

SELACHIAN FAUNA OF THE BOMBAY WATERS.

(A classificatory representation with a key for their identification.)

By S. B. SETNA, *M.Sc., Ph.D. (Cantab.), F.R.M.S., F.N.I.* and P. N. SARANGDHAR,
M.Sc., Ph.D., Department of Fisheries, Bombay.

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INTRODUCTION.

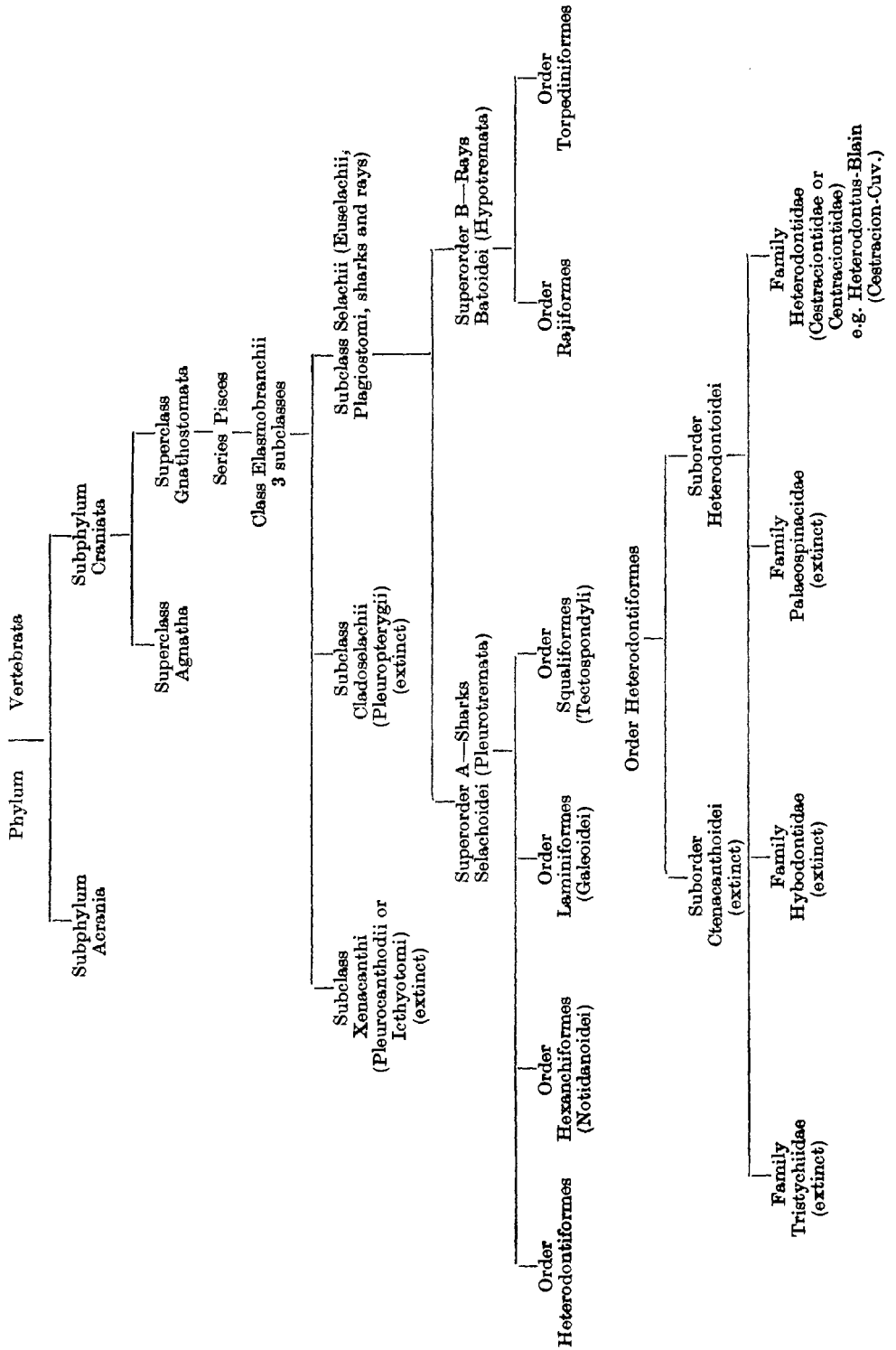
The study of elasmobranchs in this country has come to the forefront in the past five years owing to the need for the discovery of a substitute for cod liver oil, supplies of which to this country ceased not long after the outbreak of the war. The first handicap that presented itself in the study of elasmobranchs was the scanty literature on the subject. The most comprehensive literature available was compiled by Dr. Day (1878, 1889) 55 years ago, since when only fragmentary contributions have been made to his observations and findings on the systematics of Indian elasmobranchs, and complete records of their life-histories hardly exist. The difficulty encountered in a proper understanding of our selachian fauna was to a large extent surmounted by consultation of the works of foreign authors who have worked on the group.

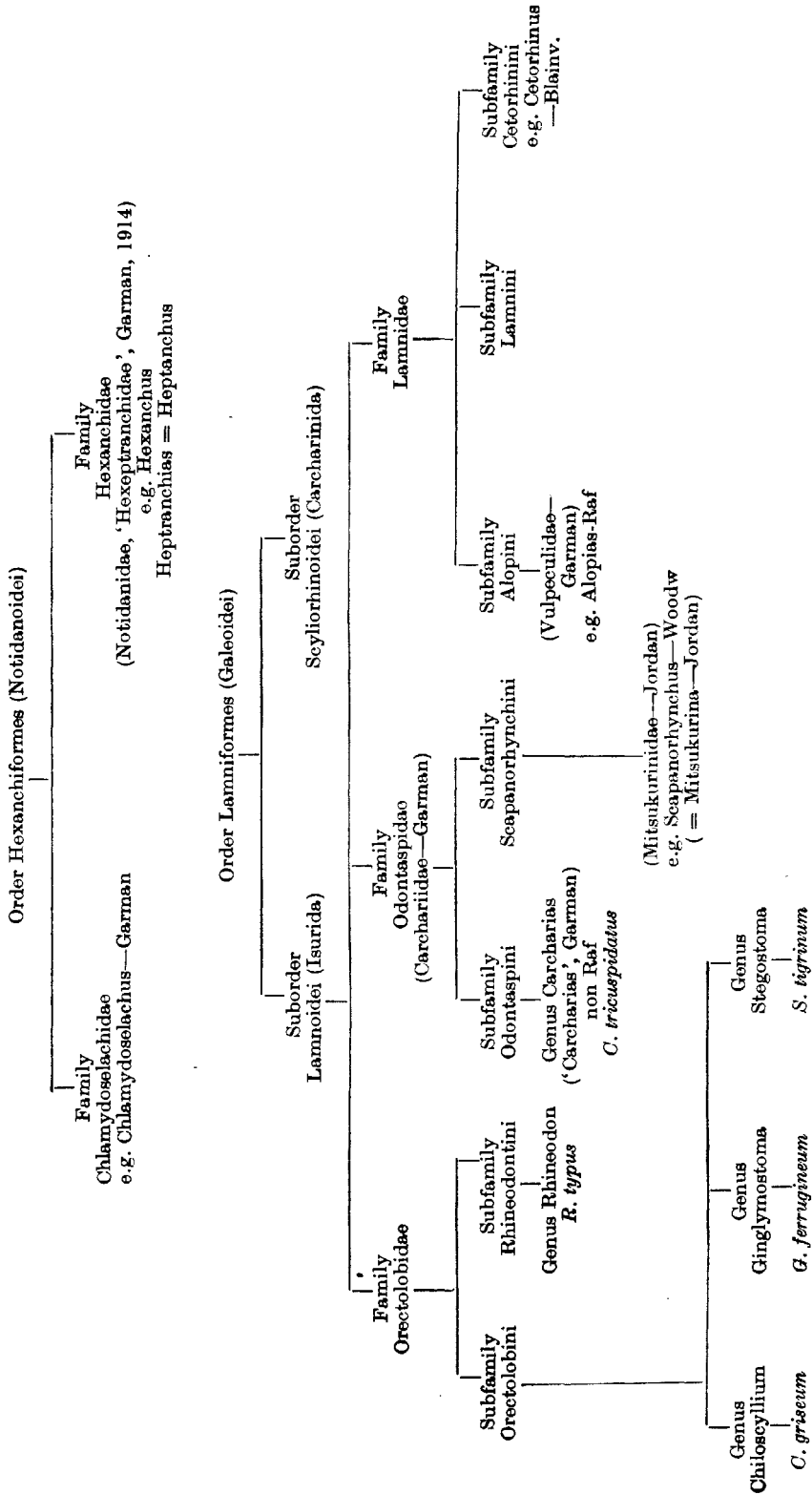
Recourse was frequently had during our study to the works of such recognised authorities as A. Gunther (1870), F. Day (1878 and 1889), D. S. Jordan (1896), C. T. Regan (1906-08), S. Garman (1913), L. S. Berg (1940), G. P. Whitley (1940), etc. in order to facilitate precise identification of the Bombay fishes, which have now been classified by us on a proper systematic basis.

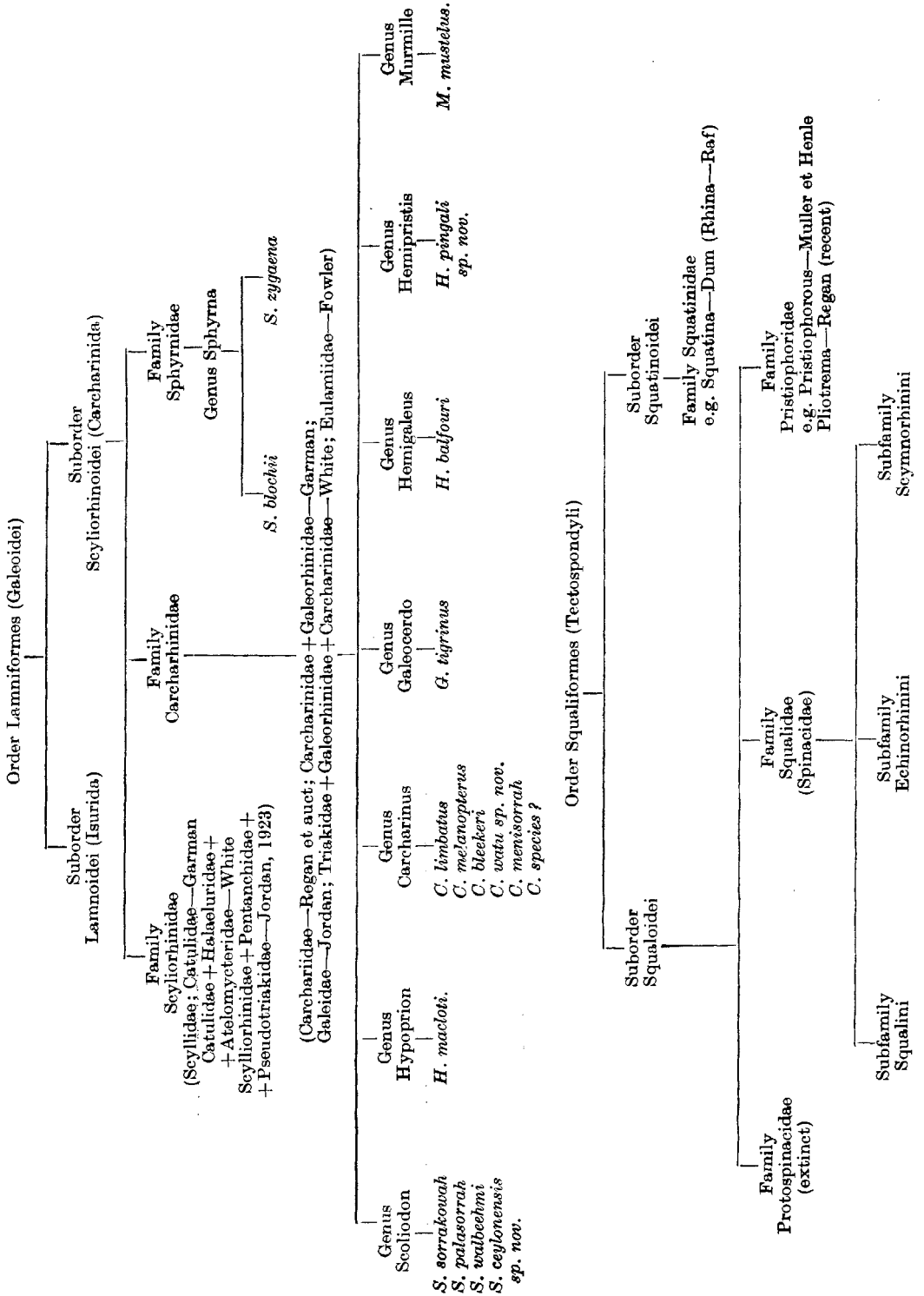
Forty-one species of sharks, skates and rays belonging to 23 different genera and ten families are represented in the Bombay waters. Out of these, three forms, viz. *Scoliodon ceylonensis*, *Carcharinus watu* and *Hemipristis pingali*, are entirely new, never having been recorded before and, with the exception of *C. watu*, occurring but seldom. With the exception of eight forms, viz. *Ginglymostoma ferrugineum*, *Stegostoma tigrinum*, *Rhineodon typus*, *Carcharias tricuspidatus*, *Scoliodon ceylonensis*, *Hemipristis pingali*, *Rhynchobatus ancylostomus* and *Torpedo zugmayeri*, the remaining forms out of these 41 so far recorded in Bombay are available almost throughout the year.

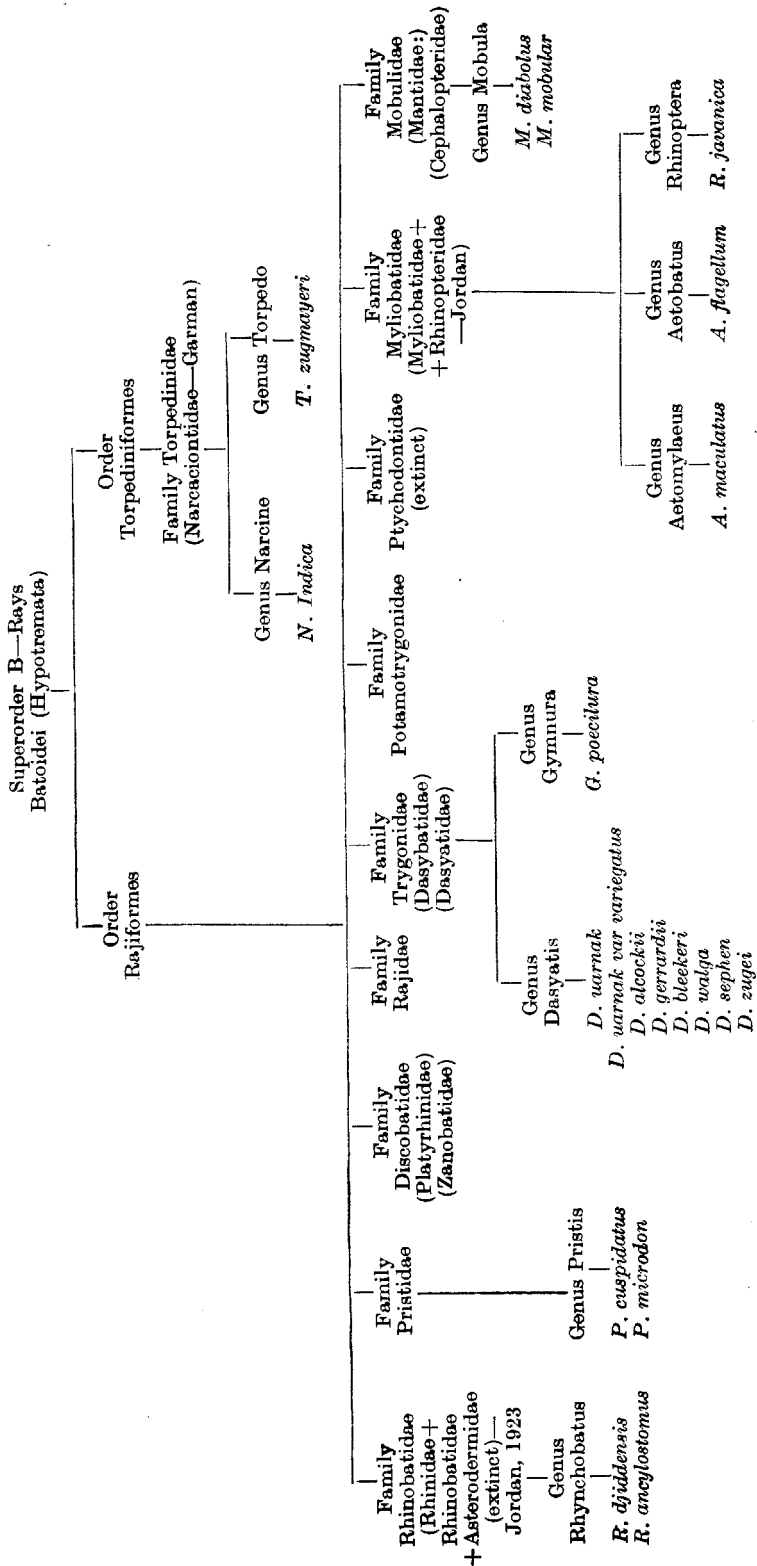
The present paper endeavours to list the 41 forms in their appropriate position in a classificatory tree. The classification adopted by L. S. Berg, in his work on 'The classification of fishes, both recent and fossil', 1940, has been adopted fully up to the stage of sub-families, while only the genera and species represented in the Bombay waters are indicated in the table. A key showing the distinctive characteristics of the various species has also been included to facilitate the identification of the various forms in the field. It may, however, be stated that the key is based on the limited number of forms occurring in Bombay waters and hence purely regional in its application.

TABLE SHOWING SYSTEMATIC POSITION OF THE FISHES FOUND ALONG THE BOMBAY COAST.









Such other aspects of the work as the systematics of the fishes, account of their life-histories, comparison of placentae, etc., will be published in a series of subsequent papers. This procedure has to be adopted in view of the obvious present-day difficulties of publishing voluminous accounts in a single paper.

FIELD KEY FOR THE IDENTIFICATION OF SHARKS, SKATES AND RAYS FOUND ALONG THE BOMBAY COAST.

Subclass—Selachii (Euselachii, Plagiostomi).

Superorder A—**Selachoidel** (Pleurotremata. Sharks).

(4 families.)

Synopsis of families.

1. Two spineless dorsal fins; a small anal fin present. Caudal fin long, axis raised. Body with or without lateral keels. Tail with or without keels or pits. Spiracles present. Nictitating membrane absent. Snout depressed. Nasoral grooves present. Nasal cirri present or absent. Labial folds present along both jaws. **Orectolobidae.**

2. Two spineless dorsal fins; a large anal fin present. Caudal fin large with low axis. Tail with or without a caudal pit. Spiracles present. No nictitating membrane. Snout pointed and short to very long. No nasoral grooves and cirri. Labial folds along both jaws. Teeth with long slender cusps and two-rooted bases. **Odontaspidae.**

3. Two spineless dorsal fins; an anal fin present. Tail with pits and prominent sub-caudal lobe. Snout depressed. Spiracles present or absent. Nictitating membrane present. No nasoral grooves and cirri. Teeth compressed and triangular with one series in function or in bands with more than one series in function or in pavement. Head not expanded across the orbital region. **Carcharhinidae.**

4. Two spineless dorsal fins; an anal fin present. Tail with pits. Spiracles absent. Nictitating membrane present. No nasoral grooves and cirri. Teeth compressed—triangular. One series in function. Head expanded along the orbital region. **Sphyrnidae.**

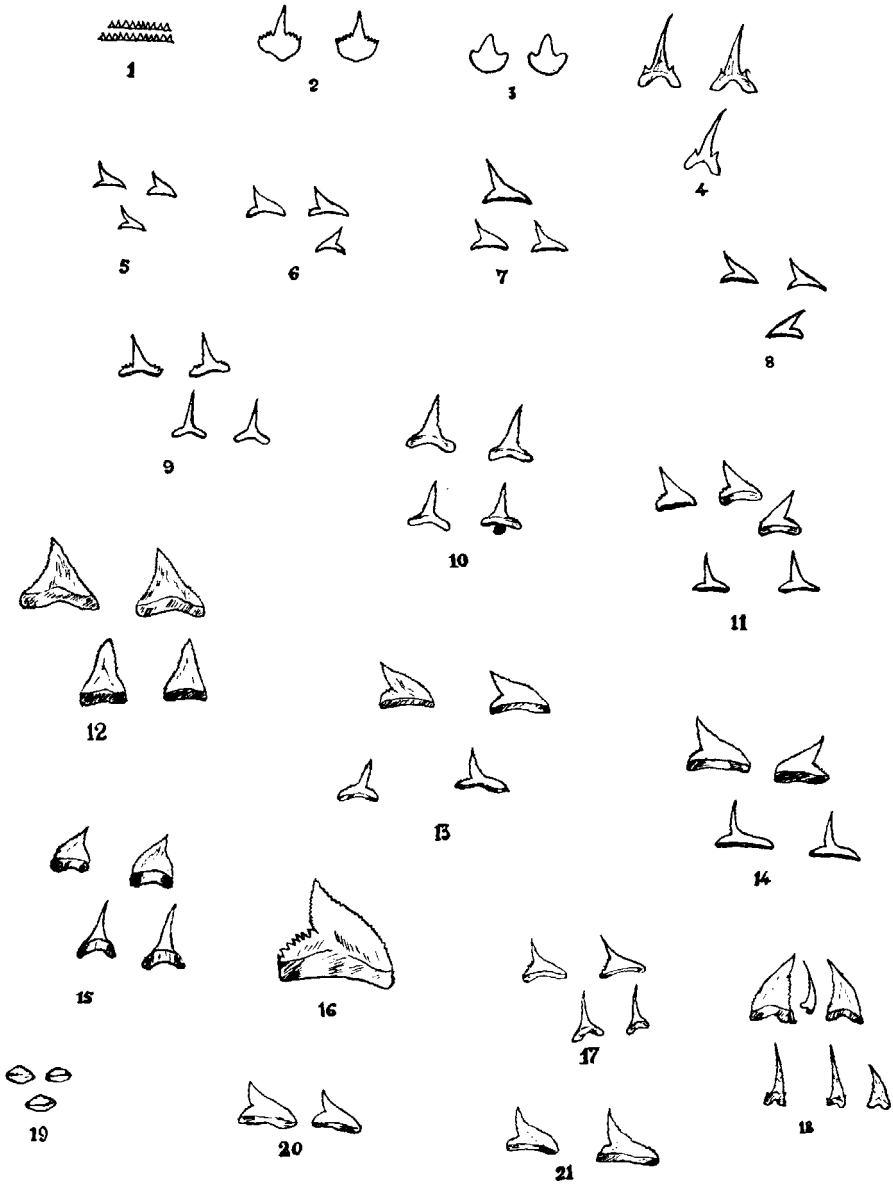
1. Family **Orectolobidae.**

(2 subfamilies.)

Synopsis of subfamilies.

1. Nasoral grooves and nasal cirri present; tail without lateral keels or pits **Orectolobini.**

2. Nasoral grooves present but nasal cirri absent. Tail with lateral keels and pit **Rhineodontini.**



TEETH OF BOMBAY SHARKS.

1. *Chiloscyllium griseum*. 2. *Ginglymostoma ferrugineum*. 3. *Stegostoma tigrinum*. 4. *Carcharias tricuspidatus*. 5. *Scoliodon sorrakowah*. 6. *Scoliodon palasorrah*. 7. *Scoliodon walbeehmi*. 8. *Scoliodon ceylonensis* sp. nov. 9. *Hypoprion macloiti*. 10. *Carcharinus limbatus*. 11. *Carcharinus watu* sp. nov. 12. *Carcharinus melanopterus*. 13. *Carcharinus bleekeri*. 14. *Carcharinus menisorrah*. 15. *Carcharinus* species? 16. *Galeocerdo tigrinus*. 17. *Hemigaleus balfouri*. 18. *Hemipristis pingali*, sp. nov. 19. *Murmille mustelus*. 20. *Sphyrna blochii*. 21. *Sphyrna zygaena*.

Subfamily **Orectolobini.**

(3 genera.)

Synopsis of genera.

1. First dorsal fin behind the pelvic fins. Teeth unicuspid or multicuspid *Chiloscyllium*—Muller & Henle.
2. First dorsal above the pelvics. Teeth tricuspid or multicuspid *Ginglymostoma*—Muller & Henle.
3. First dorsal fin ahead of the pelvics. Teeth trilobed..... *Stegostoma*—Muller & Henle.

Genus **Chiloscyllium.**

(1 species.)

1. One dermal ridge on the back. Origin of first dorsal fin above ends of pelvic bases. Teeth unicuspid *griseum*—Muller & Henle

Genus **Ginglymostoma.**

(1 species.)

1. Teeth with strong median cusps and four to five small lateral cusps on either side of the median. *ferrugineum*—(Lesson).

Genus **Stegostoma.**

(1 species.)

1. Teeth trilobed; tail as long as or slightly longer than trunk; dorsal surface of body yellowish brown marked with vertical rows of dark, round spots..... *tigrinum* (Forster).

Subfamily **Rhineodontini.**

(1 genus.)

Genus Rhineodon (Smith) Muller & Henle.

(1 species.)

1. A large species with terminal mouth, small unicuspid teeth and keeled body and tail. Colour purplish to reddish brown profusely sprinkled with round white spots and vertical streaks of white; lower surface light reddish brown..... *typus*—Smith.

2. Family **Odontaspidae.**

(1 subfamily.)

Subfamily **Odontaspini.**

(1 genus.)

Genus Carcharias Rafinesque.

(1 species.)

1. Teeth with one denticle on either side of the central cusp near the base.

D.F. $\frac{17.0.17}{16.17.0.16.17} = \frac{34}{32-34}$; First dorsal fin partly above the pelvis.
 *tricuspidatus*—Day.

3. Family **Carcharhinidae.** (7 genera.)

Synopsis of genera.

A. Teeth compressed, one cusped, one series in function.

(a) Spiracles absent.

(i) Teeth notched, but not serrate, bases not swollen, cusps flat, oblique and pointed *Scoliodon*—Muller & Henle.

(ii) Bases of teeth on upper jaw only denticulated on either side of the cusps..... *Hypoprion*—Muller & Henle.

(iii) Teeth serrate, some or all, serrations extending on bases and cusps. *Carcharinus*—Blainville.

(b) Spiracles present.

(iv) Teeth subtriangular, broad, flat, oblique, externally notched and serrated on both jaws; labial folds along both jaws.
 *Galeocerdo*—Muller & Henle.

(v) Teeth denticulated on upper jaw only; labial folds along both jaws. *Hemigaleus*—Bleeker.

(vi) Teeth dimorphous on each jaw, those nearer the centre being awl-shaped and with entire margins; others subtriangular, flattened, outwardly deflected and with coarse serrations on margins.
 *Hemipristis* Agassiz.

(Syn. *Dirrhizodon* Klunzinger.)

B. (vii) Teeth small, numerous, arranged in pavement, smooth or with shallow notches or low cusps. *Murmille* Gistel.

Genus Scoliodon.

(4 species.)

Synopsis of species.

1. Length of base of second dorsal less than half that of anal; labial folds present along lower jaw only. Dental formula: $\frac{15.1.15}{14-15.0.14-15} = \frac{31}{28-30}$
 *sorrakowah*—(Cuvier).

2. Length of base of second dorsal about half that of anal; labial folds along the lower jaw and occasionally also along the upper. D.F. $\frac{11.1.11}{11.0.11} = \frac{23}{22}$ palasorrah—(Cuvier).

3. Length of base of second dorsal nearly two-thirds that of anal; prominent labial folds along both jaws. D.F. $\frac{12.1.12}{12.0.12} = \frac{25}{24}$ walbeehmi—Bleeker.

4. Length of base of second dorsal about half that of anal, but second dorsal two-thirds as high as anal is low; labial folds only in angles of mouth. D.F. $\frac{12.1.12}{12.1.12} = \frac{25}{26}$ ceylonensis *sp. nov.*

Genus Hypoprion.

(1 species.)

1. Snout elongated and acutely pointed; second dorsal smaller than anal and originating above hinder third of the anal base. D.F. $\frac{14.1.1.14}{14.1.14} = \frac{30}{29}$ macloti—(Muller & Henle.)

Genus Carcharinus.

(6 species.)

Synopsis of species.

A. Tips of pectorals and lower lobe of caudal black.

1. Teeth more or less erect, narrow, flat, with distinct serrations on the upper jaw and narrower, with very minute, almost inconspicuous serrae on the lower jaw.

D.F. $\frac{15.1.1.1.15}{15.1.15} = \frac{33}{31}$ limbatus—(Muller & Henle).

2. Teeth broad, flat, triangular, slightly oblique, serrated and similar on both jaws but little narrower on the lower.

D.F. $\frac{12.1.12}{12.1.12} = \frac{25}{25}$ melanopterus—(Quoy & Gaimard).

3. Teeth broad, flat, oblique, externally notched and serrated on upper jaw and similar but distinctly narrower in the lower.

D.F. $\frac{12.1.12}{12.1.12} = \frac{25}{25}$ bleekeri—(Duméril).

4. Teeth on upper jaw oblique, externally notched; serrations only on notches and opposite basal margins; cusps flattened and non-serrated; teeth on lower jaw nearly erect, narrower, only slightly and lowly notched externally and non-serrated.

D.F. $\frac{14.3.14}{14.0.14} = \frac{31}{28}$ C. watu *sp. nov.*

B. Only the top of second dorsal fin black.

5. D.F. $\frac{13.2.13}{13.1.13} = \frac{28}{27}$ menisorrhah—(Muller & Henle).

C. Fins not spotted with black.

6. Teeth on upper jaw broad, flat triangular with serrated margins; those on lower awl-shaped and non-serrated.

D.F. $\frac{3-4, 13.1.1.1.13, 3-4}{2-3, 13.1.13, 2-3} = \frac{29-37}{27-33}$ C. species?

Genus **Galeocerdo.**

(1 species.)

1. Teeth on lower jaw slightly smaller than those on upper; second dorsal fin slightly in advance of anal.

D.F. $\frac{10-11.1.10-11}{10.1.10} = \frac{21-23}{21}$ tigrinus—(Muller & Henle).

Genus **Hemigaleus.**

(1 species.)

1. Snout tapering, rather pointed; top of second dorsal black.

D.F. $\frac{15-16.1.1.1.15-16}{15-16.1.1.1.15-16} = \frac{33-35}{33-35}$ balfouri—Day.

Genus **Hemipristis.**

(1 species.)

1. Snout rounded in outline; spiracles very small.

D.F. $\frac{12-13.0.12-13}{15, 3.0.3, 15} = \frac{24-26}{36}$ pingali *sp. nov.*

Genus **Murmille.**

(1 species.)

1. Teeth tuberculated, without any definite cusps and arranged in pavement; dorsal fin originating slightly behind the axil of the pectoral..... mustelus—(Linnaeus).

4. Family **Sphyrnidae.**

(1 genus.)

Genus **Sphyrna** Rafinesque

(2 species.)

Synopsis of species.

1. Length of each oculo-narial expansion 3-4 times its maximum width.
..... *blochii*—(Cuvier).
2. Length of each oculo-narial expansion about equal to its width.
..... *zygaena*—(Linné).

 Superorder B—**Batoidei** (Hypotremata. Rays).

(6 families.)

Synopsis of families.

- A. Electric organ absent.
 1. Rostrum elongated or rounded in outline but not toothed on edges; no nasoral grooves..... *Rhinobatidae*.
 2. Rostrum produced and toothed on edges; no nasoral grooves.
..... *Pristidae*.
 3. Disc broad; pectorals extended to end of snout; no median rostral cartilage; tail slender with or rarely without a spine; nasoral grooves present..... *Trygonidae*.
 4. Disc polygonal, pectorals broad, angular; no rostral cartilage; snout in single or two separate lobes; teeth broad, molarial; nasoral grooves present; tail whiplike with one or more spines..... *Myliobatidae*.
 5. Disc polygonal; pectorals broad, angular; no pronounced rostral cartilage; snout very broad with two lateral lobes; teeth minute; tail whiplike with or without spines..... *Mobulidae*.
- B. Electric organ present.
 6. Disc broad; electric battery at each side of the head; nasoral grooves present..... *Torpedinidae*.

 1. Family **Rhinobatidae.**

(1 genus.)

Genus **Rhynchobatus** Muller & Henle.

(2 species.)

Synopsis of species.

1. Rostrum elongated; black pectoral spots surrounded by smaller white; supraorbital, middorsal and dorso-pectoral rows of spines and tubercles.
..... *djiddensis*—(Forskal).

2. Rostrum semicircular in outline; very prominent, orbito-spiracular, mid-dorsal and dorso-lateral rows of stout spines and tubercles; occasional black tortuous lines on head, body and pectorals.....ancylostomus—(Bloch & Schneider).

2. Family **Pristidae.**

(1 genus.)

Genus **Pristis** Latham.

(2 species.)

Synopsis of species.

1. Dorsal fin originating behind bases of pelvics; subcaudal lobe prominent; 23-25 teeth on each edge of rostrum; both the dorsals nearly equal in size.
.....*cuspidatus*—Latham.

2. Dorsal fin origin in advance of origins of pelvics; subcaudal lobe indistinct; 17-22 teeth on each edge of rostrum; second dorsal smaller than first.
.....*microdon*—Latham.

3. Family **Trygonidae.**

(2 genera.)

Synopsis of genera.

1. Tail long, whiplike, with a serrated spine; disc quadrangular.
.....*Dasyatis*—Rafinesque.
2. Tail short, slender, pointed; disc very broad; dorsal fin absent.
.....*Gymnura*—Kuhl.

Genus **Dasyatis.**

(7 species.)

Synopsis of species.

- A. Tail without cutaneous folds or keels.
 - i. Disc yellowish brown marked with more or less solid dark spots; tail banded; buccal papillae 4..... *uarnak*—(Forskal).
 - ia. Disc yellowish brown marked with complete or incomplete dark brown rings; tail banded; buccal papillae 4.....
.....*uarnak* var *variegatus*—(Annandale).
 - ii. Disc olive brown marked with pale white spots either all over or only on the posterior portion of body; tail not banded; buccal papillae 4.
.....*alcockii*—(Annandale).
 - iii. Disc dark brown marked with pale white spots only on the posterior portion; tail banded; buccal papillae 4.....*gerrardii*—(Gray).

- iv. Ventral surface of disc purplish brown with irregular, white median patch; buccal papillae 2..... bleekeri—(Blyth).
 - v. Tail with a row of 7–12 small, flat, lanceolate spines in front of caudal spines; buccal papillae 2..... walga—(Muller & Henle).
- B. Tail without keel above, but with a prominent fold below.
- vi. Tail nearly thrice length of disc; dorsal tubercles depressed and stellate; buccal papillae 5..... sephen—(Forskal).
- C. Tail with a cutaneous fold below and another above.
- vii. Back smooth except for some slender spinous tubercles in a median row; no buccal papillae; tail with a row of 9–13 slender spines in front of caudal spine..... zugei—(Muller & Henle).

Genus **Gymnura**.

(1 species.)

- 1. No tentacle behind spiracle; tail nearly as long as body; no dermal folds or keels..... poecilura—(Shaw).

4. Family **Myliobatidae**.

(3 genera.)

Synopsis of genera.

- A. Rostral fins united in one lobe.
 - i. Teeth in more than three rows on each jaw; caudal spine absent.
..... Aetomylaeus—Garman.
 - ii. Teeth in a single row on each jaw; caudal spines present.
..... Aetobatus—Muller & Henle.
- B. Rostral fins separate.
 - Teeth in 5–19 rows..... Rhinoptera—Kuhl.

Genus **Aetomylaeus**.

(1 species.)

- 1. Origin of dorsal behind ends of pelvic bases; disc marked with brown-edged stripes and ocelli..... maculatus—(Gray & Hardwicke).

Genus **Aetobatus**.

(1 species.)

- 1. Snout long, tapering, acute; back uniform or spotted white.
..... flagellum—(Schneider).
-

Genus **Rhinoptera.**

(1 species.)

1. Teeth in 7 rows; median teeth 3-5 times as wide as long, next outer, half as wide, outer rows on each side as wide as long..... javanica—Muller & Henle.

5. Family **Mobulidae.**

(1 genus.)

Genus **Mobula** Duméril.

(2 species.)

Synopsis of species.

1. Tail shorter than length of body and without caudal spine; rows of teeth nearly reaching angles of mouth..... diabolus—(Shaw).
2. Tail more than twice as long as body and with one or more serrated, caudal spines; rows of teeth reaching angles of mouth..... mobular—(Bonnaterre).

6. Family **Torpedinidae.**

(2 genera.)

Synopsis of genera.

- i. Spiracles close behind orbits..... Narcine—Henle.
- ii. Spiracles situated some distance behind orbits..... Torpedo—Houttuyn.

Genus **Narcine.**

(1 species.)

1. Spiracles without papillae and situated close behind orbits; chocolate brown spotted with dark..... indica—Henle.

Genus **Torpedo.**

(1 species.)

1. Spiracles 2-3 times as large as eyes and situated well behind orbits, second dorsal fin about half the size of the first..... zugmayeri—Engelhart.

LIST OF LOCAL NAMES. (BOMBAY.)

Chiloscyllium griseum	—	Baravla.
Ginglymostoma ferrugineum	—	Sunera.
Stegostoma tigrinum	—	Shinavla.
Rhineodon typus	—	Karanj or Bahiri.
Carcharias triuspidatus	—	Wagir.
Scoliodon sorrakowah	—	Son mushi.
,, palasorrah	—	Mushi.
,, walbeehmi	—	"
,, ceylonensis sp. nov.	—	"
Hypoprion macloti	—	Toki mushi.
Carcharinus limbatus	—	Small sized—Balda.
,, melanopterus	—	Big ,, —Teli Pisori.
,, bleekeri	—	Small sized—Balda.
,, watu sp. nov.	—	Big ,, —Khada mushi.
,, menisorrah	—	Small sized—Balda.
,, species ?	—	Big ,, —Pisori.
Galeocerdo tigrinus	—	watu or Balda.
Hemigaleus balfouri	—	Ghari mushi or Balda.
Hemipristis pingali	—	Kirwa.
Murmille mustelus	—	Waghbeer.
Sphyrna blochii	—	Chichundri.
,, zygaena	—	Pingal.
Rhynchobatus djiddensis	—	"
,, ancylostomus	—	Kanar.
Pristis cuspidatus	—	Boot.
,, microdon	—	Ranja or Pok.
Dasyatis uarnak	—	"
,, ,, var variegatus	—	Nali.
,, bleekeri	—	Win or Khandére.
,, alcockii	—	Waghya pakat.
,, gerrardii	—	Chamli.
,, walga	—	Goras.
,, sephen	—	"
,, zugei	—	Goval pakat.
Gymnura poecilura	—	"
Aetobatus flagellum	—	Randgi or Shevta.
Aetomylaeus maculatus	—	"
Rhinoptera javanica	—	Bolad or Wagli.
Mobula diabolus	—	"
Mobula mobular	—	Shing pakat.
Narcine indica	—	"
Torpedo zugmayeri	—	Zinzina.

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