click for previous page

BONY FISHES

GENERAL REMARKS

by K.E. Carpenter, Old Dominion University, Virginia, USA

Bony fishes constitute the bulk, by far, of both the diversity and total landings of marine organisms encountered in fisheries of the Western Central Atlantic. They are found in all macrofaunal marine and estuarine habitats and exhibit a lavish array of adaptations to these environments. This extreme diversity of form and taxa presents an exceptional challenge for identification. There are 30 orders and 269 families of bony fishes presented in this guide, representing all families known from the area. Each order and family presents a unique suite of taxonomic problems and relevant characters. The purpose of this preliminary section on technical terms and guide to orders and families is to serve as an introduction and initial identification guide to this taxonomic diversity. It should also serve as a general reference for those features most commonly used in identification of bony fishes throughout the remaining volumes. However, I cannot begin to introduce the many facets of fish biology relevant to understanding the diversity of fishes in a few pages. For this, the reader is directed to one of the several general texts on fish biology such as the ones by Bond (1996), Moyle and Cech (1996), and Helfman et al. (1997) listed below. A general introduction to the fisheries of bony fishes in this region is given in the introduction to these volumes. Taxonomic details relevant to a specific family are explained under each of the appropriate family sections.

The classification of bony fishes continues to transform as our knowledge of their evolutionary relationships improves. Many changes have been proposed in fish classification since the initiation of this project in 1993. At the time, Eschmeyer's (1990) classification was the most widely accepted in its general form and it served as a basis for planning the taxonomic assignments for these volumes. Since then, Nelson's (1995) third edition of "Fishes of the World" appeared with some changes to Eschmeyer's classification and some reassignments in these volumes were made to adjust for improvements. In addition, some authors made a special case for a deviation from our acceptance of Nelson's classification and these were mostly incorporated. The classification in Eschmeyer's (1998) more recent monumental "Catalog of Fishes" largely follows Nelson (1995) and further supports the basis for the classification used here. There have been a number of notable advances in our knowledge of the phylogenetic relationships of bony fishes in recent years. Many of these are found in Johnson and Anderson (1993) and Stiassney et al. (1996). However, much of the comparative morphology with implications to changes in classifications in these volumes needs to be further corroborated before these changes will become commonly used. An alternative classification with modifications to Nelson's (1994) classification, particularly with respect to suborders of perciform fishes, can be found in Paxton and Eschmeyer (1994).

The common English names of orders and families varies widely from place to place. To help standardize common family names, we asked the authors to choose the single most representative name. In cases where there was ambiguity, we tended to choose the one listed in Nelson (1994). This recommended common family name is given in the guide to orders and families section. In separate family accounts, the preferred name is given first and followed by secondary frequent common names listed in parentheses.

References

Bond, C.E. 1996. *Biology of Fishes. Second Edition*. Fort Worth, Saunders College Publishing, 750 p.

Eschmeyer, W.N. (Ed). 1990. *Catalog of the Genera of Recent Fishes.* California Academy of Sciences, 697 p.

Eschmeyer, W.N. (Ed). 1998. *Catalog of Fishes.* California Academy of Science, 2905 p.

Helfman, G.S., B.B. Collette, and D.E. Facey. 1997. *The Diversity of Fishes.* Blackwell Science, Malden, 528 p.

Johnson, G.D. and W.D. Anderson (Eds). 1993 Proceedings of the symposium on phylogeny of Percomorpha. *Bull. Mar. Sci*., 52(1):1-626.

Nelson, J. S. 1994. *Fishes of the World. Third Edition.* New York, John Wiley and Sons, Inc., 600 p.

Moyle, P. B. and J. J. Cech. *Fishes. Third Edition.* Prentice Hall, New Jersey, 590 p.

Paxton, J. R. and W.N. Eschmeyer (Eds). 1994. *Encyclopedia of Fishes.* Sydney, University of New South Wales Press, 240 p.

Stiassny, M.L.J., L.R. Parenti, and G.D. Johnson (Eds). 1996. *Interrelationships of Fishes.* San Diego, Academic Press, 496 p.

TECHNICAL TERMS AND MEASUREMENTS

by K. E. Carpenter

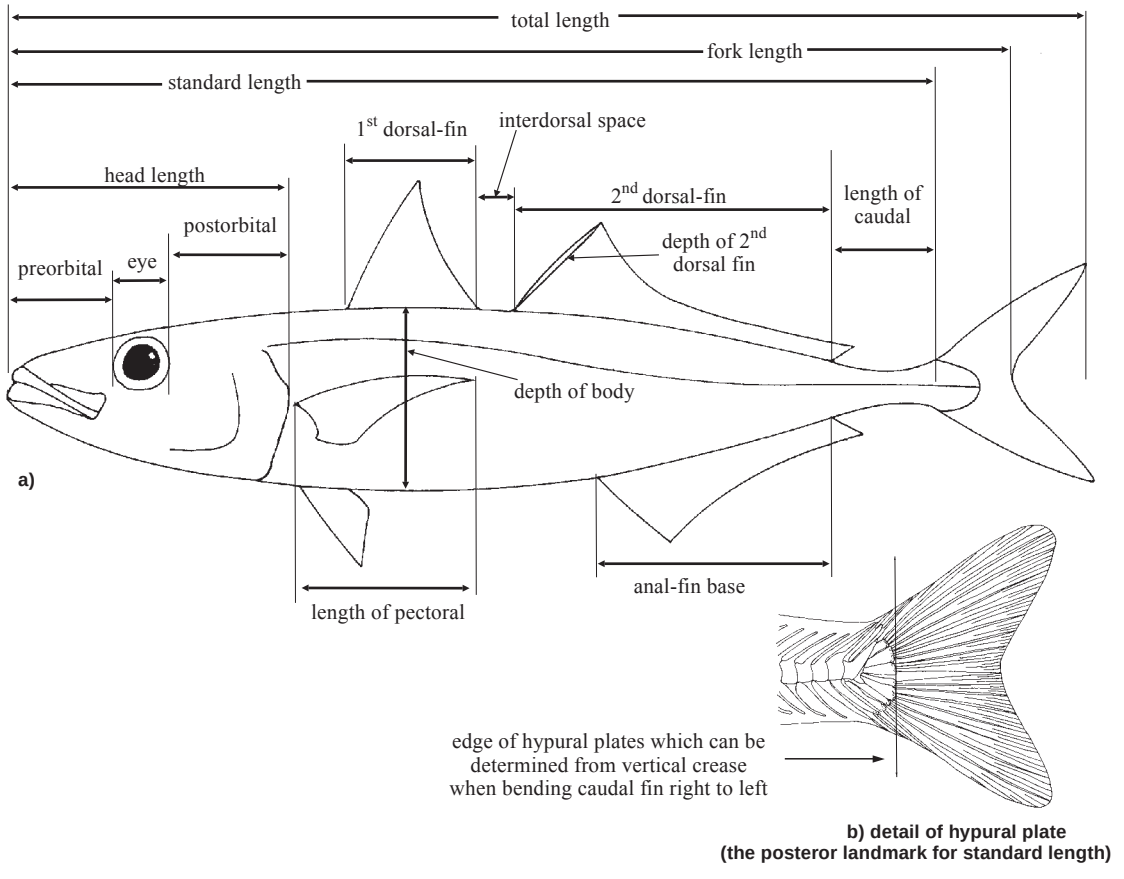


Fig. 1 common external measurements
NOTE: although all measurements are shown vertical and horizontal, all distances are measured as the straight line, shortest distance between the 2 points

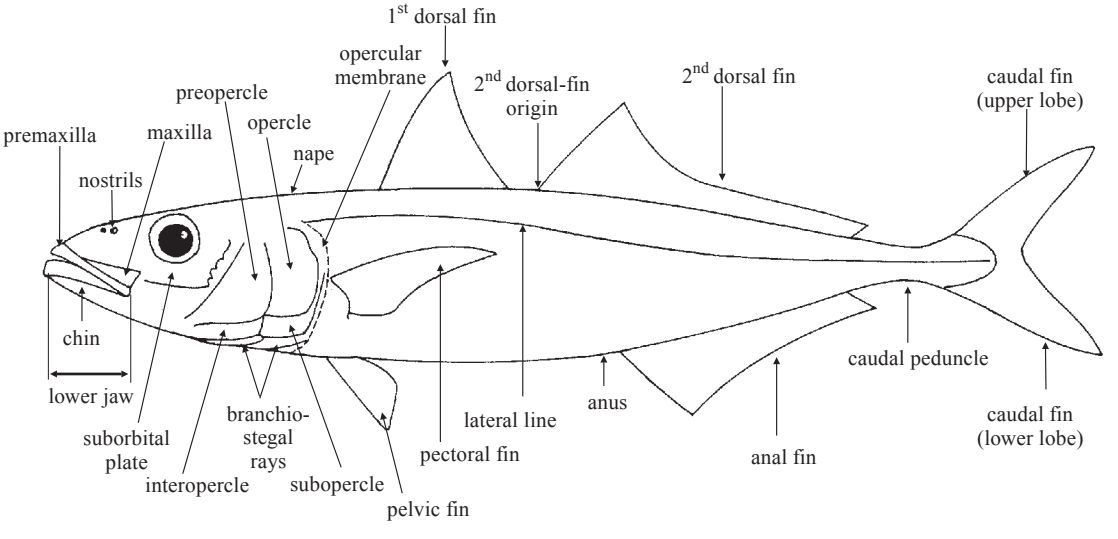


Fig. 2 common external features

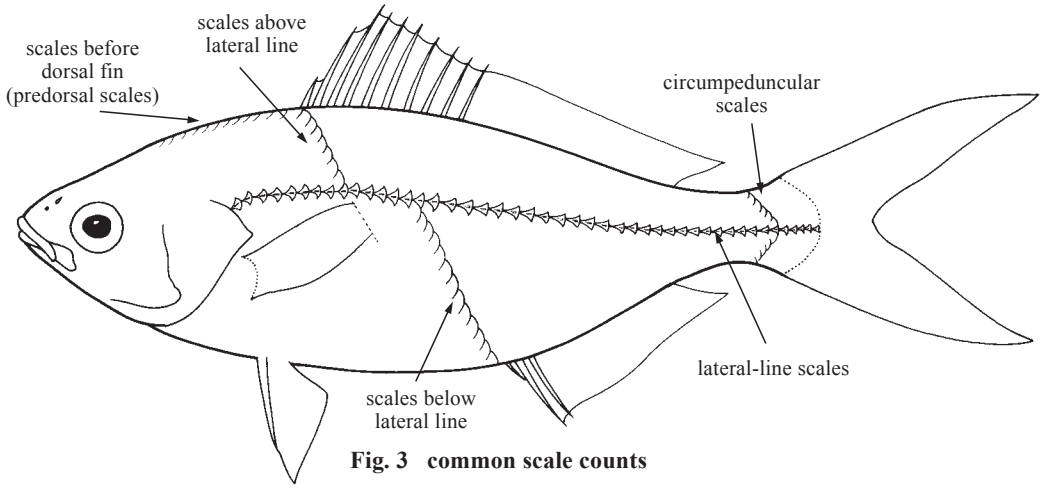


Fig. 3 common scale counts

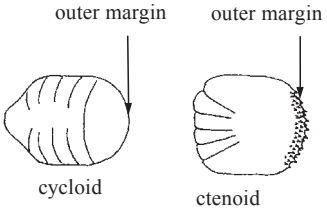
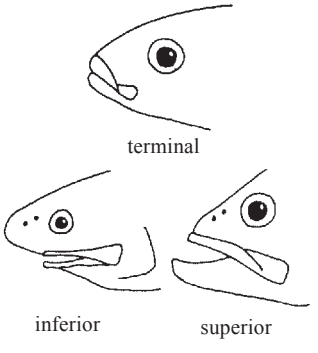


Fig. 4 schematic examples of typical scales



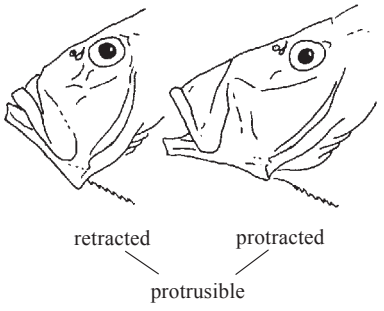


Fig. 5 mouth position and protrusibility

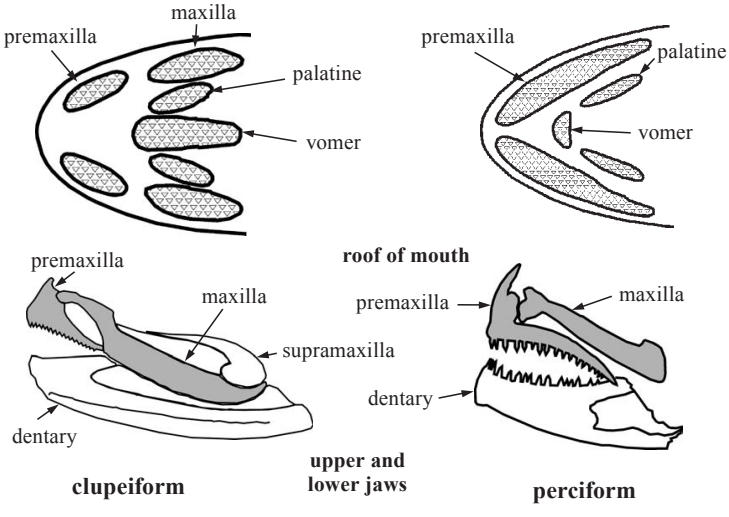


Fig. 6 teeth bearing bones in the roof of the mouth and alternative positions of premaxilla and maxilla in ancestral (clupeiform) versus derived (perciform) fishes

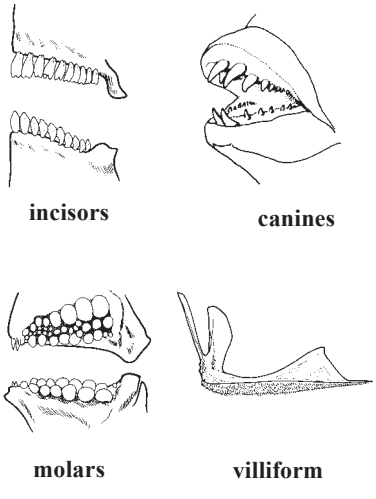


Fig. 7 common teeth types

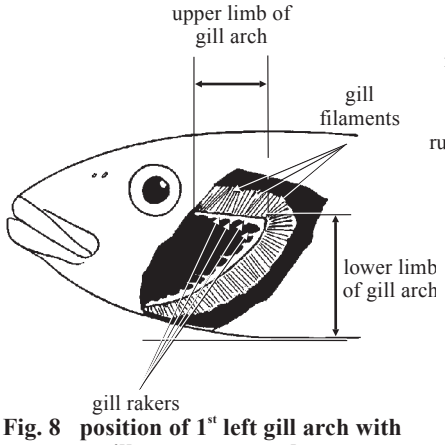


Fig. 8 position of 1st left gill arch with gill cover removed

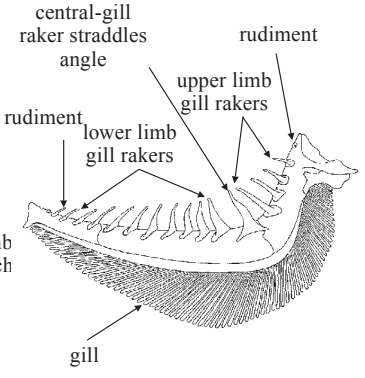


Fig. 9 structures of 1st left

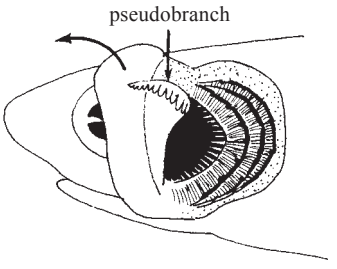


Fig. 10 position of pseudobranch with left gill cover folded forward

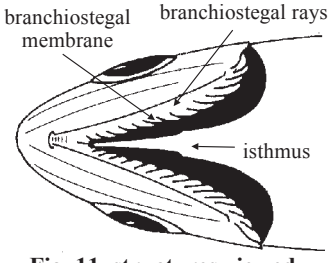


Fig. 11 structures viewed on underside of head

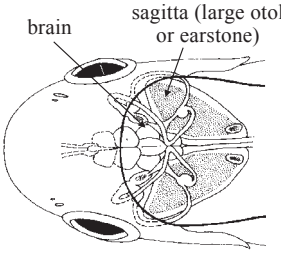


Fig. 12 position of sagittal otolith inside head (dorsal view)

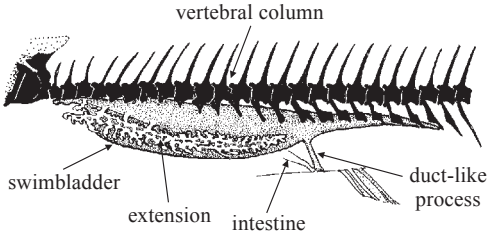


Fig. 13 position of swimbladder inside body cavity

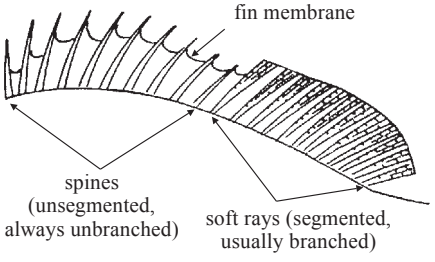


Fig. 14 example of a continuous dorsal fin of a spiny-rayed fish

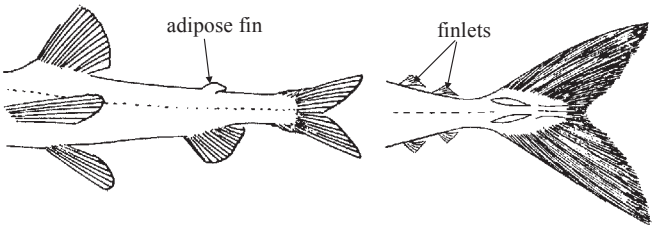


Fig. 15 accessory dorsal and anal fins: adipose fin and finlets

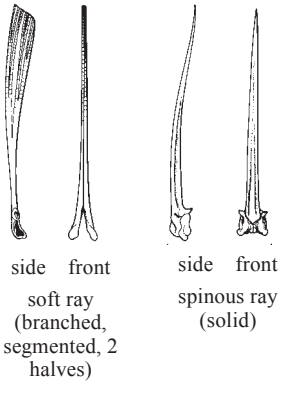


Fig. 16 construction of fin

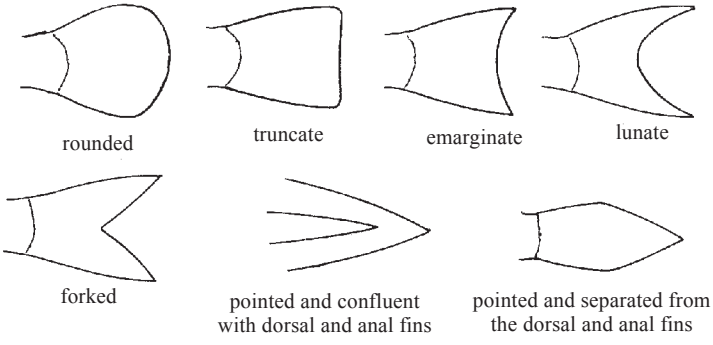


Fig. 17 most common types of caudal fins

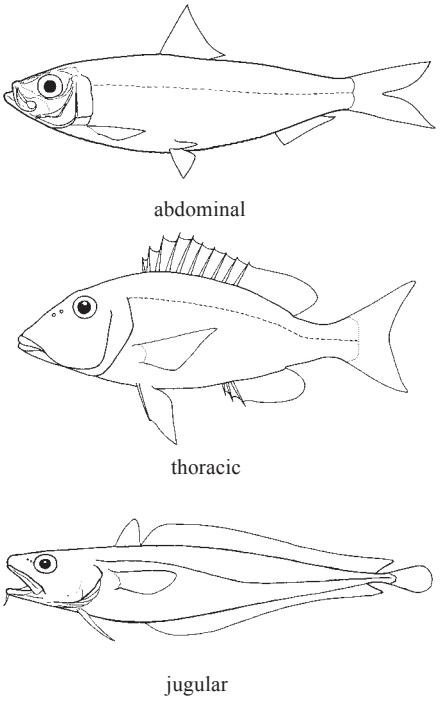


Fig. 18 positions of pelvic fins

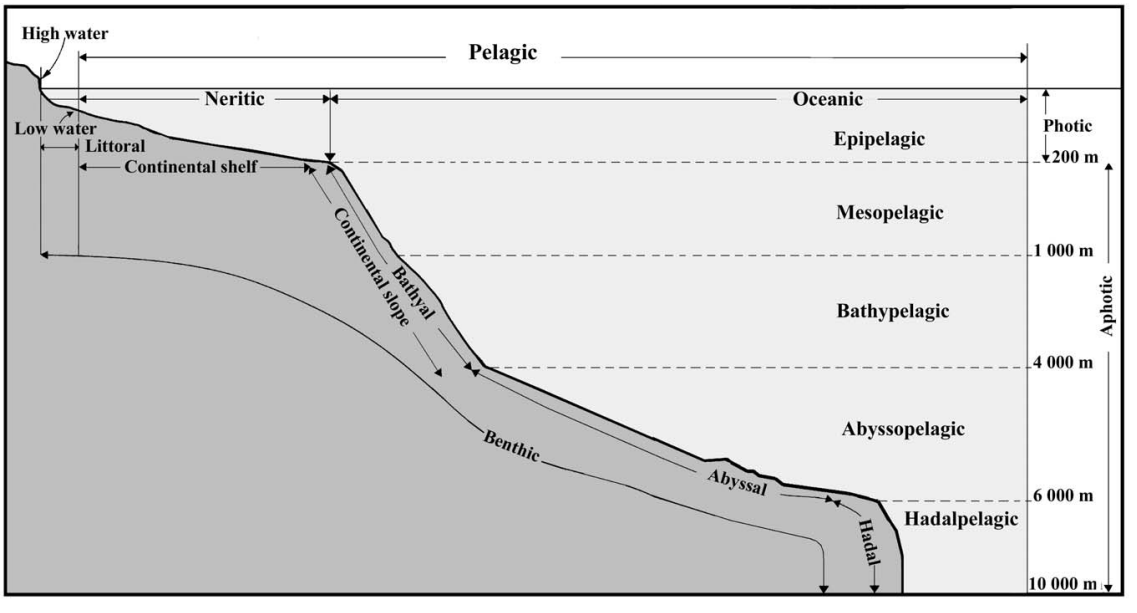


Fig. 19 marine habitat divisions

GLOSSARY OF TECHNICAL TERMS USED FOR BONY FISHES

by K.E. Carpenter, Old Dominion University, Virginia, USA

This glossary refers to figures 1-18 in the previous pages.

Abdomen - the belly; ventral area between breast and anus.

Abyssal - region of the ocean floor between the depths of 4 000 and 6 000 m (Fig. 19).

Abyssopelagic - pelagic zone between the depths of 4 000 and 6 000 m (Fig. 19).

Acute - pointed or sharp.

Adipose eyelid - transparent fleshy tissue covering part or all of the eye in some fishes.

Adipose fin - small, fleshy fin without rays or spines on the dorsal midline between the dorsal and caudal fins of some fishes (Fig. 15).

Air bladder - see swimbladder.

Anadromous - living mostly in seawater and migrating to freshwater to spawn.

Anal fin - unpaired median fin supported by rays on the tail behind the anus (Fig. 2).

Anterior - pertaining to the front portion often combined with other directional terms such as lateral in a shortened form (anterolateral, referring to front part of sides).

Antrorse - turned forward.

Anus - posterior opening of the intestine through which wastes are excreted; vent (Fig. 1).

Appressed - pressed down or lying flat.

Attenuate - elongate; extended or drawn out.

Axil - angular area between pectoral fin and body, equivalent to arm-pit.

Axillary scale - an elongate or modified scale at the insertion of the pelvic or pectoral fins in some fishes.

Band - usually refers to an oblique or irregular marking.

Bar - elongate nearly straight vertical marking.

Barbel - elongate fleshy tentacle-like sensory projection, usually about the mouth or head.

Base of fin - part of the fin that attaches to the body (Fig. 1).

Bathyl zone - region of the ocean floor from the edge of the continental shelf (at around 200 m) down to a depth of about 4 000 m (Fig. 19).

Bathypelagic - pelagic zone between the depths of about 1 000 and 4 000 m (Fig. 19).

Benthic - referring to the ocean bottom; benthic species are closely associated with and often attached to the ocean bottom (Fig. 19).

Benthopelagic - inhabiting waters above but near the bottom or, spending part of the time on the bottom and part of the time further up in the pelagic zone.

Bifed, bifurcate - separated or divided into 2 branches (forked).

Branchiostegal membranes - membranes on the ventral interior surface of the gill cover supported by branchiostegal rays.

Branchiostegal rays - bony rays supporting the membranes inside the lower part of the gill cover (Fig. 11).

Breast - ventral surface of body between the isthmus and pectoral or pelvic fins.

Canine - slender conical tooth, often enlarged and elongate (Fig. 7).

Carapace - a hardened encasing covering all or part of the body.

Cardiform - small, short conical outgrowths in a close-set patch or band; usually refers to a band of close-set small conical teeth.

Catadromous - living in freshwater and migrating to the sea to spawn.

Caudal fin - tail fin (Fig 1).

Caudal peduncle - posterior part of body between the rear parts of the dorsal and anal fins, and the caudal fin (Fig. 1).

Cephalic - pertaining to the head.

Cheek - side of head below and slightly behind the eye.

Cirrus - small, fleshy protuberance.

Cleithral - pertaining the cleithrum or area of the cleithrum which is typically the largest bone of a series of bones that support the pectoral fin (pectoral-girdle bones).

Compressed - flattened laterally; a body shape much deeper than wide.

Continental rise - gentle slope at the base of the continental slope.

Continental shelf - flattened edge of the continental land mass between the coast and the continental slope (generally, the continental subtidal zone down to a depth of about 200 m).

Continental slope - sloping edge of the continental land mass, generally beginning at a depth of around 200 m.

Crenate - having a notched edge.

Crenulate - scalloped or wavy edge.

Ctenoid scale - scale with a spiny posterior margin (Fig. 4).

Cycloid scale - scales with smooth posterior margin, without spines on posterior margin (Fig. 4).

Deciduous - easily shed or rubbed off; refers to scales.

Demersal - free living close to the sea bottom.

Dentary - the main tooth bearing bone of the lower jaw (Fig. 6).

Denticle - small tooth-like structures.

Depressed - flattened from top to bottom; body shape much wider then deep.

Dimorphism - having 2 different morphological forms.

Distal - near outer edge; far end from point of attachment or centre of body.

Dorsal - back or upper body.

Dorsal fin - median fin supported by spines and/or rays; in spiny-rayed fishes the dorsal fin is separable into spiny-rayed and soft fins and can be continuous (Fig. 14a), incised (Fig. 14b), separate (sometimes soft-rayed portion has 1 or more spines anteriorly) (Fig. 14c), or with separate spines (Fig. 14d).

Ectopterygoid - one of the series of bones that suspends the jaw.

Edentulous - without teeth.

Emarginate - margin slightly concave; pertains to a caudal fin shape (Fig. 17).

Entire - smooth or straight margin.

Epaxial - referring to the main body muscles (myomeres) of the upper sides.

Estuary - partly enclosed body of sea water that is measurably diluted with fresh water.

Falcate - sickle-shaped (Fig. 14c).

Finlets - small separate dorsal and anal fins (Fig. 15).

Forked - branched; caudal fin shape with distinct upper and lower lobes and the posterior margin of each lobe relatively straight or gently curved (Fig. 17).

Frontal - a major paired bone of the skull that articulates medially and generally found dorsal to the orbit.

Furcate - forked.

Fusiform - spindle-shaped, tapering toward each end.

Gas bladder - see swimbladder.

Gill - organ for exchange of dissolved gasses between water and the blood stream; gill tissues are supported by a gill arch in fishes (Figs. 8,9).

Gill arch - bony angular skeleton that supports the gill filaments and gill rakers (Figs. 8,9).

Gill filaments - principal site of gas exchange in the gill (Fig. 9).

Gill membrane - membranes along the posterior and ventral margin of the gill cover.

Gill rakers - bony projections along the front edge of the gill arch that help prevent food from escaping through the gill opening (Figs. 8,9); gill-raker counts are typically taken on the outermost (first) gill arch and are often separated into upper limb and lower limb counts; if a raker straddles the angle of the arch, the count is included in the lower limb; rudiments are included in counts unless otherwise noted.

Gular plate - bony plate covering the underside of the head as exemplified in elopiform fishes.

Hadal zone - region of the ocean floor between the depths of 6 000 and 10 300 m (Fig. 19).

Herbivore - feeding on plants.

Heterocercal - asymetrical caudal fin with the upper lobe larger than the lower lobe.

Hyoid - referring to the series of bones behind the gill cover that suspends the branchiostegal rays and connects to the gill arches.

Hypural plates - series of bones that support the caudal-fin rays (Fig. 1b).

Incised - notched, cut into; see Dorsal fin.
Infraorbital - another term for suborbitals (see Lacrimal).

Illicium - modified isolated first ray of the dorsal fin that forms the 'fishing gear' (rod-and-lure) in anglerfishes.

Incisor - flattened chisel-shaped tooth (Fig. 7).

Inferior - mouth position on underside of head with snout projecting in front of mouth (Fig. 5).

Insertion - anterior or posterior point of attachment of a fin to the body.

Integument - referring to the skin.

Interdorsal - space on the back between the bases of the first and second dorsal fins (Fig. 1).

Interopercle - lower anterior bone of the gill cover (Fig. 2).

Interorbital - space on top of the head between the eyes.

Intertidal - area of the shore covered at high tide and exposed at low tide.

Isthmus - part of the underside of the head separating the gill openings (Fig. 11).

Jugular - pertaining to the throat region; pelvic fins are jugular when positioned on the underside of the head in front of the pectoral fins (Fig. 18).

Lanceolate - spear- or lance-shaped.

Lacrimal (lachrymal) - the most anterior of the series of 6 or fewer bones around the lower margin of the eye that are refered to as suborbital bones; the lacrimal is sometimes also referred to as the preorbital.

Lateral - the side or toward the side.

Lateral line - a vibration sensory canal along the side of the body with a series of pores that communicate to the outside of the body, often through specialized pored lateral-line scales (Figs 2, 3).

Littoral - intertidal area of the shore.

Lunate - crescent-shaped; caudal-fin shape that is deeply emarginate with narrow lobes (Fig. 17).

Mandible - lower jaw.

Maxilla - bone in the upper jaw behind/above the premaxilla. In ancestral fishes the maxilla is the principal bone of the upper jaw that bears teeth; in derived fishes it generally does not bear teeth and serves more to support the premaxilla (Fig. 6).

Median - middle or toward the midline.

Median fins - fins that lie on the midline; the dorsal, anal, and caudal fins.

Melanophore - cell carrying black or greyish pigments.

Membrane - a thin sheet of tissue; often refers to thin sheet of tissue between fin (Fig. 14) and branchiostegal (Fig. 11) rays.

Mesopelagic - pelagic zone between the depths of about 200 and 1 000 m (Fig. 19).

Molar - a low, blunt, rounded tooth for crushing and grinding (Fig. 7).

Nape - dorsal part of the body just behind the occiput or hard dorsal region of the skull (Fig. 2).

Neritic - nearshore; the zone of water above the continental shelves.

Nuchal - pertaining to the neck; the nape of the neck.

Occiput - upper back part of the head or skull.

Ocellus - a round eye-like spot or marking with a marginal ring.

Opercle - large posterior upper bone of the gill cover (Fig. 2).

Operculum - gill cover composed of the preopercle, opercle, interopercle, and subopercle.

Orbital - referring to the eye, particularly the bones surrounding the eye.

Origin - anterior point of attachment of fins to the body (anterior insertion) (Fig. 2).

Otolith - a small calcareous structure (or ear stone) in the inner ear of fishes (Fig. 12).

Oviparous - egg laying, development of the embryo occurs externally and nourishment comes from the egg.

Ovoviviparous - eggs are retained in the female and the embryo develops partially or wholly internally but nourishment is still derived from the egg.

Paired fin - fins found on both sides of the body; the pectoral and pelvic fins (Fig. 2).

Palate - roof of the mouth.

Palatine - paired bones on each side of the palate, behind and lateral to the vomer, often bearing teeth (Fig. 6).

Papilla - a small fleshy projection.

Parietal - a bone of the upper posterior part of the skull.

Pectoral fin - paired fins on the sides behind the gill cover (Fig. 2).

Peduncle - a stalk-like process (see Caudal peduncle).

Pelagic - the division of the marine environment composed of all the ocean's water; living in the open seas or oceans (Fig. 19).

Pelvic fins - paired fins in front of the anus (Fig. 2), sometimes called the ventral fins; lower or primitive fishes generally have the pelvic fins in the abdominal position while derived (advanced) fishes generally have the pelvic fins in the thoracic or jugular position (Fig. 18).

Peritoneum - a thin membrane that lines the body cavity, covers the heart, and forms the mesenteries.

Pharyngeal teeth - teeth on the elements of the last gill arch or pharyngeal arch.

Photophore - light-emitting organ or luminous spot.

Physoclistous - the advanced condition wherein the pneumatic duct is closed in the adult (see Physostomous).

Physostomous - the primative condition wherein a connection via the pneumatic duct between the swimbladder and the gut is retained in adults potentially allowing gas to enter the swimbladder through gulping air.

Posterior - pertaining to the rear portion.

Postmaxillary process - a broad or finger-like extension of the premaxilla along the upper edge of the lower arm of this bone.

Postorbital - 1 or more of the suborbital bones, starting with the third suborbital bone and possibly referring also to the fourth, fifth, and sixth suborbital bone (see Lacrimal).

Premaxilla - anterior bone in the upper jaw (see maxilla) (Fig. 6).

Preopercle - upper anterior bone of the gill cover (Fig. 2).

Preorbital - referring to the region before the eye; a suborbital bone in front and below the eye (see Lacrimal).

Principal caudal-fin ray - branched and unbranched caudal-fin rays that reach the rear margin of the fin.

Procurrent caudal-fin ray - small ray (sometimes spinous) at the insertions of the fin that do not reach the rear margin.

Proximal - part nearest the centre of the body.

Pseudobranchium - a small patch of gill-like filaments on the upper inner surface of the gill cover (Fig. 10).

Pyloric caeca - finger-like projections of the digestive system near the juncture of the stomach and the small intestine.

Ray - supporting element of fins (Fig. 16); ray is sometimes used as a collective term to designate both soft rays and spines; it is also sometimes used to designate exclusively, soft rays.

Rostral/rostrum - towards the front of the fish/the area of the snout.

Rounded - a caudal-fin shape with the terminal border smoothly convex (Fig. 17).

Rudiment - a poorly developed structure, usually small and minimally functional at best; these include small unbranched soft rays and small gill rakers at the ends of a gill arch.

Scapula/scapular - a flat bone on the upper part of the pectoral girdle/pertaining to the shoulder region.

Scute - a modified scale that can be enlarged, hardened, ridged, keeled, or spiny.

Serrate - with saw-like teeth along a margin.

Setae - bristles or hardened hair-like projections.

Soft dorsal fin - the portion of the dorsal fin supported by soft rays (Fig. 14).

Soft ray - a fin support element that is composed of 2 halves (paired laterally), segmented, and usually flexible and branched (Fig. 16). Rarely, soft rays can be pointed and stiff and appear to be a spine.

Spine - a fin support element that is unpaired laterally, unsegmented, unbranched and usually stiff and pointed (Fig. 16); also refers to slender, sharply pointed bony processes not associated with fins.

Sphenotic - a bone of the skull above and behind the orbit.

Spinous dorsal fin - the anterior portion of the dorsal fin that is supported by spines (Fig. 14).

Spinule - a small spine.

Standard length - distance from the anteriormost point on the fish to the posterior end of the vertebral column that is generally equivalent to the end of the hypural plates (and recognized externally by the crease between the tail and caudal fin when the caudal fin is bent laterally); sometimes abbreviated as SL (Fig. 1).

Stripe - generally refers to a horizontal nearly straight side marking.

Subopercle - lower rear bone in the gill cover (Fig. 2).

Suborbital bones - see Lacrimal.

Subtidal - ocean floor below the low tide mark.

Sulcus - a groove or fissure.

Superior - above or on the upper surface; a mouth position with the snout behind the anterior opening of the mouth (Fig. 5).

Supramaxilla - 1 or 2 bones above the maxilla; found in primitive bony fishes (Fig. 6).

Swimbladder - a gas-filled sac lying under the backbone in the abdominal cavity, used in buoyancy; also referred to as air bladder or gas bladder (Fig. 13).

Symphysis - the articulation between two bones; often refers to the anterior juncture between the two halves of either jaw.

Terminal - pertaining to at the end, or situated at the end; a mouth position with the opening of the mouth even with the tip of the snout (Fig. 5).

Vomer - an unpaired median bone on the roof of the mouth (Fig. 6).

Terete - cylindrical, typically tapering at both ends, circular in cross-section, and smooth.

Thoracic - referring to the breast region; pelvic fins are thoracic in position when directly below the pectoral fins (Fig. 18).

Truncate - terminating abruptly in a square end; a caudal-fin shape with a vertically straight terminal border (Fig. 17).

Vent - see anus.

Ventral - the bottom, lower surface, or abdominal part of the body.

Ventral fins - see pelvic fins.

Vertebrae - bones of the vertebral column or back bone; vetebral counts are often given as a formula: precaudal vertebrae + caudal vertebrae, where precaudal vertebrae typically have paired ventrolateral extensions that support ribs and caudal vertebrae have a single ventrally directed spine (haemal spine) and does not support ribs.

Vertical fins - median fins; the dorsal, caudal, and anal fins.

Vestige - small or underdeveloped structure, as in a rudiment.

Villiform - many small slender outgrowths, usually in a close-set patch or carpet; often refers to slender teeth forming velvety bands (Fig. 7).

Viviparous - development of embryo internally with nourishment from the mother.

GUIDE TO ORDERS AND FAMILIES OCCURRING IN THE AREA

by K.E. Carpenter, Old Dominion University, Virginia, USA

This guide is designed to help find the family identity of a fish in 2 steps. First, the appropriate order should be found by comparing the characters listed under each order until a match is found. Second, the characters listed to distinguish the families within the order should be compared with the fish in hand until a match is found. Volume and page numbers for the family account are listed after each family to refer to further information about the family and its species. The volume number is listed first, followed by the page number in the volume. The orders and families are listed in phylogenetic order. Key characters for the order are presented only on the first family listed in the order but are generally applicable to all families in the order. These order-specific characters are presented in capital letters and highlighted in grey. This will help distinguish the ordinal characters from the unhighlighted, uncapitalized characters useful in distinguishing among the families within the order. These family characters are presented with a general diagram representing the family and point to the area on the fish where the character can be found, if appropriate. The diagram representing the family can, in most cases, help with identification through its generalized shape. However, in some families, the general shape of particular genera and species varies widely within the family and therefore particular care should be paid to examination of the characters. In some cases, additional diagrams of morphological details are presented to help clarify the use of the character. Characters used are not only key characters but also those characters most useful in distinguishing the family from similar looking families. This guide is specifically designed to work for those orders and families found in the Western Central Atlantic area and may not work well for identification to this level outside the area.

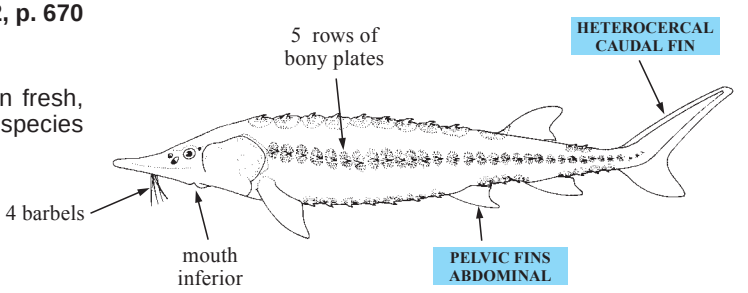
Identification hints: The orders and families are listed in phylogenetic sequence. Therefore, it is helpful to be able to distinguish a primitive or ancestral fish from an advanced or derived fish to quickly find the appropriate order. This is not always and easy task but certain characters can be examined to give a general impression. For example, more ancestral fishes generally have the position of the pelvic fin more abdominal while advanced fishes usually have them thoracic or jugular (Fig. 18 above). Primitive fishes also tend to lack true spines (Fig. 16), have the maxilla with teeth and a prominent part of the gape (Fig. 6), and have non-protrusible mouths (Fig. 5). There are some exceptions to this, however, and these characters should be used cautiously. An example are the barracudas (family Sphyraenidae) that have true spines and the premaxilla predominant in the gape but that have abdominal pelvic fins and non-protrusible jaws. Since barracudas are considered advanced fishes, the primitive characteristics are thought to have evolved secondarily from more advanced character states.

Order ACIPENSERIFORMES - Sturgeons

ACIPENSERIDAE **Vol. 2, p. 670**

Sturgeons

To 200 cm. Generally near bottom in fresh, brackish, and coastal waters. Three species in the area.

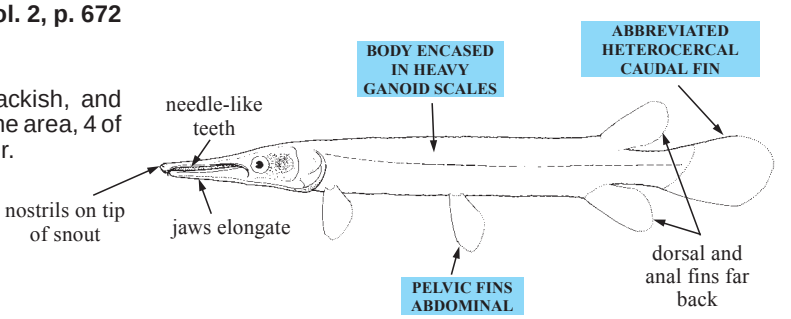


Order SEMIONOTIFORMES - Gars

LEPISOSTEIDAE **Vol. 2, p. 672**

Gars

To at least 300 cm. In fresh, brackish, and coastal waters. Seven species in the area, 4 of which commonly in brackish water.

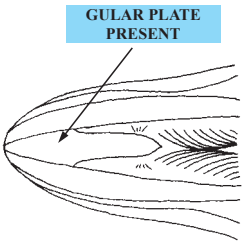


Order ELOPIFORMES - Tarpons and allies

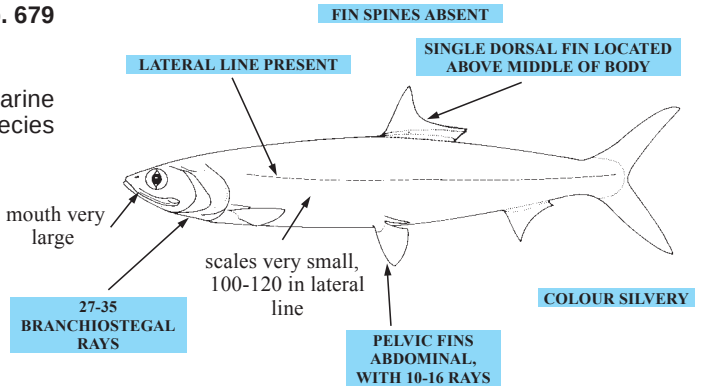
ELOPIDAE **Vol. 2, p. 679**

Ladyfishes

To 90 cm. Mostly midwater in coastal marine waters and brackish waters. A single species in the area.



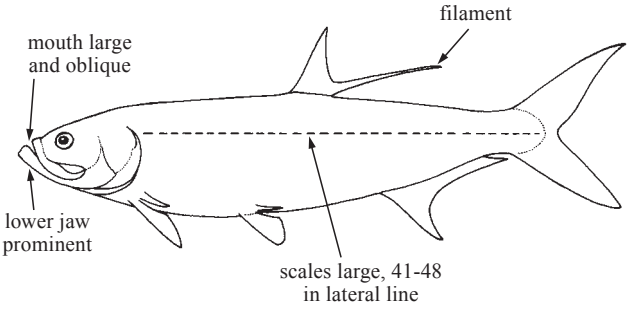
ventral view of head



MEGALOPIDAE Vol. 2, p. 681

Tarpons

To 220 cm. Mostly pelagic in coastal marine waters, but also brackish, hypersaline, and fresh waters. A single species in the area.

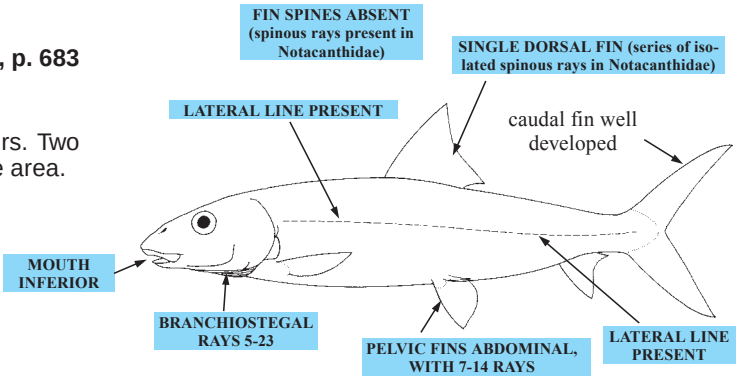


Order ALBULIFORMES - Bonefishes and allies

ALBULIDAE Vol. 2, p. 683

Bonefishes

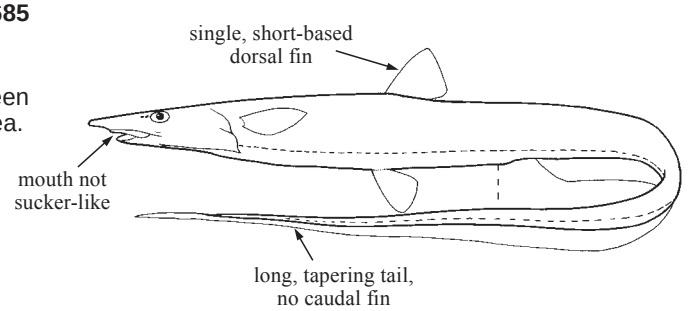
To 80 cm. Demersal in coastal waters. Two species currently recognized from the area.



HALOSAURIDAE Vol. 2, p. 685

Halosaurs

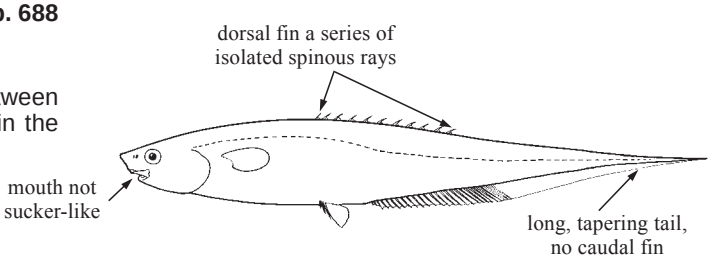
To 100 cm. Demersal from depths between 500 and 3 000 m. Eight species in the area.



NOTACANTHIDAE Vol. 2, p. 688

Spiny eels

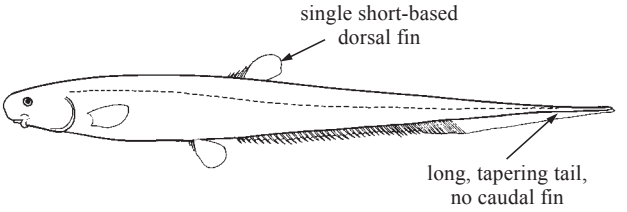
To about 50 cm. Demersal at depths between 200 and 3 500 m. Possibly 4 species in the area.

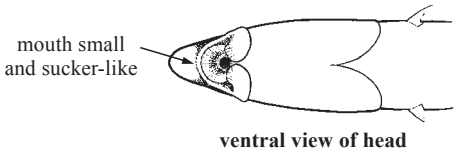


LIPOGENYIDAE **Vol. 2, p. 690**

Spiny sucker eels

To about 40 cm. Demersal at depths between 600 and 2 000 m. A single species. Sometimes included within Notacanthidae.





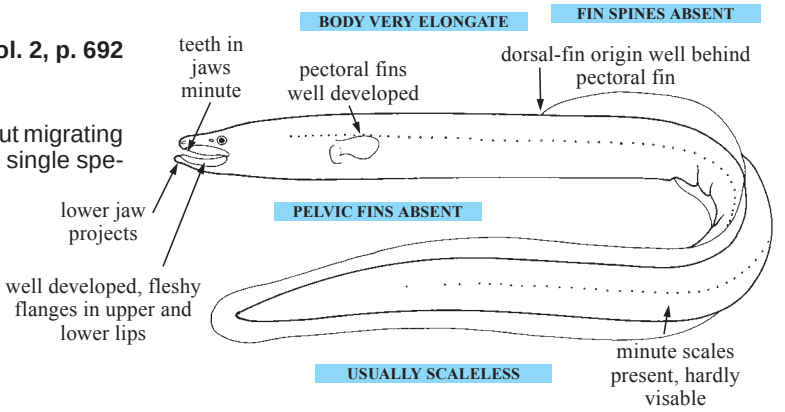
ventral view of head

Order ANGUILLIFORMES - Eels

ANGUILLIDAE **Vol. 2, p. 692**

Freshwater eels

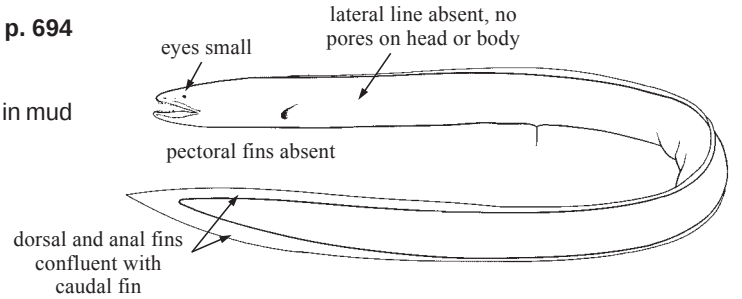
To 150 cm. Mainly in fresh water, but migrating to oceanic waters for spawning. A single species in the area.



HETERENCHELYIDAE **Vol. 2, p. 694**

Mud eels

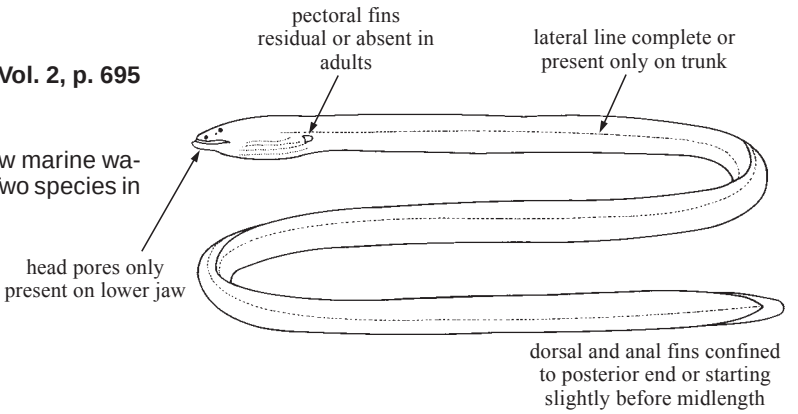
To about 100 cm. Demersal, burrowing in mud or sand. A single species in the area.



MORINGUIDAE **Vol. 2, p. 695**

Spaghetti eels

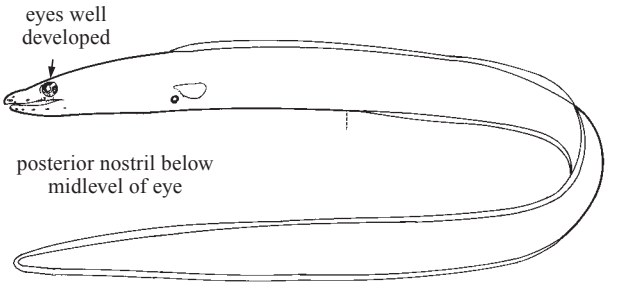
To about 60 cm. Mostly in shallow marine waters, burrowing in sand or mud. Two species in the area.



CHLOPSIDAE **Vol. 2, p. 697**

False morays

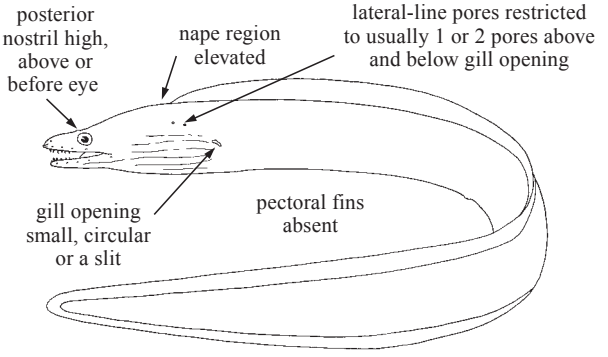
To about 30 cm. Small, cryptic eels found in coral reefs, seagrass beds, and rubble. Seven species in the area.



MURAENIDAE **Vol. 2, p. 700**

Morays

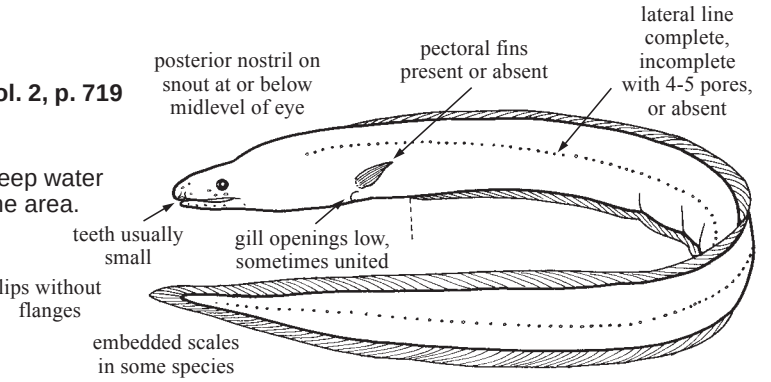
To 375 cm. Cryptic or demersal in shallow coastal areas including coral reef, rock, sand, or mud bottoms, to a depth of about 500 m. Twenty-two species in the area.



SYNAPHOBRANCHIDAE **Vol. 2, p. 719**

Cutthroat eels

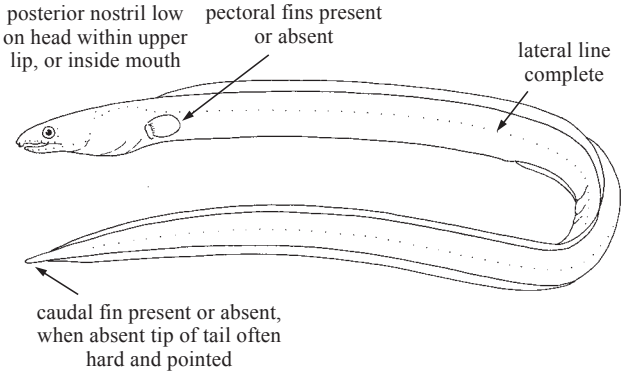
To 180 cm. Demersal, typically in deep water to 2 000 m. Around 13 species in the area.

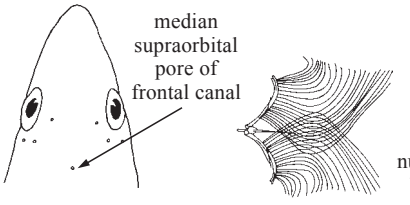


OPHICHTHIDAE **Vol. 2, p. 724**

Snake eels

To about 250 cm. From sandy intertidal to midwater depths of 800 m; mostly shallower than 200 m on sand and mud bottoms, estuaruies, and coral reefs. At least 49 species in the area.



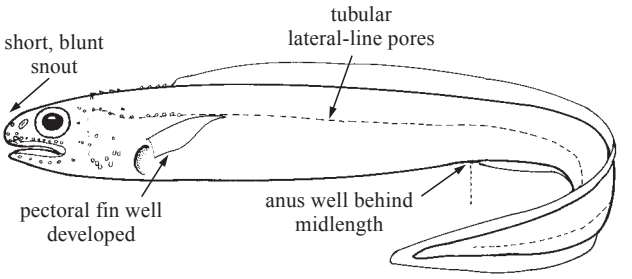


dorsal view of head

COLOCONGRIDAE **Vol. 2, p. 734**

Short-tailed eels

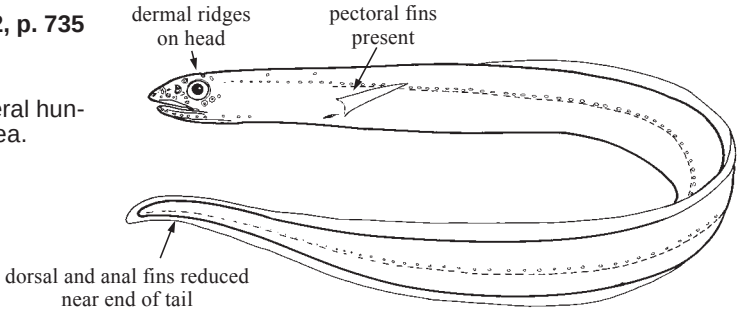
To 60 cm. Mostly on muddy bottoms on the mid to upper continental slope at around 300 to 1 000 m. A single species in the area.



DERICHTHYIDAE **Vol. 2, p. 735**

Longneck eels

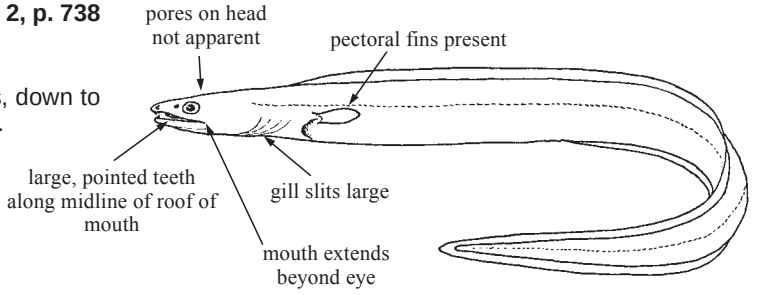
To 60 cm. Midwater at depths of several hundred metres. Three species in the area.



MURAENESOCIDAE **Vol. 2, p. 738**

Pike congers

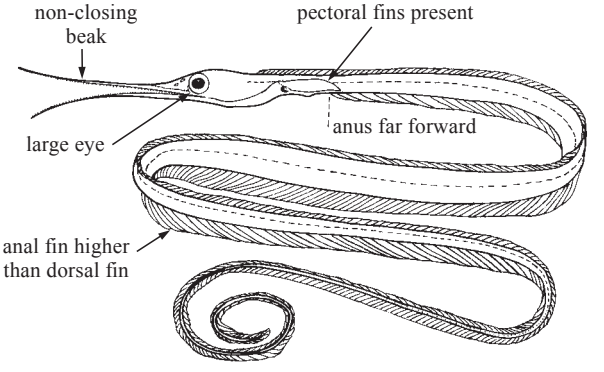
To 50 cm. Demersal in soft bottoms, down to 100 m. A single species in the area.



NEMICHTHYIDAE **Vol. 2, p. 740**

Snipe eels

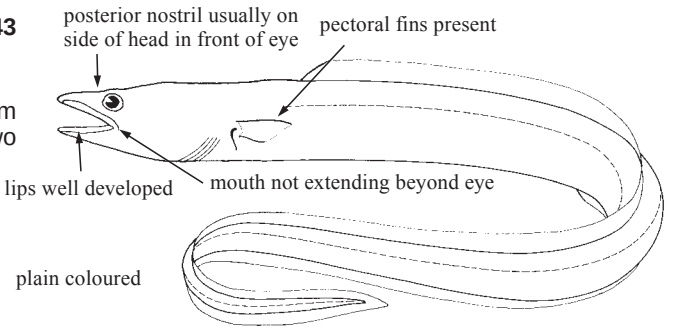
To 1 m or more. Midwater between around 300 and 2 000 m. Four species in the area.



CONGRIDAE **Vol. 2, p. 743**

Conger eels

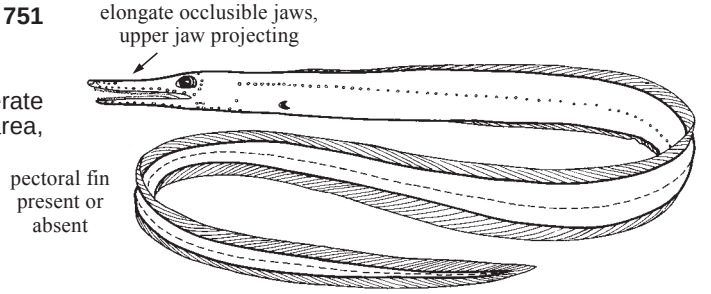
To 300 cm. Demersal on sand or mud bottom from coastline to 2 000 m or more. Thirty-two species in the area.



NETTASTOMATIDAE **Vol. 2, p. 751**

Duckbill eels

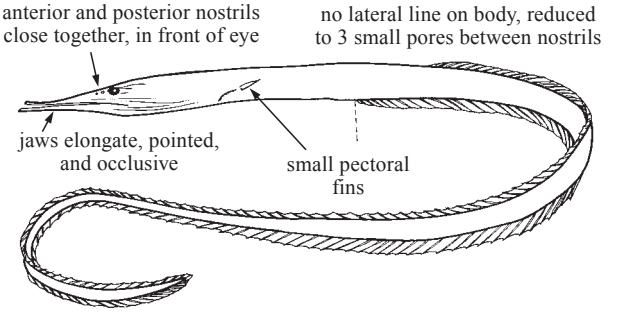
To about 1 m. On or near bottom in moderate to deep water. At least 13 species in the area, probably more.



SERRIVOMERIDAE **Vol. 2, p. 755**

Sawtooth eels

To 75 cm. Midwater at depths between 500 and 1 000 m. Three species in the area.

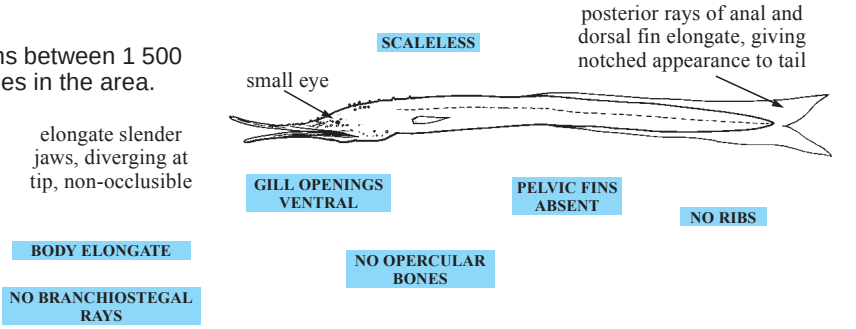


Order SACCOPHARYNGIFORMES - Gulpers and allies

CYEMATIDAE **Vol. 2, p. 757**

Bobtail eels

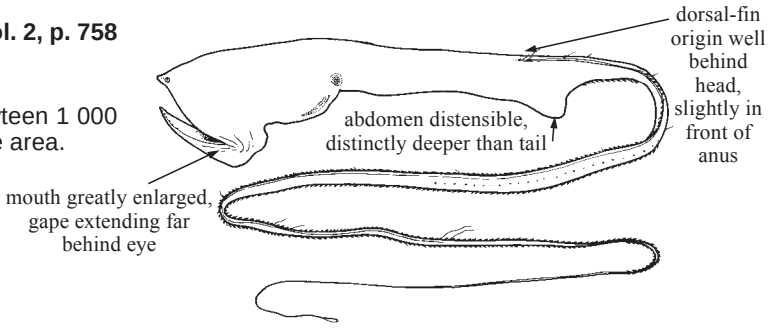
To 14 cm. Midwater at depths between 1 500 and 3 000 m. A single species in the area.



SACCOPHARYNGIDAE Vol. 2, p. 758

Swallower eels

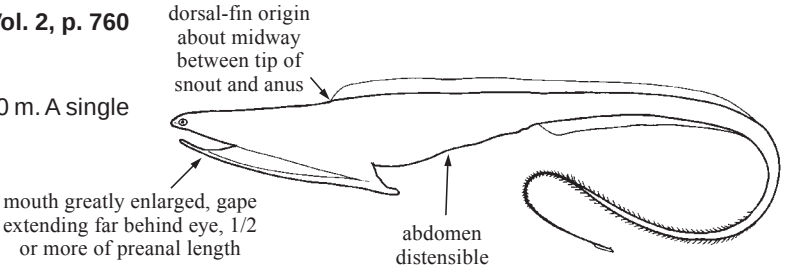
To 170 cm. Pelagic at depths bewteen 1 000 and 3 000 m. Three species in the area.



EURYPHARYNGIDAE Vol. 2, p. 760

Gulper eels

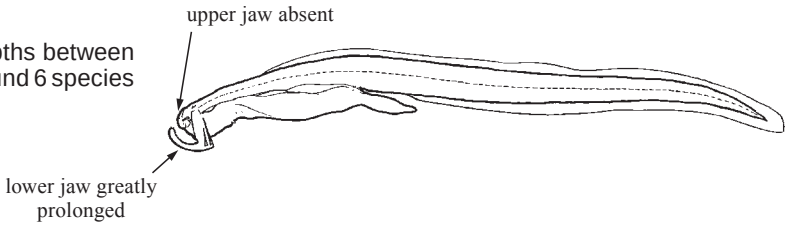
To 75 cm. Midwater, down to 3 000 m. A single species in the family.



MONOGNATHIDAE Vol. 2, p. 762

Monognathids

To 16 cm. Pelagic, mostly at depths between 2 000 and 5 400 m. Probably around 6 species in the area.

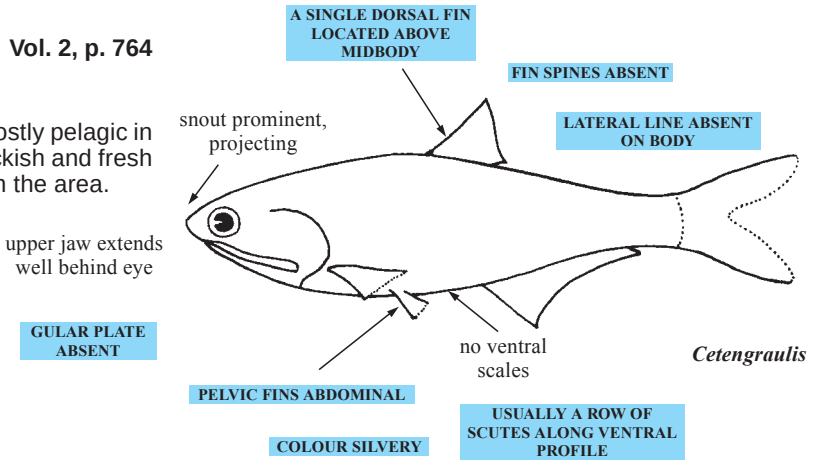


Order CLUPEIFORMES - Herrings and allies

ENGRAULIDAE Vol. 2, p. 764

Anchovies

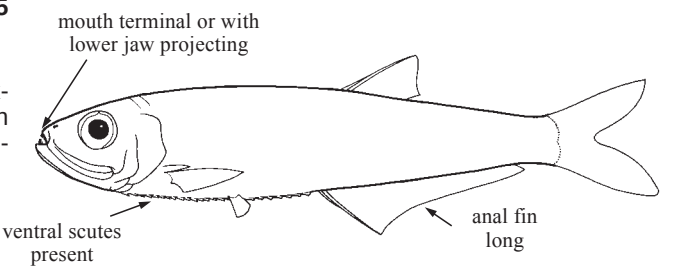
To 30 cm, generally smaller. Mostly pelagic in coastal waters, but also in brackish and fresh waters. Twenty-eight species in the area.



PRISTIGASTERIDAE **Vol. 2, p. 795**

Pellonas

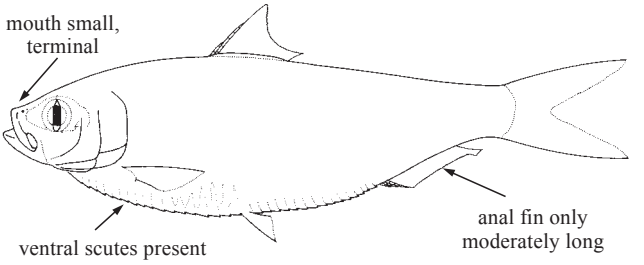
To 18 cm. Usually demersal in coastal, brackish, and fresh waters. Five marine species in the area with an additional 3 fresh water species.



CLUPEIDAE **Vol. 2, p. 804**

Herrings (shads, menhadens)

To 60 cm, generally smaller. Mostly pelagic in coastal waters, but some species also in brackish and fresh waters. Twenty-seven species in the area.

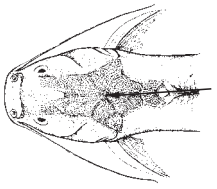


Order SILURIFORMES - Catfishes

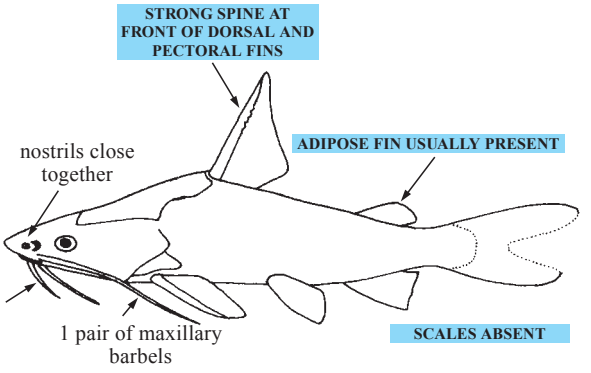
ARIIDAE **Vol. 2, p. 831**

Sea catfishes

To over 100 cm. Demersal in coastal marine and brackish waters and in fresh waters, from the coastline usually to about a depth of 100 m. At least 15 marine species.



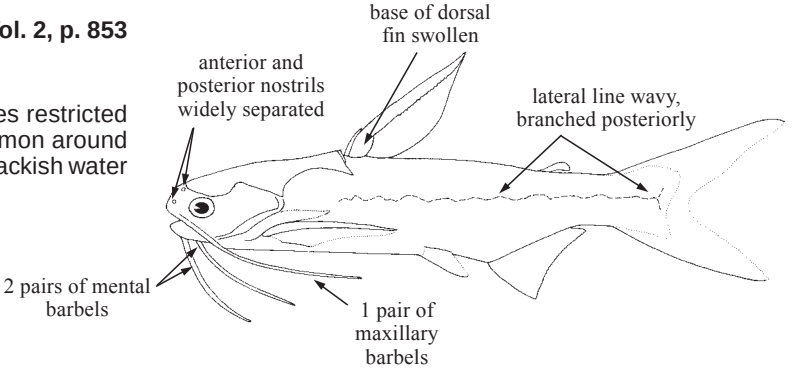
dorsal view of head



AUCHENIPTERIDAE **Vol. 2, p. 853**

Driftwood catfishes

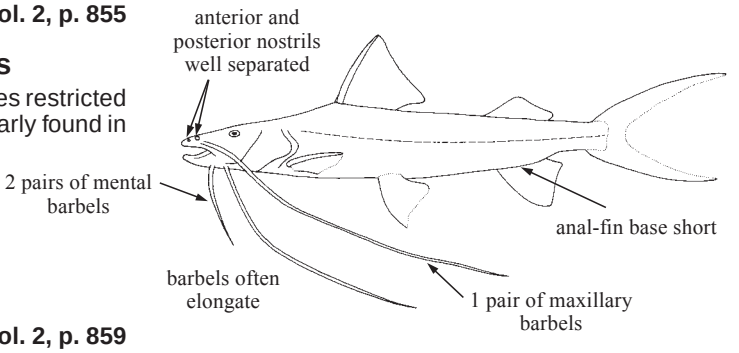
To 30 cm. Demersal, most species restricted to fresh water but 1 species common around brackish river mouths. A single brackish water species in the area.



PIMELODIDAE **Vol. 2, p. 855**

Long-whiskered catfishes

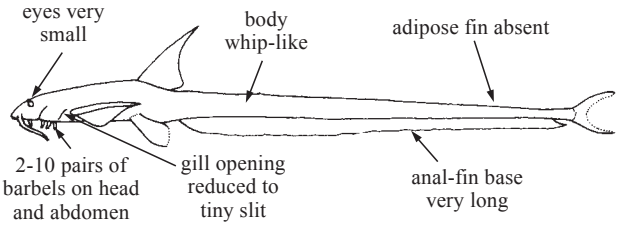
To 200 cm. Demersal, most species restricted to fresh water. Four species regularly found in brackish water in the area.



ASPREDINIDAE **Vol. 2, p. 859**

Banjo catfishes

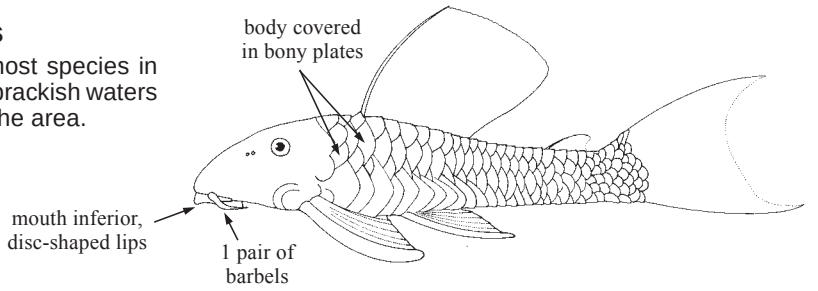
To 40 cm. Demersal; the majority of species live in fresh water, but 3 genera and 4 species are also found in brackish waters and occasionally in coastal marine waters of the area.



LORICARIIDAE **Vol. 2, p. 864**

Suckermouth catfishes

To about 75 cm. Demersal, most species in fresh water. Only 4 species in brackish waters and of interest to fisheries of the area.

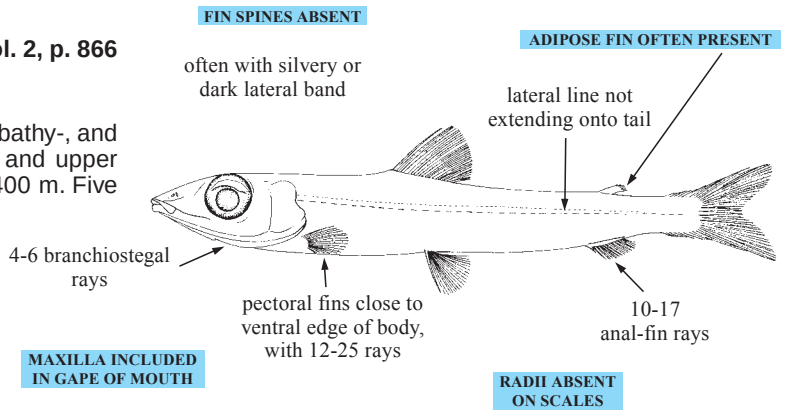


Order OSMERIFORMES - Argentines and allies

ARGENTINIDAE **Vol. 2, p. 866**

Argentines

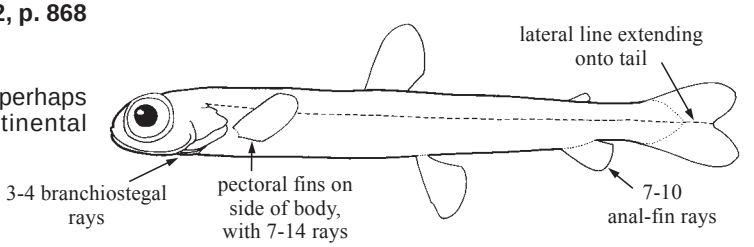
To 70 cm standard length. Meso-, bathy-, and benthopelagic on the outer shelf and upper slope, to a maximum depth of 1 400 m. Five species in the area.



MICROSTOMATIDAE Vol. 2, p. 868

Microstomatids

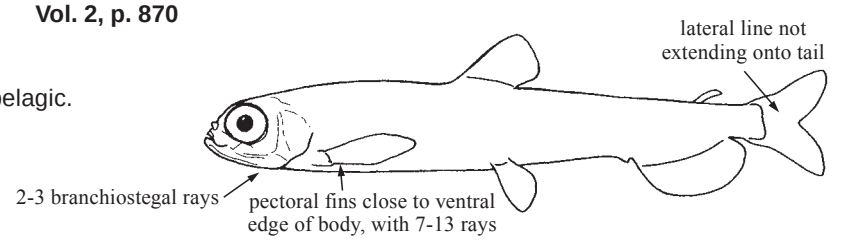
To perhaps 25 cm. Mesopelagic, perhaps also near the bottom along continental slopes.



BATHYLAGIDAE Vol. 2, p. 870

Deepsea smelts

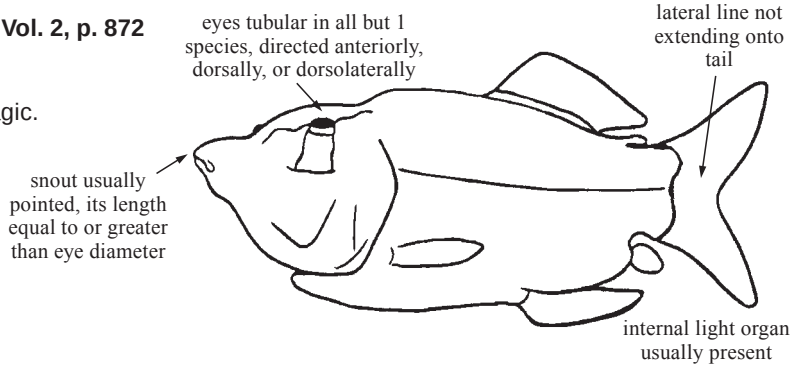
To 20 cm. Meso- and bathypelagic.



OPISTHOPROCTIDAE Vol. 2, p. 872

Barreleyes

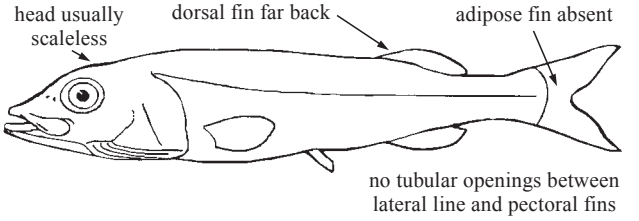
To 16 cm. Meso- and bathypelagic.



ALEPOCEPHALIDAE Vol. 2, p. 874

Slickheads

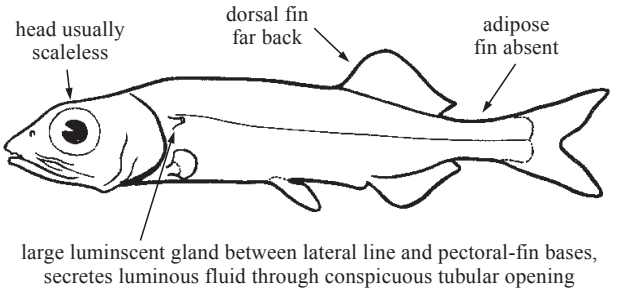
To about 60 to 70 cm. Benthopelagic, mesopelagic, and bathypelagic from depths of 100 to 5 000 m; usually between 800 and 2 500 m.



PLATYTROCTIDAE Vol. 2, p. 879

Tubeshoulders

To about 35 cm. Benthopelagic, mesopelagic, and bathypelagic; most commonly between depths of 800 and 2 000 m.

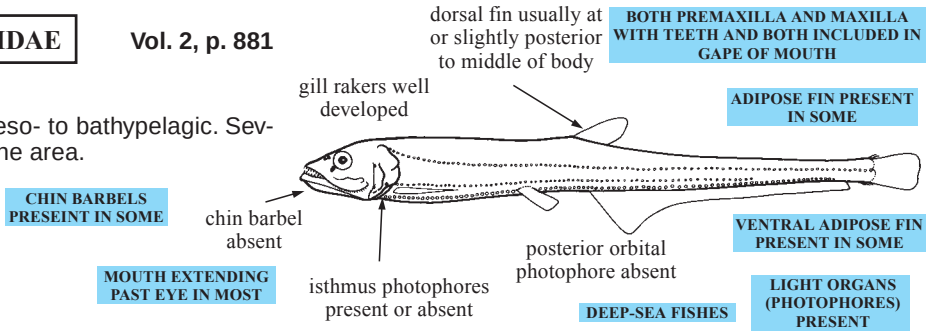


Order STOMIIFORMES - Bristlemouths and allies

GONOSTOMATIDAE Vol. 2, p. 881

Bristlemouths

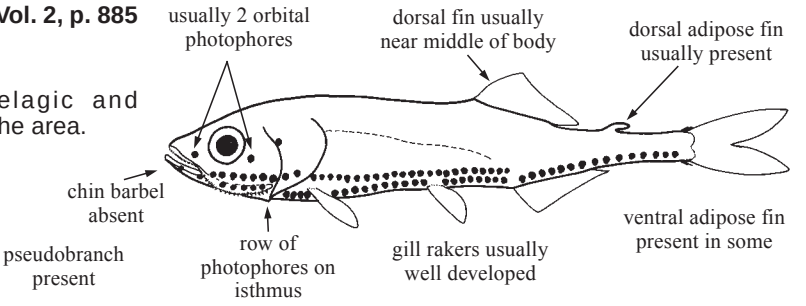
To about 36 cm. Meso- to bathypelagic. Seventeen species in the area.



PHOSICHTHYIDAE Vol. 2, p. 885

Lightfishes

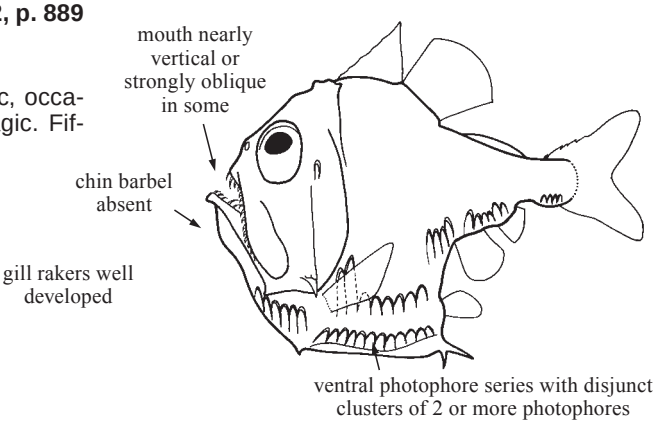
To about 30 cm. Mesopelagic and bathypelagic. Eight species in the area.



STERNOPTYCHIDAE Vol. 2, p. 889

Hatchetfishes

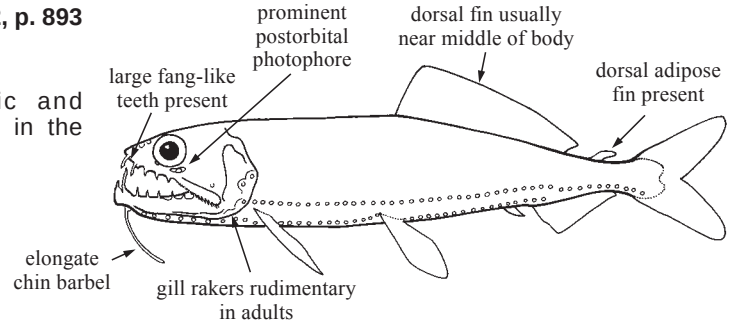
To about 10 cm. Mostly mesopelagic, occasionally bathypelagic or benthopelagic. Fifteen species in the area.



ASTRONESTHIDAE Vol. 2, p. 893

Snaggletooths

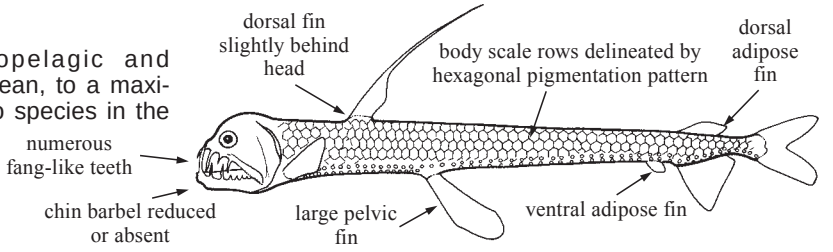
To about 22 cm. Mesopelagic and benthopelagic. Seventeen species in the area.



CHAULIODONTIDAE **Vol. 2, p. 896**

Viperfishes

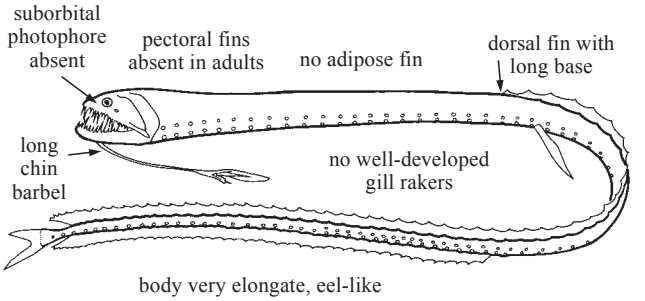
To about 30 cm. Mesopelagic and bathypelagic in the open ocean, to a maximum depth of 2 800 m. Two species in the area.



IDIACANTHIDAE **Vol. 2, p. 899**

Black dragonfishes

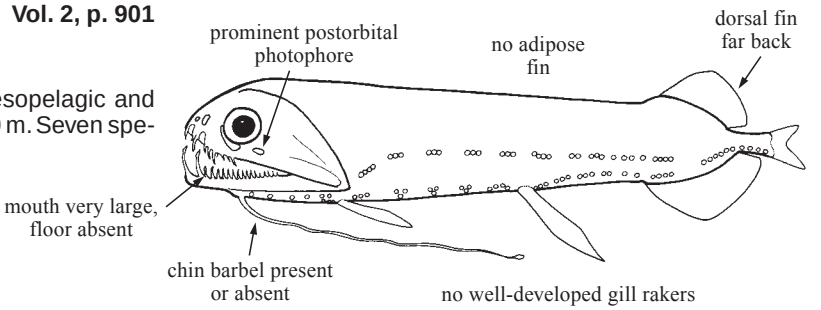
To about 48 cm. Mesopelagic and bathypelagic to a depth of 2 000 m. A single species in the area.



MALACOSTEIDAE **Vol. 2, p. 901**

Loosejaws

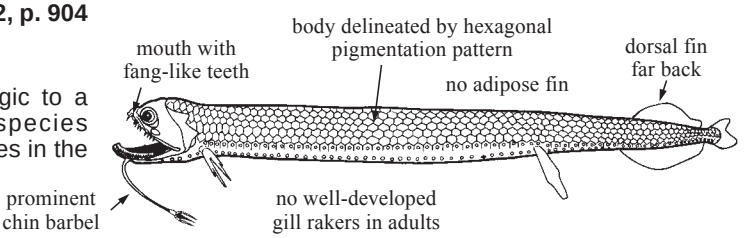
To 24 cm standard length. Mesopelagic and bathypelagic to depths of 4 000 m. Seven species in the area.



STOMIIDAE **Vol. 2, p. 904**

Scaly dragonfishes

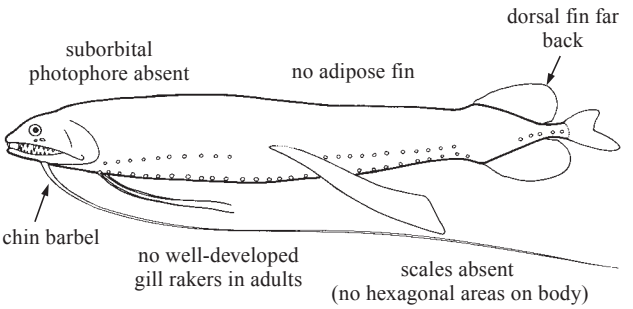
To about 41 cm. Mostly mesopelagic to a depth of 1 000 m, but some species bathypelagic to 2 000 m. Four species in the area.



MELANOSTOMIIDAE **Vol. 2, p. 907**

Scaleless black dragonfishes

To 50 cm standard length. Mostly mesopelagic to depths of 1 000 m, although some caught to depths of 4 500 m; some spceis migrate to surface at night. Around 90 species in the area.

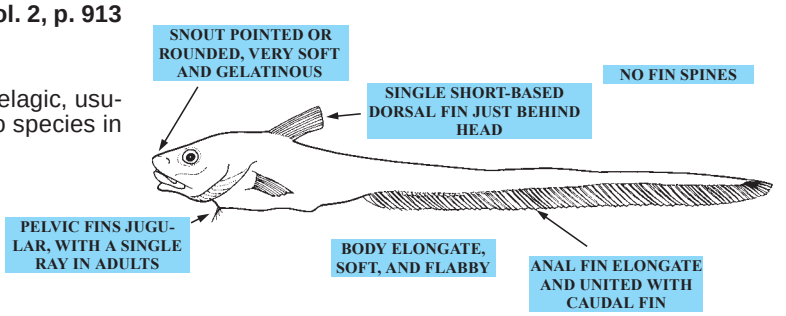


Order ATELEOPODIFORMES - Jellynoses

ATELEOPODIDAE **Vol. 2, p. 913**

Jellynoses

To 200 cm. Demersal or benthopelagic, usually between 200 and 800 m. Two species in the area.

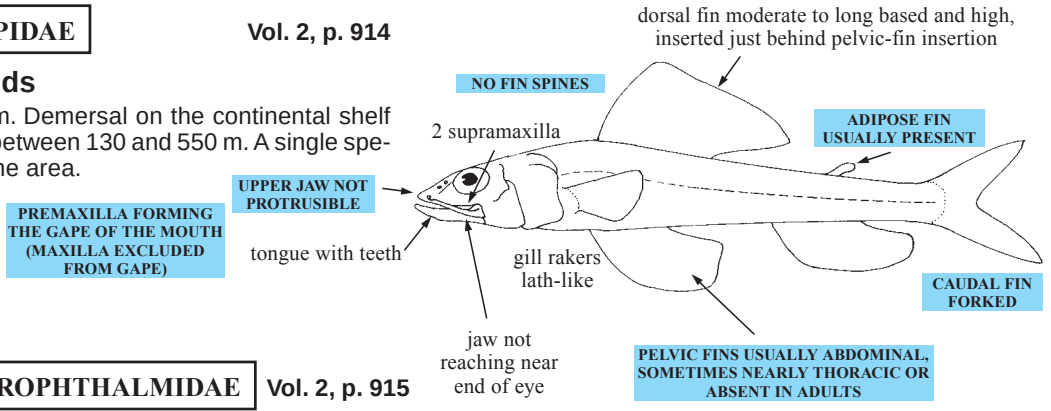


Order AULOPIFORMES - Greeneyes and allies

AULOPIDAE **Vol. 2, p. 914**

Aulopids

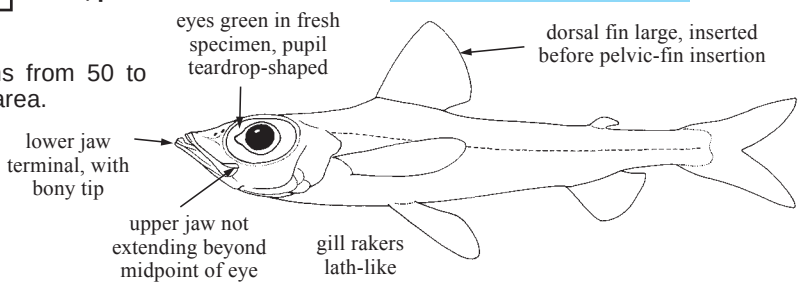
To 45 cm. Demersal on the continental shelf bottom between 130 and 550 m. A single species in the area.



CHLOROPHTHALMIDAE **Vol. 2, p. 915**

Greeneyes

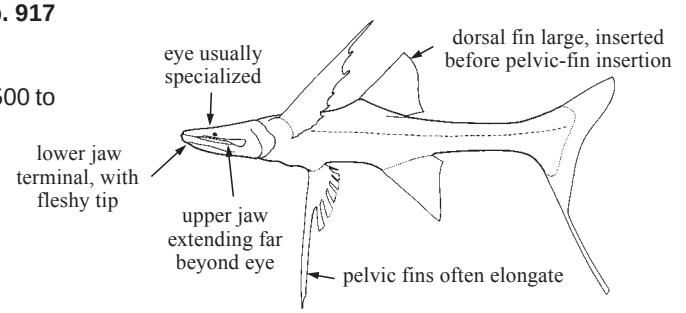
To 23 cm. Demersal at depths from 50 to 1 000 m. Three species in the area.



IPNOPIDAE **Vol. 2, p. 917**

Tripod fishes

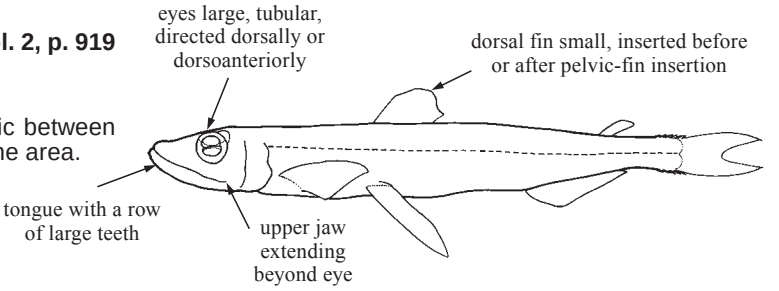
To 30 cm. Demersal in deep water from 500 to 6 000 m. Ten species in the area.



SCOPELARCHIDAE **Vol. 2, p. 919**

Pearleyes

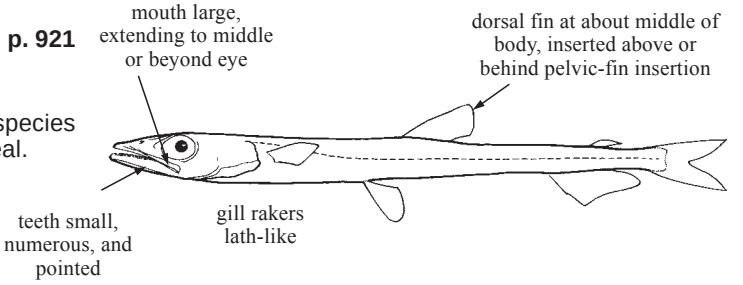
To 15 cm. Meso- and bathypelagic between 500 and 1 000 m. Six species in the area.



NOTOSUDIDAE **Vol. 2, p. 921**

Waryfishes

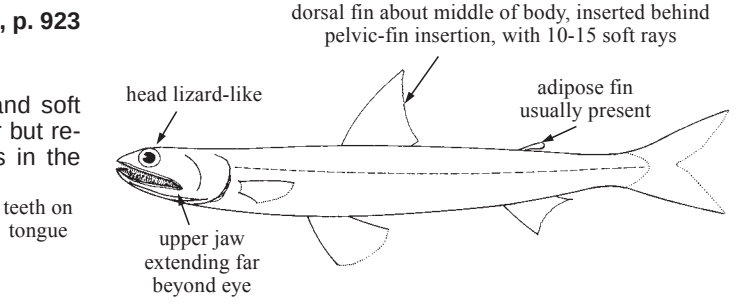
To 50 cm. Epi- to bathypelagic; some species benthopelagic. Five species in the areal.



SYNODONTIDAE **Vol. 2, p. 923**

Lizardfishes

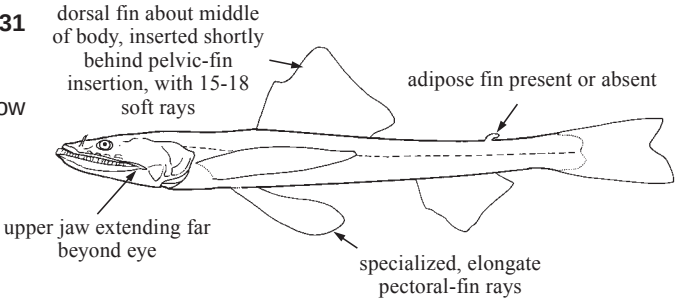
To 45 cm. Demersal on both hard and soft substrates generally in shallow water but recorded down to 545 m. Ten species in the area.



BATHYSAURIDAE **Vol. 2, p. 931**

Deepsea lizardfishes

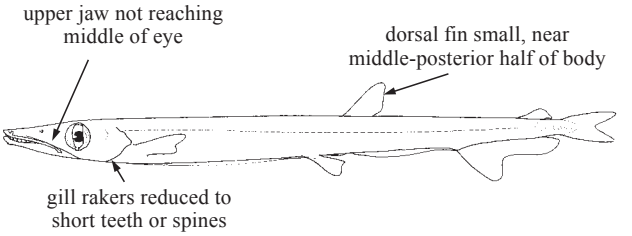
To about 83 cm. Demersal at depths below 1 000 m. Two species in the area.

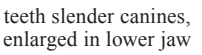


PARALEPIDIDAE **Vol. 2, p. 933**

Barracudinas

To 56 cm. Meso- to bathypeligic from the surface (at night) to a depth of 800 m. Around 20 species in the area.

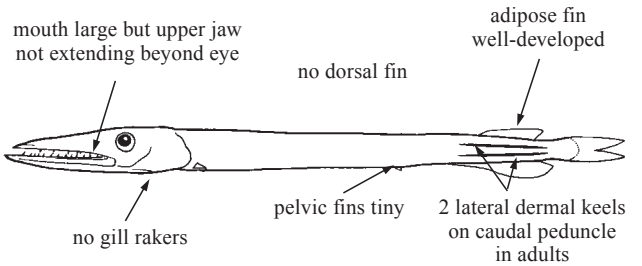




ANOTOPTERIDAE **Vol. 2, p. 935**

Daggertooth

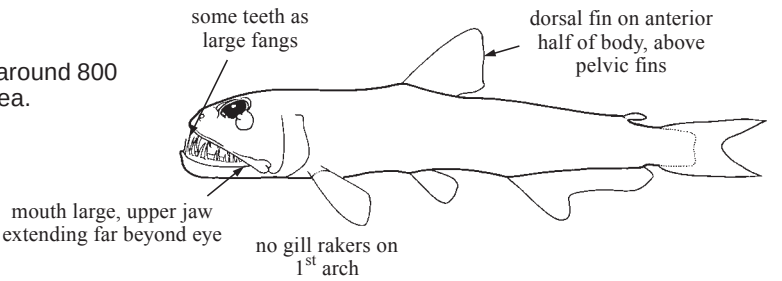
To about 1 m. Epi- to mesopelagic. A single species.



EVERMANNELLIDAE **Vol. 2, p. 936**

Sabertooth fishes

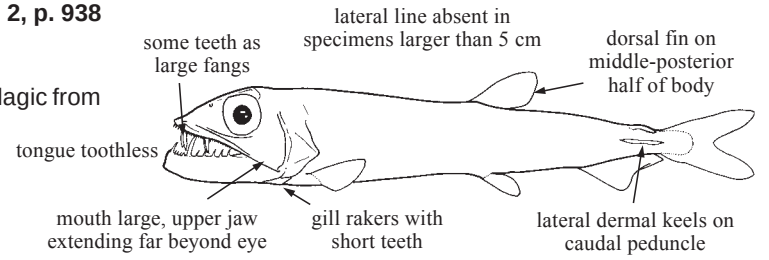
To 19 cm. Mesopelagic usually at around 800 to 1 000 m. Four species in the area.



OMOSUDIDAE **Vol. 2, p. 938**

Omosudid

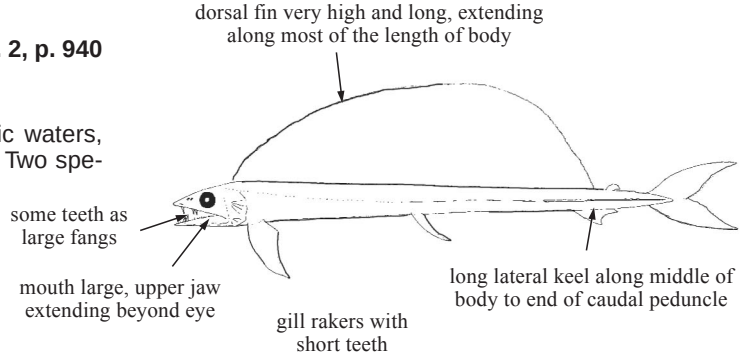
To 25 cm. Mesopelagic and bathypelagic from 700 to 1 650 m. A single species.



ALEPISAURIDAE **Vol. 2, p. 940**

Lancetfishes

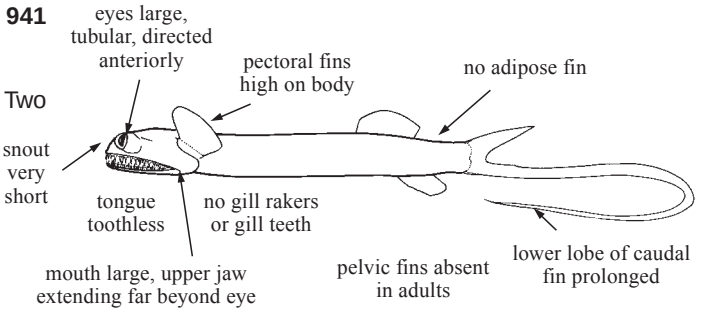
To over 200 cm. Pelagic in oceanic waters, from the surface down to 1 000 m. Two species in the area.



GIGANTURIDAE **Vol. 2, p. 941**

Telescope fishes

To 23 cm. Mesopelagic and bathypelagic. Two species in the area.

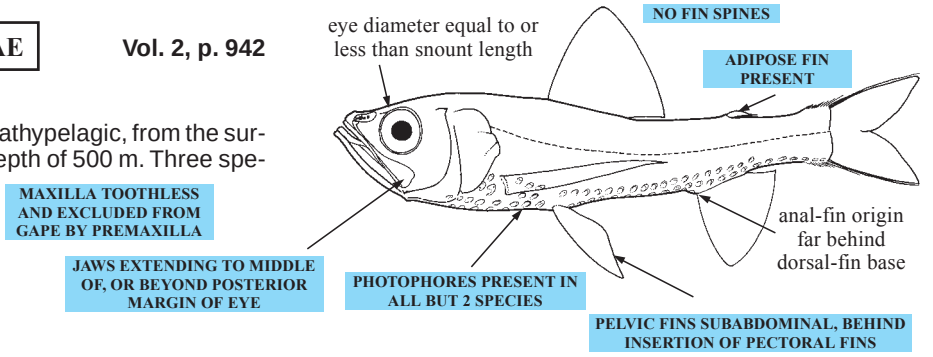


Order MYCTOPHIFORMES - Lanternfishes and Allies

NEOSCOPELIDAE **Vol. 2, p. 942**

Neoscopelids

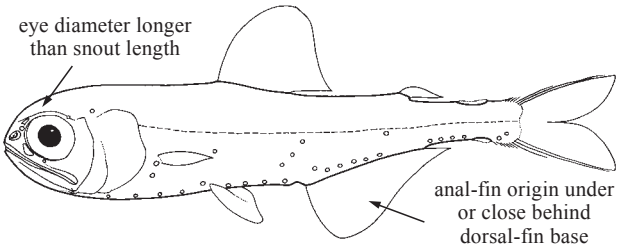
To 30 cm. Meso- to bathypelagic, from the surface (at night) to a depth of 500 m. Three species in the area.



MYCTOPHIDAE **Vol. 2, p. 944**

Lanternfishes

To 30 cm, but generally smaller than 10 cm. Meso- to bathypelagic migrating to surface waters at night. Around 77 species in the area.

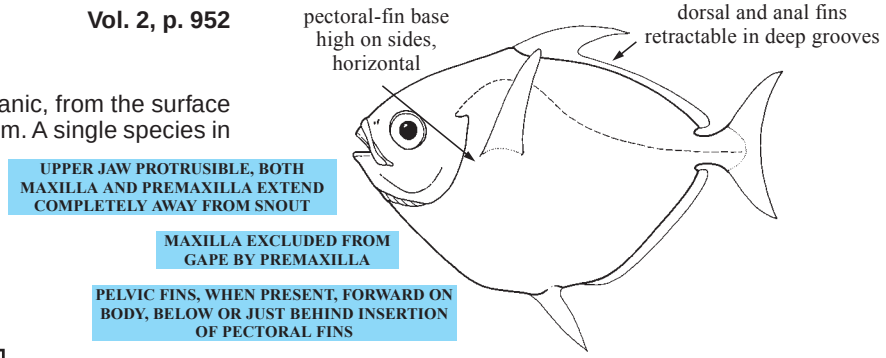


Order LAMPRIDIFORMES - Opahs and allies

LAMPRIDAE **Vol. 2, p. 952**

Opahs

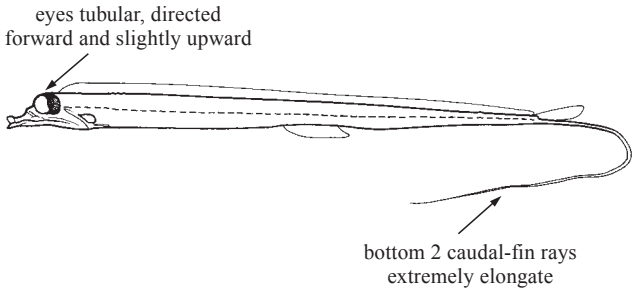
To 185 cm. Pelagic oceanic, from the surface to a depth of about 200 m. A single species in the area.



STYLEPHORIDAE **Vol. 2, p. 953**

Tube-eyes

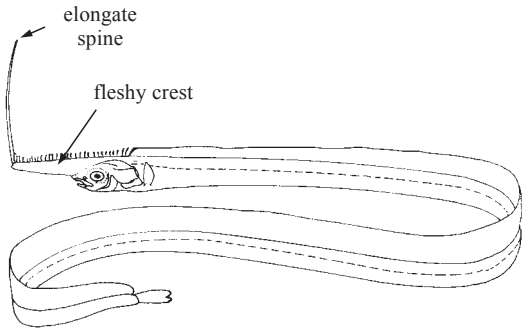
To 30 cm. Mesopelagic or bathypelagic usually between 300 and 800 m. Rare. A single species in the family.



LOPHOTIDAE **Vol. 2, p. 954**

Crestfishes

To 200 cm. Mesopelagic. Two species in the area.

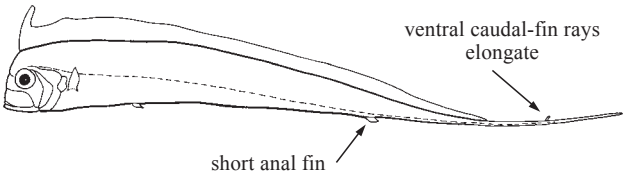


RADIICEPHALIDAE

Vol. 2, p. 956

Tapertails

To 80 cm. Mesopelagic. Very rare. A single species in the family.

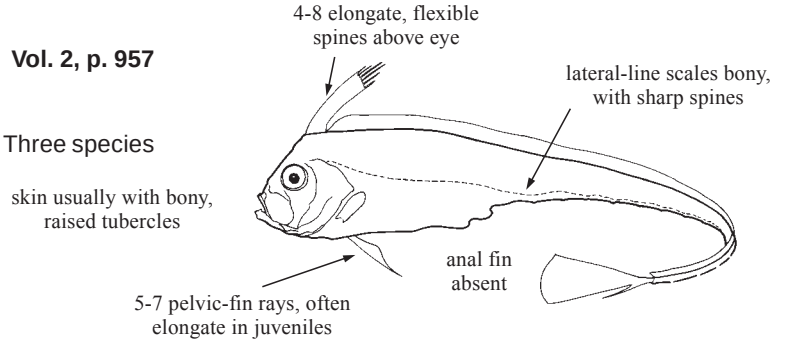


TRACHIPTERIDAE

Vol. 2, p. 957

Ribbonfishes

To 200 cm. Mesopelagic. Rare. Three species reported in the area.

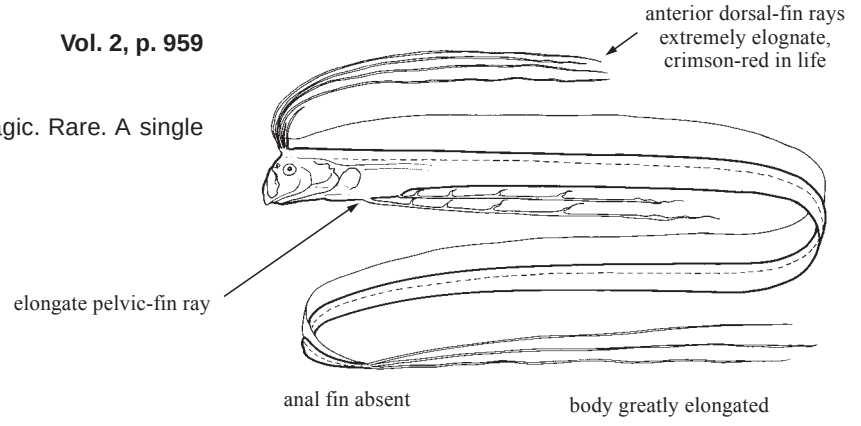


REGALECIDAE

Vol. 2, p. 959

Oarfishes

To about 17 m. Mesopelagic. Rare. A single species in the area.

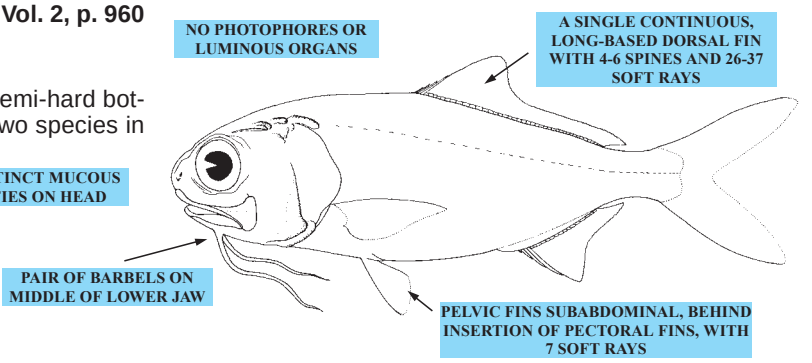


Order POLYMIXIIFORMES - Beardfishes

POLYMIXIIDAE Vol. 2, p. 960

Beardfishes

To 43 cm. Dimersal on soft or semi-hard bottoms between 50 and 800 m. Two species in the area.

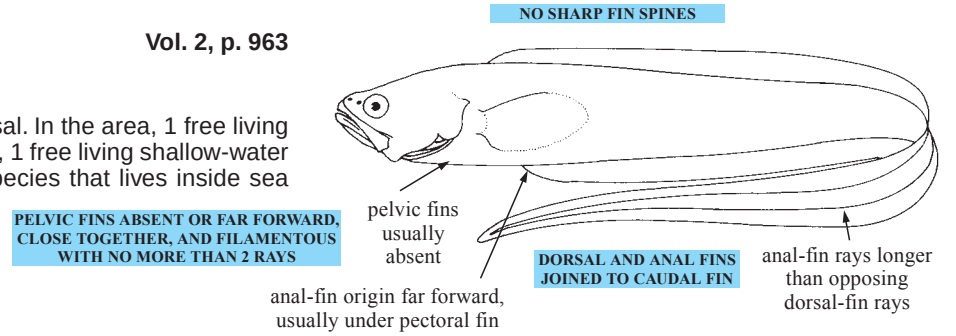


Order OPHIDIIFORMES - Brotulas and allies

CARAPIDAE Vol. 2, p. 963

Pearlfishes

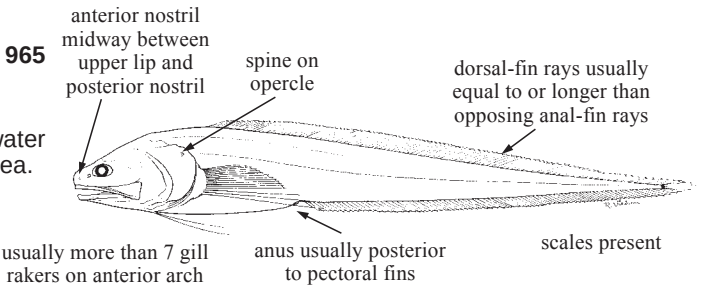
To 37 cm. Demersal. In the area, 1 free living deep-sea species, 1 free living shallow-water species, and 1 species that lives inside sea cucumbers.



OPHIDIIDAE Vol. 2, p. 965

Cusk-eels, brotulas

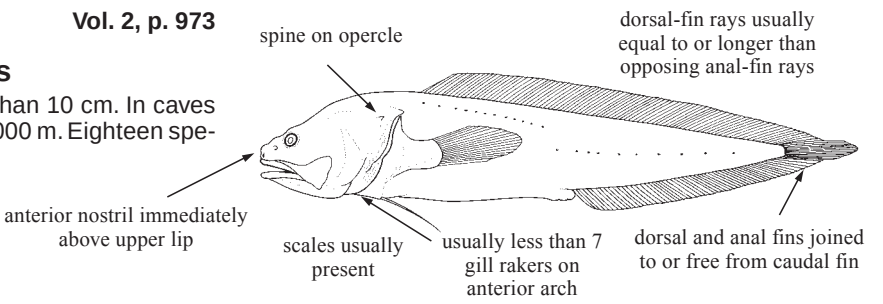
To 200 cm, Typically demersal, shallow water down to 8 370 m. Over 65 species in the area.



BYTHITIDAE Vol. 2, p. 973

Viviparous brotulas

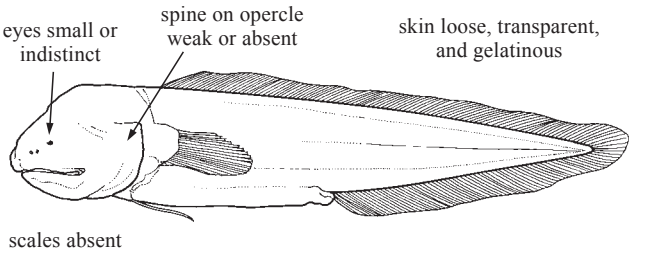
To 50 cm, typically less than 10 cm. In caves and demersal down to 2 000 m. Eighteen species in the area.



APHYONIDAE **Vol. 2, p. 975**

Aphyonids

To 25 cm. Demersal usually between 250 and 5 600 m. Rare. Eight species in the area.



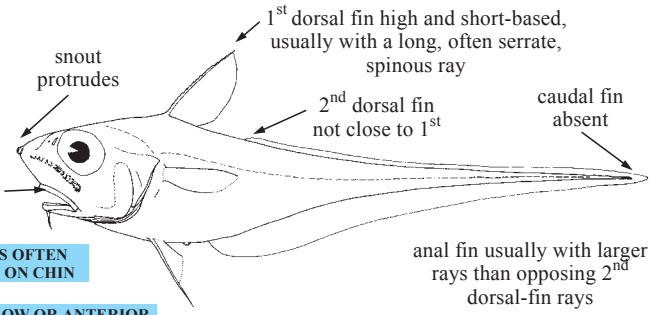
Order GADIFORMES - Hakes, Cods, and allies

MACROURIDAE **Vol. 2, p. 977**

Grenadiers

To about 110 m. Benthopelagic from a depth of about 250 to below 4 000 m. About 34 species in the area.


underside of body



BARBELS OFTEN PRESENT ON CHIN

PELVIC FINS BELOW OR ANTERIOR TO PECTORAL FINS AND WIDELY SEPARATED FROM EACH OTHER, USUALLY ENTIRE, BUT REDUCED TO FILAMENTS IN SOME SPECIES

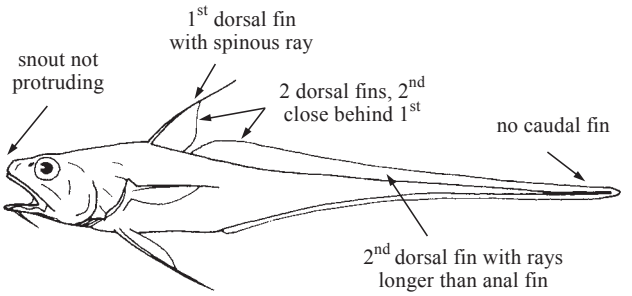
ALL SPECIES WITH LONG DORSAL AND ANAL FINS

NO TRUE SPINES IN FINS (ALTHOUGH SPINOUS RAYS PRESENT IN DORSAL FIN OF MOST MACROURIDS)

BATHYGADIDAE **Vol. 2, p. 988**

Bathygadids

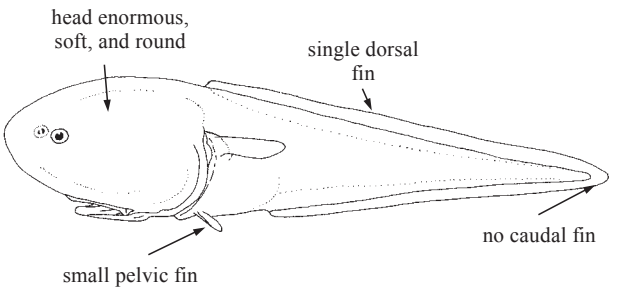
To about 60 cm. Benthopelagic on continental slope from 300 to 2 700 m. Six species in the area.



MACROUROIDIDAE **Vol. 2, p. 991**

Macrouroids

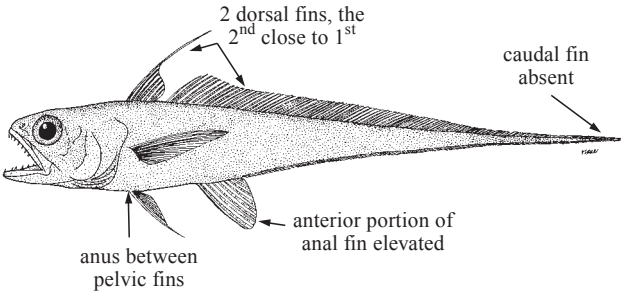
To 35 cm. Bentho- to bathypelagic. Two species in the area.



STEINDACHNERIIDAE **Vol. 2, p. 993**

Luminous hake

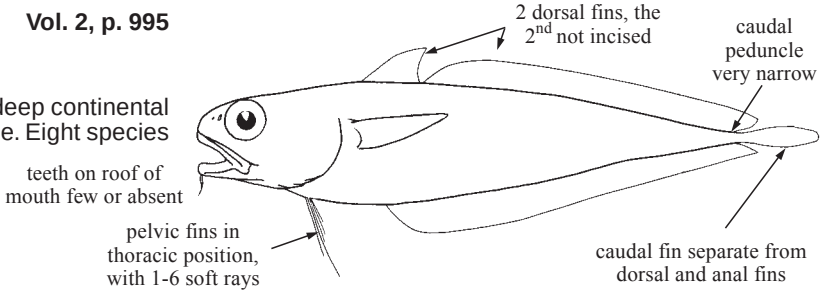
To about 30 cm. Benthopelagic between 350 and 550 m. A single species.



MORIDAE **Vol. 2, p. 995**

Moras

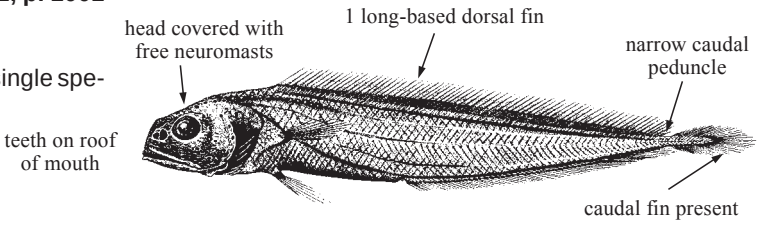
To 65 cm. Benthopelagic on deep continental shelf and the continental slope. Eight species in the area.



MELANONIDAE **Vol. 2, p. 1001**

Pelagic cods

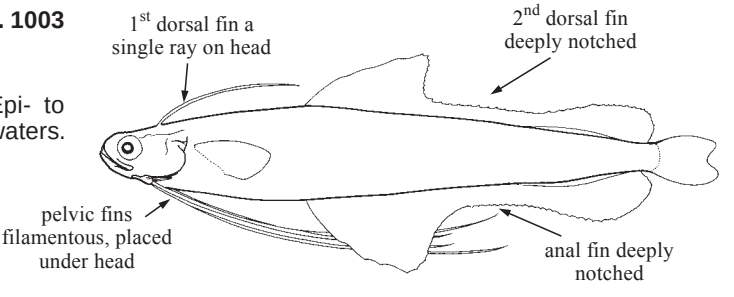
To 25 cm. Meso- to bathypelagic. A single species in the area.



BREGMACEROTIDAE **Vol. 2, p. 1003**

Codlets

To 10 cm, but usually 5 to 6 cm. Epi- to mesopelagic in coastal and oceanic waters. At least 4 species in the area.

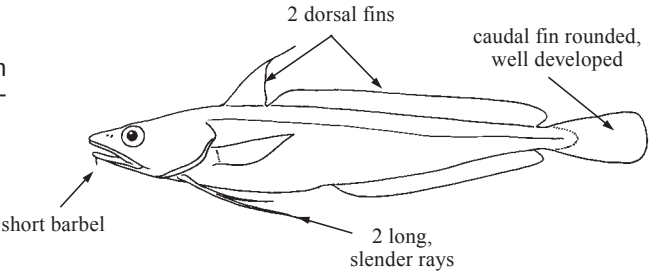


PHYCIDAE

Vol. 2, p. 1005

Phycid hakes

To 120 cm, usually 20 to 40 cm. Demersal on soft bottoms from shallow areas to upper continental slope. Seven species in the area.

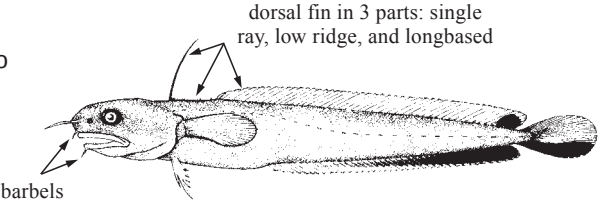


GAIDROPSARIDAE

Vol. 2, p. 1015

Rocklings

To 41 cm. Demersal on soft bottoms from 20 to 650 m. A single species in the area.

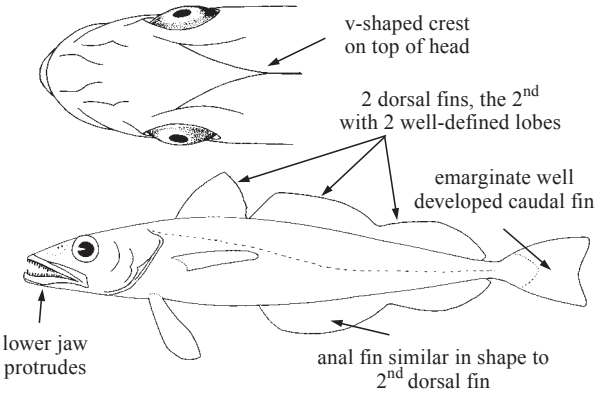


MERLUCCIIDAE

Vol. 2, p. 1017

Merlucciid hakes

To about 80 cm. Benthopelagic, from coastal waters to below a depth of 1 000 m. Two species in the area.



GADIDAE

Vol. 2, p. 1021

Cods

To 200 cm. Demersal, benthopelagic, and pelagic down to more than 1 000 m. Mostly temperate but 3 species occur in the very northern range of the area.