicoy (1), 480 mm.

Length of disc about 1.25 in its width. Snout slightly pointed. Head to hind border of spiracle about 3.3 in disc length. 4 skinny flaps on floor of mouth. Dental laminae undulating. Caudal spine serrated, situated above first

sixth of tail. Tail long, whip-like, almost cylindrical without cutaneous folds. Tail about 2.5 times width of disc. Disc almost smooth except for a few rows of tubercles between eyes and on middle of back. Colour: Sandy brown.

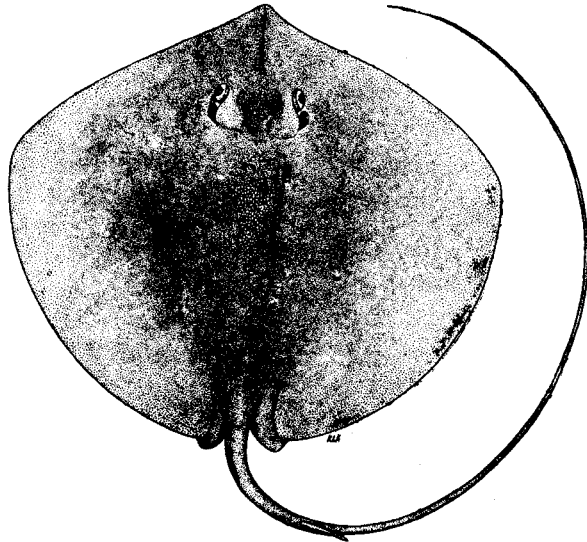


FIG. 16. *Dasyatis uarnak* (Forskål), 480 mm.

Local names: *Madi* (Minicoy). *Thirandi* (Kalpeni).

Distribution: Red Sea and east coast of Africa to Seychelles, Laccadives, coasts of India and Ceylon, Indonesia, Malaysia, Philippines, China and Australia.

17. *Dasyatis imbricatus* (Bloch and Schneider)

Raja imbricata Bloch and Schneider, Syst. Ichth., p. 366, 1801.

Amphotistius imbricatus Munro, Fishes of Ceylon, p. 14, pl. 3, fig. 38, 1955.

Dasyatis imbricatus Jones, Bull. cent. mar. Fish. Res. Inst., 8, p. 2, 1969 (Cat. No. CMFRI-LA-F. 9/15).

Trygon imbricata Day, Fishes of India, p. 739, 1878.

Trygon walga Day, Fishes of India, p. 738, pl. 194, fig. 3, 1878.

Specimen studied: Kadamat (1), 160 mm.

Disc as wide as long. Snout slightly produced, pointed and somewhat longer than preoral length. Head to hind margin of spiracle about 2.7 in length of disc. Dental laminae undulating. Interorbital space concave. Spiracle slightly larger than eye. Tail shorter than length of disc. Very narrow dorsal and ventral cutaneous folds present on tail. Interspace between spiracles and middle of

back with rough tubercles continued backwards to caudal spine; seven median tubercles from base of tail to caudal spine and some in the centre of the shoulder being larger than others. Colour: Brownish.

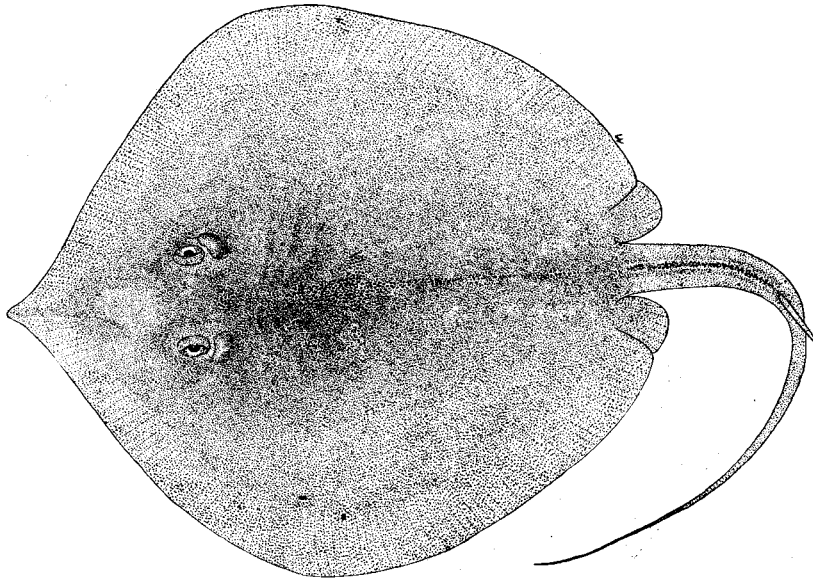


FIG. 17. *Dasyatis imbricatus* (Bloch and Schneider), 160 mm.

Distribution: Red Sea and Mauritius to the Laccadives, coasts of India, Ceylon, Indonesia, Malaysia, Philippines and China.

18. *Dasyatis sephen* (Forskål)

Raja sephen Forskål, Descript. Animal., p. 17, 1775.

Dasyatis sephen Smith and Smith, Fishes of Seychelles, p. 7, pl. 3, J, 1963. Jones, Bull. cent. mar. Fish. Res. Inst., 8, p. 2, 1969 (Cat. No. CMFRI-LA-F. 9/16).

Pastinachus sephen Munro, Fishes of Ceylon, p. 13, pl. 3, fig. 36, 1955.

Trygon sephen Day, Fishes of India, p. 740, pl. 195, fig. 2, 1878.

Specimens studied: Agathi (3), 325 to 390 mm. Minicoy (4), 340 to 370 mm.

Disc somewhat quadrangular, length of disc 1.3-1.5 in its width. Head to hind margin of spiracle 2.9-3.1 in length of disc. Dental surface granular. Caudal and dorsal fins absent. Tail depressed with broad cutaneous fold ventrally beginning before a level from the insertion of caudal spine and ending below posterior third of tail. Serrated caudal spine inserted above second quarter of tail. Back granular with three central flattened tubercles in a row. Colour:

Back leaden grey, darker towards tail and paler towards sides. Ventral surface white.

Local names: *Madi* (Minicoy). *Olavalan-thirandi* (Agathi).

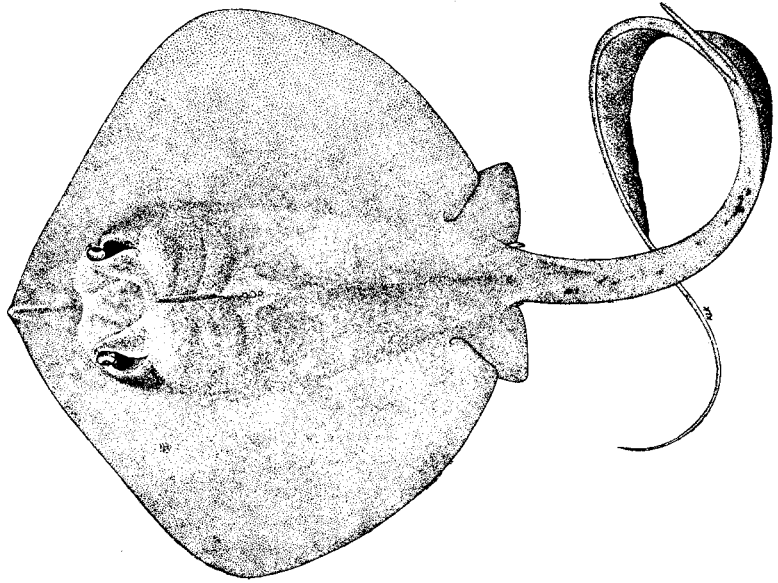


FIG. 18. *Dasyatis sephen* (Forskål), 370 mm.

Distribution: Widespread from the Red Sea and Arabia to Seychelles, Laccadives, coasts of India and Ceylon, Indonesia, Malaysia, Philippines, Indo-China, Palau Islands and Australia.

Family MYLIOBATIDAE

Disc wide, pectoral ends somewhat falcate. Eyes lateral. Spiracles very large, close behind eye. Snout with triangular prolongation or separated into two lobes by a median notch. Teeth broad, flat, the median series wider than the lateral ones. Tail narrow and tapering, usually with a small dorsal fin and one or two serrated spines.

Snout with triangular prolongation. A single row of teeth in each jaw. Numerous whitish or bluish white spots on dorsal side excepting head

..... *Aetobatus narinari*

Snout divided into two lobes by a median notch. 7 rows of teeth in jaws. Dorsal side dark brown

..... *Rhinoptera javanica*

19. *Aetobatus narinari* (Euphrasen)

Raia narinari Euphrasen, Kon. Vet. Acad. Nija Handl. Stockholm, 11, p. 217, pl. 10, 1790.

Aetobatis narinari Day, Fishes of India, p. 743, pl. 194, fig. 4, 1878.

Aetobatus narinari Munro, Fishes of Ceylon, p. 15, pl. 3, fig. 43, 1955. Jones, Bull. cent. mar. Fish. Res. Inst., 8, p. 2, 1969 (Cat. No. CMFRI-LA-F. 12/17).

Stoasodon narinari Smith, Fishes of Southern Africa, p. 68, fig. 74, 1949. Smith and Smith, Fishes of Seychelles, p. 6, pl. 3, E, 1963.

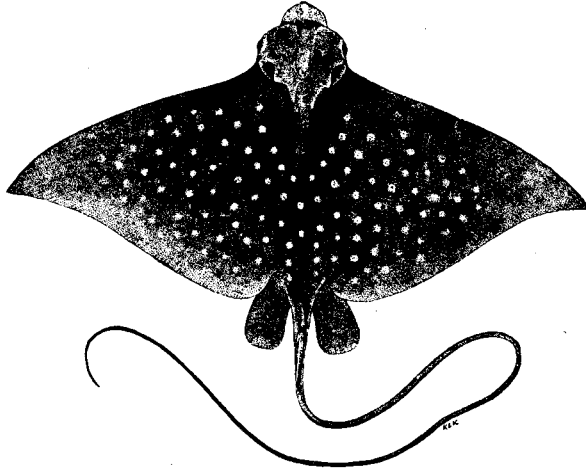


FIG. 19. *Aetobatus narinari* (Euphrasen), 285 mm.

Specimens studied: Agathi (4), 205 to 260 mm. Minicoy (3), 230 to 285 mm.

Disc very wide, ends of discs somewhat falcate. Head to hind margin of spiracle 2.7-2.9 in disc length. Disc length 1.7-1.9 in its width. Snout with triangular prolongation, 1.7-1.9 in head. Spiracles large, about twice eye diameter. Teeth, broad, flat, in single series in jaws. Dorsal origin opposite distal part of base of ventrals. Tail very long, narrow, about twice width of disc and with one or two serrated spines just behind dorsal fin. Skin smooth. Colour: Leaden grey to dark brown above with numerous whitish or bluish white spots on dorsal side excepting head; ventral side whitish. Tail black.

Local names: *Madi* (Minicoy). *Vaval* (Agathi).

Distribution: Widespread in the tropical Indo-Pacific and Atlantic Oceans.

Note: This species is more common than any other species of rays.

20. *Rhinoptera javanica* Müller and Henle

Rhinoptera javanica Müller and Henle, Plagiost., p. 182, pl. 58, 1841. Day, Fishes of India, p. 744, pl. 195, fig. 4, 1878. Smith, Fishes of Southern Africa, ed. 3, p. 504, fig. 77 a, 1953.

Specimens studied: Agathi (3), 40 to 68 cm.

Head projects beyond the disc. Snout divided into two rounded lobes by a median notch and a separate flap-like rostral fin on each side which are not continuous with pectorals on sides of head. Disc about twice broader than long. Teeth in wide flattened pavement, in 7 rows in jaws, those in the central row four or five times wider than long and about twice as wide as the row on either side. Teeth in lower jaw narrower than in upper. Spiracles large, close behind eye. Skin smooth. Tail long, slender, whip-like, with a serrated spine at its base and immediately behind dorsal fin. Colour: Dark brown above; whitish on lower side.

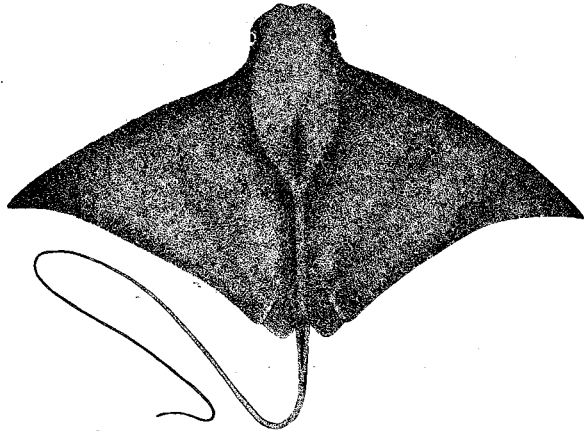


FIG. 20. *Rhinoptera javanica* Müller and Henle, 420 mm.

Distribution: East coast of Africa to the Laccadives, Ceylon, coasts of India, Indonesia, Philippines, China and south to Queensland.

Family MOBULIDAE

Disc wider than long, pectoral tips falcate. Snout produced forward in two fleshy cephalic "horns". Mouth very wide, anterior or inferior; teeth small and numerous, in several rows; sometimes only in one jaw and in the form of a flat rasp. Tail short and normally without serrated spine.

Mouth ventral to head. Teeth present in both jaws *Mobula diabolus*

Mouth at front of head. Teeth present only in lower jaw *Manta birostris*

21. *Mobula diabolus* (Shaw)

Raja diabolus Shaw, Gen. Zool., 5, p. 291, 1804.

Dicerobatis eregoodoo Day, Fishes of India, p. 744, pl. 193, fig. 1, 1878.

Mobula diabolus Smith, Fishes of Southern Africa, p. 72, fig. 87, 1949. Munro, Fishes of Ceylon, p. 16, pl. 3, fig. 48, 1955. Smith and Smith, Fishes of Seychelles, p. 7, pl. 3, K, 1963.

Specimens studied: Kavarathi (1), 63 cm. and embryo 195 mm (excluding tail).

Head free from pectoral fins, truncate in front and broadly flattened. Cephalic portion of pectoral fins projects forward in front of eye as a fleshy flap on each side, curled outwards and separated from one another by a little more than its length. Head from tip of cephalic "horn" to hind margin of spiracle 3.7 in length of disc. Spiracles small, about 0.3 in eye. Length of disc 1.6 in its width. Width of head 2.6 in length of disc. Mouth ventral, wide

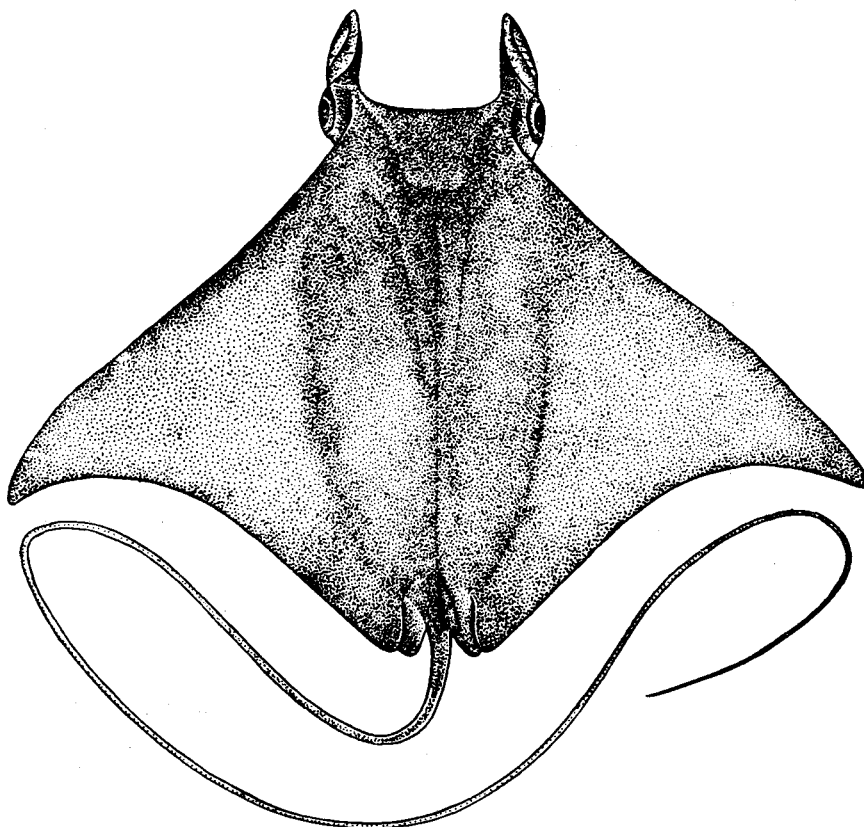


FIG. 21. *Mobula diabolus* (Shaw) 63 cm.

and almost straight. About 50 bands of small, tubercle-like teeth extending nearly to the angle of the mouth could be distinguished in the upper jaw. Rows of similar teeth more numerous in lower jaw. Nasal flaps very broad. Dorsal fin at base of tail, triangular, opposite to ventrals. Tail without serrated spine, twice length of disc in the embryo. Body smooth. Colour: Dark greenish brown above, whitish below.

Local name: *Kottar* (Kavarathi).

Distribution: Red Sea and tropical Indian and Pacific Oceans.

22. *Manta birostris* (Walbaum)

Raja birostris Walbaum, Artedi Piscium, p. 535, 1792.

Manta birostris Smith, Fishes of Southern Africa, p. 73, fig. 88, 1949. Smith and Smith, Fishes of Seychelles, p. 7, pl. 3, H, 1963. Jones, Bull. cent. mar. Fish. Res. Inst., 8, p. 2, 1969 (Cat. No. CMFRI-LA-F. 10/18).

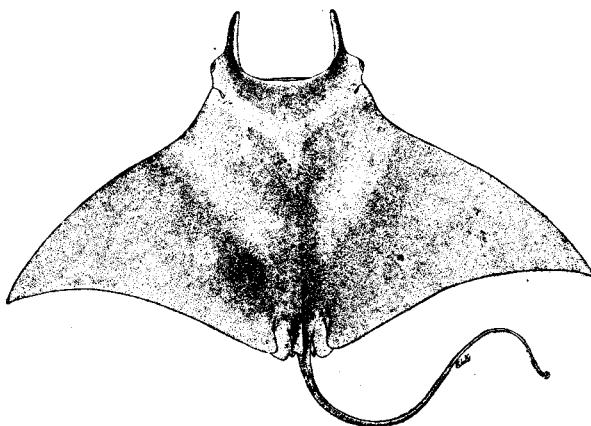


FIG. 22. *Manta birostris* (Walbaum), embryo 320 mm.

Specimens studied: Minicoy (4), 240 to 375 cm. and an embryo 320 mm (excluding tail).

Head truncate in front, greatly depressed, broad and free from pectoral fins. Pectorals produced forward and inward as a fleshy flap on each side in front of eyes. Head from tip of cephalic "horn" to hind margin of spiracle 2.5-2.7 in length of disc. Length of disc 1.9-2.3 in its width. Width of head 1.8-1.9 in length of disc. Mouth very wide, terminal, lower jaw somewhat convex and projects beyond the upper. Tubercle-like teeth in many rows present, in lower jaw only. Pectoral tips falcate. Dorsal fin triangular, situated above the base of tail and opposite to ventrals. Tail slender, whip-like, without serrated spine and as long as or slightly longer than length of disc. Dorsal surface rather rough. Colour: Dark greenish brown superiorly; ventral side white.

Local name: *Kottar* (Minicoy).

Distribution: Tropical Indian, Pacific and Atlantic Oceans.

Note: Appreciable numbers of devil rays are caught by harpooning during September to December and the flesh is very much relished by the islanders.

Order TORPEDINIFORMES

Family TORPEDINIDAE

Somewhat like the rays with almost circular disc and characterised by two large electric organs, one on each side of head. Head and body smooth, depressed and naked.

23. *Torpedo marmorata* Risso

Torpedo marmorata Risso, Ichth. Nice, p. 20, pl. 111, fig. 4, 1810. Smith, Fishes of Southern Africa, p. 75, pl. 4, fig. 91, 1949.

Torpedo fuscomaculata Smith and Smith, Fishes of Seychelles, p. 7, pl. 3, C, 1963.

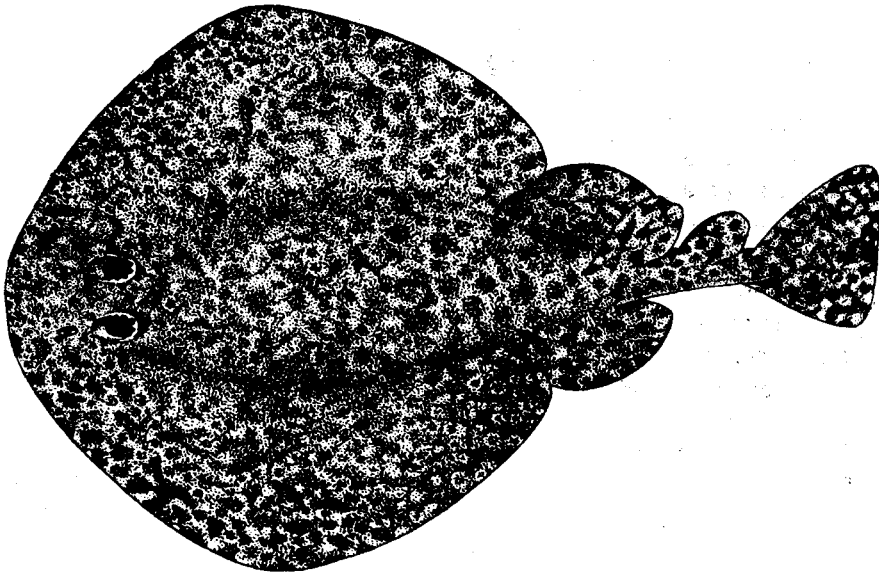


FIG. 23. *Torpedo marmorata* Risso, 370 mm.

Specimen studied: Kavarathi (1), 370 mm.

Disc more than half of total length. Disc slightly broader than long, its outline somewhat circular. Spiracle separate from eye by about one eye diameter with a number of small fleshy tentacles on hind margin. First dorsal fin larger than second dorsal, its anterior half opposite to base of ventrals. Caudal somewhat rounded. Colour: Upper parts of head, body and fins marbled with brown and whitish; lower surface white.

Local name: *Thimithirandi* (Kavarathi).

Distribution: Indian and Atlantic Oceans, Mediterranean Sea and Philippines.