

EXPLANATION

MEASUREMENTS AND COUNTS

The description of each species is based on the collections listed under "Specimens studied". When large number of specimens were available of a species, a minimum of about twenty-five were examined to find out the variations in morphometric and meristic characters.

MEASUREMENTS

Total length:— Distance from the extreme tip of the snout to the extreme tip of the caudal fin.

Standard length:— Distance from tip of snout to midbase of caudal fin.

Length of head:— Distance from tip of snout to hind edge of gill opening.

Depth:— Greatest depth of body.

Length of maxillaries:— Distance from tip of snout to rear edge of maxillary.

Snout:— Distance from tip of snout to the front edge of the eye.

Interorbital space:— Least width of fleshy area between eyes.

Postorbital length of head:— Distance from rear edge of eye to posterior tip of fleshy operculum.

Depth of caudal peduncle:— Least dorsoventral distance of caudal peduncle.

COUNTS

Scale counts and fin counts are stated as formulae. In the fin-ray counts that appear in this book, large Roman numerals represent spines or non-striated

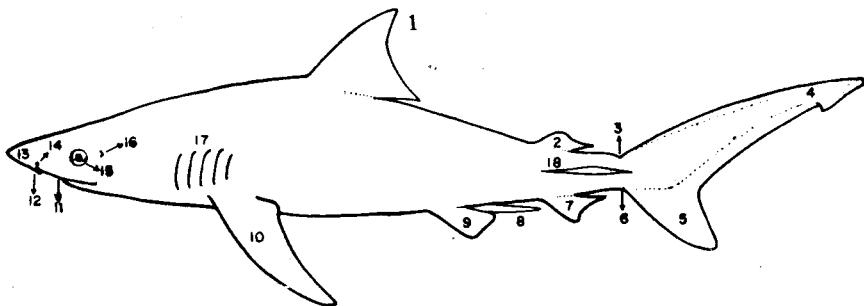


FIG. A. Explanation of external features of a common Elasmobranch. 1. First dorsal fin; 2. Second dorsal fin; 3. Notch at caudal base, upper; 4. Upper caudal lobe; 5. Lower caudal lobe; 6. Notch at caudal base, lower; 7. Anal fin; 8. Clasper; 9. Ventral fin; 10. Pectoral fin; 11. Mouth; 12. Nasal cirrus; 13. Snout; 14. Nostril; 15. Eye; 16. Spiracle; 17. Gill openings; 18. Lateral keel on caudal peduncle.

rays, lower-case Roman numerals represent striated unbranched soft rays and Arabic numerals represent branched soft rays which are striated along their length. A comma between fin formula indicates incomplete division or that the different types of spines and rays are confluent.

The number of gill rakers is represented by a formula of three numbers (eg. 7+1+13), wherein the first indicates the count in the upper part, the second at the angle and the third in the lower limb respectively of the first gill arch.

In counting scales along the side of the body, the number of oblique rows were counted along or just dorsal to the lateral line, from the upper

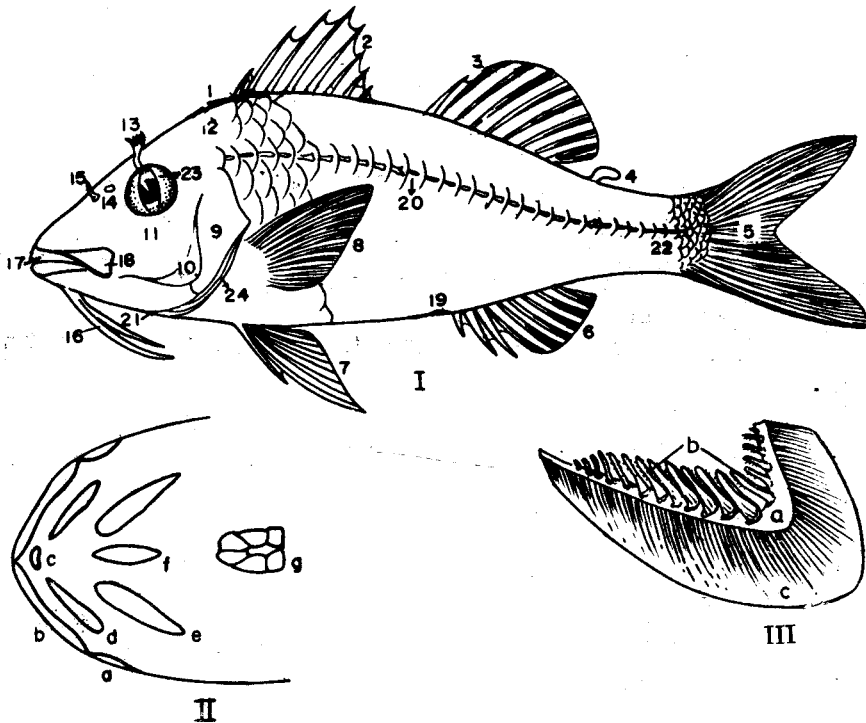


FIG. B. Characters of a typical teleost. I. External characters. 1. Antrorse spine; 2. First dorsal fin; 3. Second dorsal fin; 4. Adipose fin; 5. Caudal fin; 6. Anal fin; 7. Ventral fin; 8. Pectoral fin; 9. Opercle; 10. Preopercle; 11. Suborbital; 12. Nape; 13. Orbital tentacle; 14. Nostrils; 15. Nasal tentacle; 16. Barbel; 17. Premaxilla; 18. Maxilla; 19. Vent; 20. Lateral line; 21. Isthmus; 22. Caudal peduncle; 23. Eyelid; 24. Branchiostegals.

II. Bones in the roof of the mouth. a. Maxillary; b. Premaxillary; c. Vomerine; d. Palatine; e. Pterygoid; f. Parasphenoid; g. Pharyngeal.

III. Gill components. a. Gill arch; b. Gill rakers; c. Gill filaments.

- Anterior — Relating to the front portion
Antrorse — Directed forward
Anus — External opening of the alimentary canal; the vent
Auxiliary scales — Small scales superimposed on or along hind edges of larger ones
Axil — Angle between pectoral fin and body
Axillary — Pertaining to the axil or upper angle of pectoral fin
- Barbel — Elongate fleshy projection on the head
Basal — pertaining to the base; at or near the base; used with reference to fins
Bicuspid — Having two cusps or lobes
Bifid — Cleft into two
Bifurcate — Forked
Bilobate — Having two lobes
Branchial — Pertaining to the gills
Branchiostegals — Bony rays supporting the gill-membranes
Buckler — A bony shield often with a spinous projection on caudal peduncle
- Canines — Elongate conical teeth
Caniniform — In the form of canine teeth
Caninoid — Similar in form to canines
Carapace — A bony covering encasing the body
Cardiform — Coarse and sharp teeth
Cartilaginous — Composed of cartilage or gristle
Caudal — Pertaining to the tail; abbreviation for caudal fin
Caudal peduncle — The narrow terminal part of body between the end of dorsal fin and the base of caudal fin
Chin — Space in front of the lower jaw
Cilia — Fine, hair-like outgrowths
Ciliated — Bordered with cilia
Cirri — Small simple projections
Compressed — Flattened from side to side. Refers to body
Confluent — Joined together
Corselet — A band of specialised scales on mid-lateral part of body behind the pectoral fin
Cranial — Pertaining to the skull
Crenulate — With the edge slightly scalloped
Ctenoid — With spiny hind margin. Refers to scales
Cutaneous — Pertaining to the cuticle or skin
Cycloid — With smooth hind margin. Refers to scales
- Deciduous — Which is shed easily
Dendritic — Resembling a tree or shrub
Denticulate — With tooth-like projections

- Dentition — Pattern of arrangement of teeth
Depressed — Flattened dorso-ventrally as in skates and rays
Depth — Vertical height of body
Dermal — Pertaining to the skin
Distal — Remote from the point of origin or insertion
Dorsal — Pertaining to the back; abbreviation for dorsal fin
Dorso-ventrally — Pertaining to direction from top towards bottom
- Edentulous — Without teeth
Elongate — Extended
Emarginate — With the margin slightly hollowed
Entire — With a smooth margin. Refers to scales, operculum and fin
Erectile — Capable of being raised or erected
- Falcate, Falciform — Long, narrow and curved; scythe-shaped
Filamentous — Thread-like
Furcate — Forked
Fusiform — Spindle-shaped
- Gibbous — Convex, protuberant
Gill-membrane — Membranes covering gill-openings, attached to the branchiostegals
Gill-openings — Openings of the branchial chamber to the exterior
Gill-rakers — A series of projections along the anterior edge of the gill-arches
- Hexagonal — six-sided
Hyaline — Transparent; devoid of colour
Hyoid — A bone or series of bones at the base of the tongue and derived from the hyoid arch of the developing embryo
- Illicium — Modified isolated first ray of the dorsal fin in angler-fish
Incisiform — Shaped like an incisor
Incisors — Laterally flattened cutting teeth
Infraorbital — Small bones along lower side of eye
Intermaxilla — Anterior bone in the upper jaw and situated between the maxillaries; premaxilla
Interopercle — Membrane bone between preopercle and branchiostegals
Interorbital space — The space above and between the eyes
Isthmus — The narrow fleshy projection of the chest below the gill openings
- Jugular — Pertaining to the throat
- Lanceolate — Lance-shaped; gradually tapering towards the extremity
Lateral — At or towards the side

Lateral line — A series of muciferous tubes forming a slightly raised line along the side of the body

Luminescent — Pertaining to the production of light

Lunate — Shaped like a crescent

Mandible — The bone or bones forming the lower jaw

Mandibular — Pertaining to the lower jaw

Maxilla — The principal side bone of the upper jaw

Maxillary — Pertaining to the upper jaw

Median, Mesial — Pertaining to the middle

Molar — A blunt and rounded tooth adapted for grinding

Molariform — Having the form of rounded grinding teeth

Multifid — Having many clefts or divisions

Nape — Part of the neck adjoining the skull

Nasal — Pertaining to the nostrils

Nictitating membrane — Inner eyelid; a transparent membrane which assists in keeping the eye clean

Nuchal — Pertaining to the nape

Obtuse — Blunt

Occipital — Pertaining to the hind part of the head dorsally

Occiput — The hind part of head or skull

Ocellus — An eye-like spot or marking often with marginal ring

Opercular — Pertaining to the bones forming the protective cover over the gill region

Opercles, Operculum — Gill cover. The posterior bone in the protective cover over the gill region

Orbital — Pertaining to the eye, especially bones surrounding the eye

Osseous — Composed of or resembling bone

Palate — Roof of the mouth

Palatines — Membrane bones on each side of the palate; teeth on the palatine bones

Papilla — A small fleshy projection

Parietal — A paired bone forming part of the roof of the skull

Pectoral — Pertaining to the breast; abbreviation for pectoral fin

Pelvic — Relating to the ventral fins or the bony girdle supporting them

Photophores — Light-emitting organs

Postorbital — Behind the eyes

Precaudal — Anterior to the tail region or caudal fin

Predorsal — Before the dorsal fin

Preopercle, Preoperculum — Membrane bone between the cheek and operculum, forming the front part of the gill cover

Preopercular — Pertaining to the preoperculum

Preorbital — Pertaining to the region before the eye; a membrane bone of the skull in front of and below the eye

Procumbent — Directed forward

Protractile — Capable of being extended forwards

Pterotic — A cranial bone in the region of the ear

Pterygoids — Paired bones on the posterior part of the palate; teeth borne on these bones

Ray — A jointed radial which supports the membrane of the fin

Reticulated — In the form of a network

Scute — An external horny or bony plate or a sharply ridged scale

Serrate, Serrated — Bearing saw-like teeth

Setiform — In the form of bristles

Soft dorsal — The portion of the dorsal fin which is composed of jointed or flexible rays

Spine — A sharp projecting point; a still unjointed radial supporting the anterior portion of the dorsal and anal fins

Spiniform — Having the shape of the spine

Spinous dorsal — Anterior portion of the dorsal fin supported by stiff unjointed spines

Spinule — A small spine

Spiracle — A respiratory opening behind the eye in sharks and rays

Squamation — Scale arrangement

Striated — Marked by narrow lines

Subcaudal — Lower lobe of tail in sharks

Sub-operculum — A membrane bone below the opercle forming part of the gill cover

Suborbital — Pertaining to beneath the eye; a membrane bone of the skull situated below the eye

Superior — Above or on the upper surface

Supraoccipital — Situated on the top of the head; a large median bone forming part of the roof of the skull

Supraorbital — Pertaining to the region above the eye

Symphysial — Pertaining to the symphysis

Symphysis — The point of junction of two halves of the jaws

Terminal — Pertaining to the end or situated at the end

Thoracic — Pertaining to the chest

Transverse — Cross-wise

Tricuspid — With three cusps or points

Trilobate — With three lobes or divisions

Truncate — Terminating abruptly as if cut off square

Tubercle — A small excrescence

Tubiform — Tube-like

Uniserial — Pertaining to arrangement in a single row

Vent — The external opening of the alimentary canal; Anus

Ventral — Pertaining to the abdominal or lower surface

Ventrals — Abbreviation for the paired fins on the ventral side or pelvic fins

Vermiculation — A pattern of wavy worm-like lines

Vertical fins — The unpaired fins along the median line of the body; the dorsal, caudal and anal fins

Villiform — Small slender teeth forming velvety bands.

Vomer — A bone forming the front part of the roof of the mouth

Vomerine — Pertaining to the vomer bone; especially teeth borne on this bone