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FISH IDENTIFICATION IN THE WESTERN NORTH ATLANTIC: A BIBLIOGRAPHY

by

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If a novice taxonomist has to identify an unusual fish and it isn't described in one of the regional guides such as Fishes of the Gulf of Maine, Fishes of the Atlantic Coast of Canada or Fishes of Chesapeake Bay, he may decide to send it to a museum to get an expert's opinion. This is a slow and often inconvenient procedure. Also, the expert will supply the name but often ask to keep the specimen. This makes it difficult for the novice who later wants to reexamine the specimen after he has acquired the appropriate keys. A better procedure is for the novice to key out the fish for himself, and then, if he so chooses, send the specimen and his tentative identification to a museum for confirmation. I have prepared this report to provide a list of some of the taxonomic literature on fishes of the western north Atlantic. It is based on articles assembled over the years by personnel of the National Marine Fisheries Service, Resource Surveys Investigation at the Northeast Fisheries Center, supplemented by the bibliographies in various books and articles. One book I used that is especially noteworthy for its references is Animal Identification, A Reference Guide, Volume 1, Marine and Brackish Water Animals, edited by R.W. Sims, British Museum (Natural History), London, John Wiley and Sons, 111 pp., copyright 1980. Sims' entire book is one immense bibliography, covering the marine and brackish water animals of the world from Protozoa to Mammalia. Pages 96 to 108 cover the fishes.

In the present report the orders and families of the bony fishes are mostly presented in the same sequence as those in Phyletic Studies of Teleostean Fishes, with a Provisional Classification of Living Forms, by P.H. Greenwood, et al., 1966, Bulletin of the American Museum of Natural History, Volume 131(4):341-455. The elasmobranch fishes are mostly presented in the same sequence as those in A List of Common and Scientific Names of Fishes from the United States and Canada, 4th Edition, by C.R. Robins, et al., 1980, American Fisheries Society Special Publication No. 12, 174 pp.

Fishes of the Western North Atlantic, which is an ongoing series being published by the Sears Foundation for Marine Research (Yale University, New Haven, Connecticut), now consists of seven parts, dating from 1948 (Part 1, predominantly on sharks) to 1977 (Part 7, predominantly on myctophids) and additional parts are scheduled to come out in the near future. For simplicity, in this report the many references to Fishes of the Western North Atlantic are abbreviated as in the following example: FWNA 1(3), where the "1" refers to Memoir One (the designation given by the Sears Foundation for the entire series) and the number in parentheses refers to the "Part." Thus, FWNA 1(3) is Part 3 (salmons, herrings and others).

For some families more than one reference is listed. The older articles sometimes have better keys or illustrations but the more recently published articles are likely to include a more updated bibliography. As a general rule, the most recently published article should always be studied first in order to consult its bibliography as an entrance into the taxonomic literature for that fish group.

The user of this report should be able to distinguish between the various fish families. There is a pictorial guide to families of fishes beginning on page 33. This guide was taken, with some modifications, from FAO Species Identification Sheets for Fishery Purposes, Western Central Atlantic (Fishing Area 31) and reproduced here by permission of W. Fischer, the editor. Illustrations for a number of families, mainly oceanic and deepwater forms, which were not covered in the FAO volumes, were taken from Fishes of the World by Joseph S. Nelson (copyright © 1976 by John Wiley and Sons, Inc.) and reproduced here by permission of John Wiley and Sons, Inc.

This report is preliminary. Some of the articles referred to I have not read but have included them because their title seemed appropriate. It is hoped that this report can be updated and improved as time goes by. Suggestions from users are encouraged, especially in regard to families and genera not covered here but that occur in the Western North Atlantic.

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MYXINIFORMES

Myxinidae

Hagfishes

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PETROMYZONTIFORMES

Petromyzontidae

Lampreys

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Hubbs, C. L., and I. C. Potter. 1971. Distribution, phylogeny and taxonomy, in: Hardisty, M. W. & I. C. Potter (eds) The Biology of Lampreys. London & New York (Academic Press) 1:1-65.

HEXANCHIFORMES

Hexanchidae

Cow Sharks

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SQUALIFORMES

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Orectolobidae

Carpet sharks

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Rhincodontidae

Whale sharks

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Odontaspididae

Sand tigers

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Alopiidae

Thresher sharks

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Lamnidae

Mackerel sharks

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Scyliorhinidae

Cat sharks

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Carcharhinidae

Requeim sharks

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Sphyrnidae

Hammerhead sharks

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Squalidae

Dogfish sharks

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Squatinidae

Angel sharks

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Pristidae

Sawfishes

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Rhinobatidae

Guitarfishes

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Torpedinidae

Electric rays

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Rajidae

Skates

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Dasyatidae

Stingrays

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Myliobatidae

Eagle rays
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Mobulidae

Mantas
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CHIMAERIFORMES

Chimaeridae/Rhinochimaeridae/Callorhynchidae

Shortnose chimaeras/Longnose chimaeras/Plownose chimaeras
Bigelow, H. B., and W. C. Schoreder. 1953. Chimaeroids, pp. 515-562, in: FWNA 1(2).

ACIPENSERIFORMES

Acipenseridae

Sturgeons
Vladykov, V. D., and J. R. Greeley. 1963. Order Acipenseroidei, pp. 24-60, in: FWNA 1(3).

SEMIONOTIFORMES

Lepisosteidae

Gars
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ELOPIFORMES

Megalopidae/Elopidae

Tarpons/Ladyfishes
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Muraenidae

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Heterenchelidae

Heterenchelids

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Dysommidae

Arrowtooth eels

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Pike congers/Duckbill eels

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Conger eels

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Ophichthidae

Snake eels

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Snipe eels

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Saccopharyngidae

Swallowers

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Eurypharyngidae

Gulpers

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NOTACANTHIFORMES

Halosauridae

Halosaurs

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Lipogenyidae

Lipogenyids

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Notacanthidae

Spiny eels

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CLUPEIFORMES

Clupeidae

Herrings

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Engraulidae

Anchovies

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SALMONIFORMES

Salmonidae

Trouts

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Deepsea smelts

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Opisthoproctidae

Spookfishes

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Esocidae

Pikes

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Gonostomatidae

Bristlemouths or Lightfishes

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Sternoptychidae

Hatchetfishes

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Astronesthidae

Snaggletooths

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Melanostomiidae

Scaleless dragonfishes

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Malacosteidae

Loosejaws
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Chauliodontidae

Viperfishes
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Stomiatidae

Scaly dragonfishes
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Idiacanthidae

Black dragonfishes
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Bathylaconidae

Bonythroats
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MYCTOPHIFORMES

Aulopidae

Aulopus
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Synodontidae

Lizardfishes
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Bathysauridae

Deepsea lizardfishes
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Chlorophthalmidae

Greeneyes
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Bathypteroidae

Tripodfish
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Ipnopidae

Ipnopids
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Paralepidae

Barracudinas
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Omosudidae

Omosudids
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Alepisauridae

Lancetfishes
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Anotopteridae

Daggertooths
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Evermannellidae

Sabretoothfishes
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Scopelarchidae

Pearleyes
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Scopelosauridae

Scopelosaurids
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Myctophidae

Lanternfishes
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Neoscopelids
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Giganturidae

Giganturids
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Batrachoididae

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GOBIESOCIFORMES

Gobiesocidae

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Lophiidae

Goosefishes

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Antennariidae

Frogfishes

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Ogcocephalidae

Batfishes

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GADIFORMES

Moridae

Moras

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Bregmacerotidae

Codlets

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Gadidae/Merlucciidae

Codfishes/Merluccid hakes

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Cusk eels/Brotulas/Pearlfishes/Aphyonids

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Brotulas

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Carapidae

Pearlfishes

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Zoarcidae

Eelpouts

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Macrouridae

Grenadiers

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Exocoetidae/Hemiramphidae

Flying fishes/Halfbeaks

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Microdesmidae

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Scombridae

Mackerels

Collette, B. B., and L. N. Chao. 1975. Systematics and morphology of the bonitos (Sarda) and their relatives (Scombridae, Sardini). Fish. Bull., U.S. 76:273-280.

Fraser-Brunner, A. 1950. The fishes of the family Scombridae. Ann. Mag. Nat. Hist., Ser. 12, 3(26):131-163.

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Matsui, T. 1967. Review of the mackerel genera Scomber and Rastrelliger with description of a new species of Rastrelliger. Copeia 1:71-82.

Miyake, M., and S. Hayasi. 1972. Field manual for statistics and sampling of Atlantic tunas and tuna-like fishes. Int. Comm. Cons. Atl. Tunas, Madrid, Spain, 142 pp. (unnumbered).

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Mackerels (cont'd)

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Rivas, L. R. 1961. A review of the tuna fishes of the subgenera Parathunnus and Neothunnus (genus Thunnus). Ann. Mus. Civ. Storia Nat. Genova 72:126-148.

Uchida, R. N. 1981. Synopsis of biological data on frigate tuna, Auxis thazard and bullet tuna, A. rochei. NOAA Tech. Rept., NMFS Circ. 436:63 pp.

Yoshida, H. O. 1979. Synopsis of biological data on tunas of the genus Euthynnus. NOAA Tech. Rept., NMFS Circ. 429:57 pp.

Yoshida, H. O. 1980. Synopsis of biological data on bonitos of the genus Sarda. NOAA Tech. Rept., NMFS Circ. 432:52 pp.

Xiphiidae

Swordfishes

Palko, R. J., G. L. Beardsley, and W. J. Richards. 1981. Synopsis of the biology of the swordfish, Xiphias gladius Linnaeus. NOAA Tech. Rept., NMFS Circ. 441:21 pp.

Luvaridae

Louvars

Bolin, R. L. 1940. A redescription of Luvarus imperialis Rafinesque based on a specimen from Monterey, California. Calif. Fish Game 26(3):282-284.

Istiophoridae

Billfishes

Morrow, J. E., and S. J. Harbo. 1969. A revision of the sailfish genus Istiophorus. Copeia 1969(1):34-43.

Robins, C. R., and D. P. deSylva. 1963. A new western Atlantic spearfish, Tetrapterus pfleugeri, with a redescription of the Mediterranean spearfish Tetrapterus belone. Bull. Mar. Sci. Gulf Carib. 13(1):84-122.

Stromateidae/Centrolophidae/Nomeidae/Ariommidae

Butterfishes/Ruffs/Man-of-war fishes/Driftfishes

Haedrich, R. L. 1967. The Stromateoid fishes: systematics and a classification. Bull. Mus. Comp. Zool. Harv. 135(2):31-139.

Horn, M. L. 1970. Systematics and biology of the stromateid fishes of the genus Peprilus. Bull. Mus. Comp. Zool. Harv. 140(5):165-261.

PLEURONECTIFORMES

Flatfishes

Norman, J. R. 1934. A systematic monograph of the flatfishes (Heterosomata). Vol. 1. Psettodidae, Bothidae, Pleuronectidae. Brit. Mus. (Nat. Hist.), London:459 pp.

Pleuronectidae

Righteye flounders

Klein-MacPhee, G. 1978. Synopsis of biological data for the winter flounder, Pseudopleuronectes americanus (Walbaum). NOAA Tech. Rept., NMFS Circ. 414:43 pp.

Bothidae

Lefteye flounders

Ginsburg, I. 1952. Flounders of the genus Paralichthys and related genera in American waters. U.S. Fish Wildl. Serv., Fish. Bull. 52(71:267-351.

Gutherz, E. J. 1967. Field guide to the flatfishes of the family Bothidae in the Western North Atlantic. U.S. Fish Wildl. Serv., Circ. 263:47 pp.

Soleidae

Soles

Nielsen, J. G. 1963. Soleoidea (Pisces:Heterosomata). Atlantide Rep. 7:7-35.

Cynoglossidae

Tonguefishes

Ginsburg, I. 1951. Western Atlantic tonguefishes with descriptions of six new species. Zoologica 36(3):185-201.

Menon, A.G.K. 1977. A systematic monograph of the tongue soles of the genus Cynoglossus Hamilton-Buchanan (Pisces:Cynoglossidae). Smithson. Contrib. Zool. 238:133 pp.

TETRAODONTIFORMES

Tyler, J. C. 1980. Osteology, phylogeny, and higher classification of the fishes of the order Plectognathi (Tetraodontiformes). NOAA Tech. Rept., NMFS Circ. 434:1-422.

Balistidae/Monacanthidae

Triggerfishes/Filefishes and Leatherjackets

Berry, F. H., and L. E. Vogele. 1961. Filefishes (Monacanthidae) of the western North Atlantic. U.S. Fish Wildl. Serv., Fish. Bull. 61(181):61-109.

Triggerfishes/Filefishes and Leatherjackets (cont'd)

Moore, D. 1967. Triggerfishes (Balistidae) of the western Atlantic. Bull. Mar. Sci. 17:689-722.

Randall, J. E. 1964. A revision of the filefish genus Amanses and Cantherhines. Copeia 1964(2):331-361.

Ostraciidae

Boxfishes

Tyler, J. C. 1965. A synopsis of the four species of cowfishes (Acanthostracion, Plectognathi) in the Atlantic Ocean. Proc. Acad. Nat. Sci. Phila. 117(8):261-287.

Tetraodontidae

Puffers

Shipp, R. L. 1974. The pufferfishes (Tetraodontidae) of the Atlantic Ocean. Publ. Gulf Coast Res. Lab. Mus. (Ocean Springs, Miss.) 4:1-162.

Shipp, R. L., and R. W. Yerger. 1969. A new pufferfish, Sphoeroides parvus, from the western Gulf of Mexico, with a key to the species of Sphoeroides from the Atlantic and Gulf coasts of the U.S. Proc. Biol. Soc. Wash. 82:477-488.

Shipp, R. L., and R. W. Yerger. 1969. Status, characters, and distribution of the northern and southern puffers of the genus Sphoeroides. Copeia 3:425-433.

Triacanthoidea

Tyler, J. C. 1968. A monograph on plectognath fishes of the superfamily Triacanthoidea. Monogr. Acad. Nat. Sci. Phila. 16, viii+364 pp.

Diodontidae

Porcupinefishes

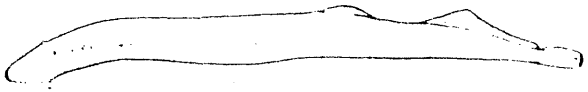
Leis, J. M. 1978. Systematics and zoogeography of the porcupinefishes (Diodon, Diodontidae, Tetraodontiformes), with comments on egg and larval development. Fish. Bull., U.S. 76(3):535-567.

Molidae

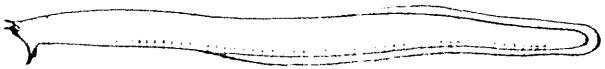
Molas

Fraser-Brunner, A. 1951. The ocean sunfishes (family Molidae). Bull. Brit. Mus. (Nat. Hist.) Zool. 1:89-121.

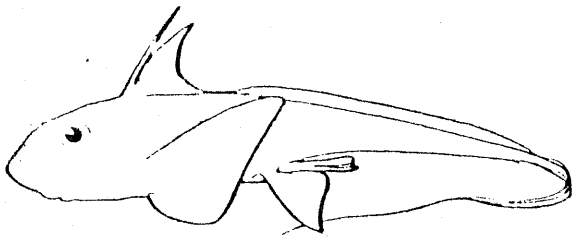
PETROMYZONTIDAE Lampreys



MYXINIDAE Hagfishes

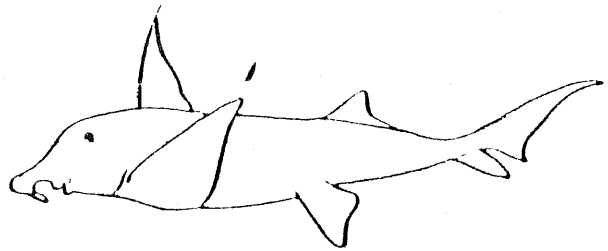


CHIMAERIDAE Shortnose chimaeras



RHINOCHIMAERIDAE Longnose chimaeras

CALLORHINCHIDAE Plownose chimaeras



KEY WITH PICTURE GUIDE TO FAMILIES OCCURRING IN THE AREA

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

2 a. Snout greatly elongated into a flat saw with large, pointed denticles on sides and a pair of long, tape-like barbels on the lower surface (Fig. 1) ..... Pristiophoridae (saw sharks)

2 b. Snout short to moderately long, not sawlike and usually without barbels (barbels present on nostrils in Squatinidae)

3 a. Body greatly depressed and ray-like; pectoral fins greatly enlarged, with anterior triangular projections that overlap gill openings; mouth terminal (Fig. 2) ..... Squatinidae (angel sharks)

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

4 a. Trunk high and compressed, with ridges between bases of pectoral and pelvic fins; dorsal fins very high; fin spine of first inclined forward* (Fig. 3) ..... Oxynotidae (humantin)

4 b. Trunk low and cylindrical, without ridges between pectoral and pelvic bases; dorsal fins lower; fin spine of first, when present, inclined backward (Fig. 4) ..... Squalidae (dogfish sharks)

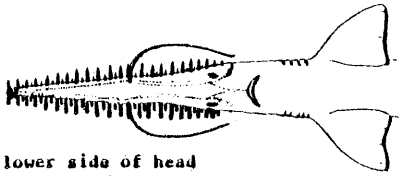
1 b. Anal fin present

5 a. Only one dorsal fin, far rearward on back; 6 or 7 gill openings on each side (Fig. 5) ..... Hexanchidae (cow sharks)

5 b. Two dorsal fins*; 5 gill openings

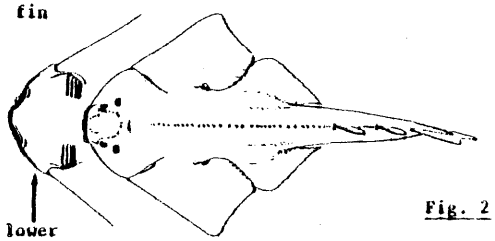
6 a. Head with lateral expansions* or blades, like a double-edged ax (Fig. 6) ..... Sphyrnidae (hammer-head sharks)

6 b. Head normal, not expanded laterally



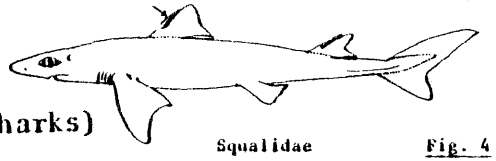
lower side of head and anterior part of body

Pristiophoridae Fig. 1



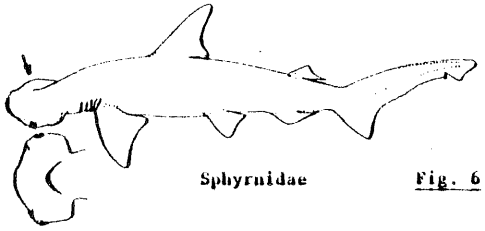
Squatinidae Fig. 2

Oxynotidae Fig. 3



Squalidae Fig. 4

Hexanchidae Fig. 5



Sphyrnidae Fig. 6

* Key character applying to Fishing Area 31 members only

7 a. Caudal fin about as long as rest of shark (Fig. 7) ..... Alopiidae (thresher sharks)

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

8 a. Eyes behind mouth; grooves connecting nostrils and mouth (Fig. 8a)

9 a. Mouth huge and terminal on head; 3 ridges on sides of trunk, the lowest ending in a strong keel on tail; light spots and stripes present at all stages (Fig. 9) ..... Rhiniodontidae (whale sharks)

9 b. Mouth small and ventral; no ridges on trunk or keel on tail; dark spots in young*, absent in adults (Fig. 10).. Ginglymostomatidae =Orectolobidae (carpet sharks)

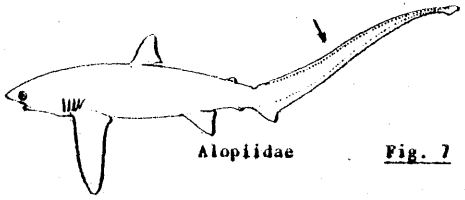
8 b. Eyes over mouth; no grooves between nostrils and mouth* (Fig. 8b)

10 a. A strong keel on each side of tail; caudal fin crescentic and nearly symmetrical (Figs. 11, 12)

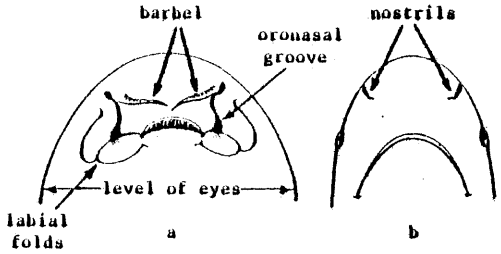
11 a. Teeth large and few, sharp-edged; gill openings large but not extending onto upper surface to head; no gill rakers (Fig. 11) ..... Lamnidae (mackerel sharks)

11 b. Teeth minute and very numerous, not sharp-edged; gill openings huge, extending onto upper surface of head; gill rakers present on internal gill openings in throat, sometimes absent after shedding (Fig. 12) ..... Cetorhinidae (basking sharks)

10 b. No keel on tail, or a very weak one (*Galeocerdo*, *Prionace*); caudal fin asymmetrical, no crescentic

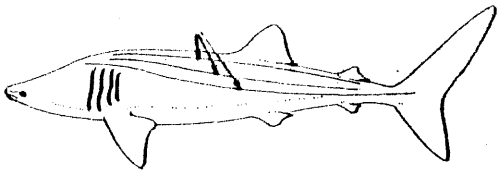


Alopiidae Fig. 7

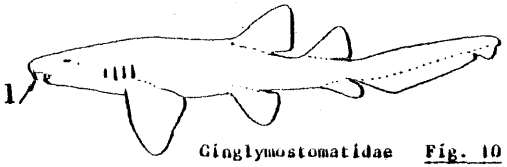


Ginglymostoma sp. *Carcharhinus* sp.

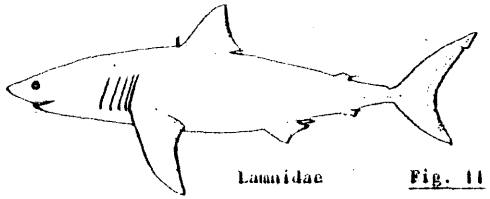
underside of head Fig. 8



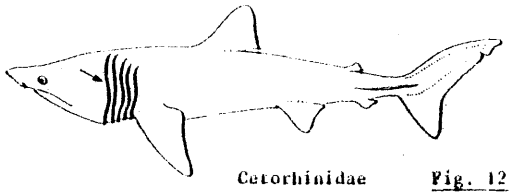
Rhiniodontidae Fig. 9



Ginglymostomatidae Fig. 10



Lamnidae Fig. 11



Cetorhinidae Fig. 12

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* Key characters applying to Fishing Area 31 members only

12 a. Origin of first dorsal fin over or behind pelvic-fin bases* (Fig. 13) .. Scyliorhinidae

12 b. Origin of first dorsal well ahead of pelvic-fin bases (Figs. 14 to 17)

(cat sharks)

13 a. Precaudal pits present

14 a. No nictitating eyelid; largest teeth on either side of symphysis (junction of jaws from either side), in upper jaw separated from large teeth at sides of jaw by a gap, usually with one or more rows of minute intermediate teeth (Fig. 14) ..... Odontaspididae

(sand tigers)

14 b. Nictitating eyelid present; largest teeth at sides of jaw, not on either side of symphysis, in upper jaw not separated from large teeth near symphysis by a gap with or without intermediate teeth (Fig. 15) ..... Carcharhinidae

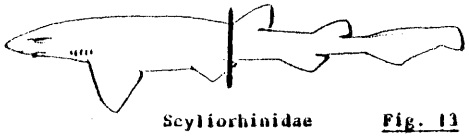
(requeim sharks)

13 b. Precaudal pits absent

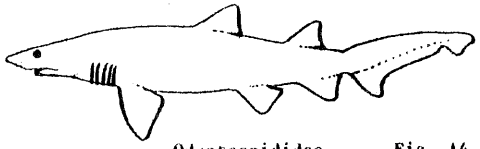
15 a. Caudal fin elongated and ribbonlike*; teeth with strong cusps and side cusplets*, rear teeth comblike (Fig. 16) ..... Proscylliidae

15 b. Caudal fin short and broad; teeth without cusps or with weak ones*, rear teeth not comblike (Fig. 17) ..... Triakidae

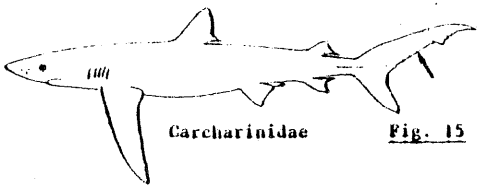
(smoothhounds)



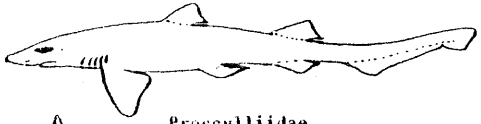
Scyliorhinidae Fig. 13



Odontaspididae Fig. 14



Carcharinidae Fig. 15

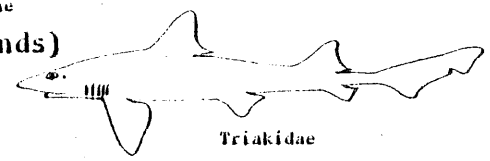


Proscylliidae

lower teeth

comb-like rear teeth

Fig. 16



Triakidae

teeth

Fig. 17

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* Key characters applying to Fishing Area 31 members only

KEY WITH PICTURE GUIDE TO FAMILIES OCCURRING IN THE AREA
(illustrations show type genera of families)

1 a. Body shark like, moderately depressed only; pectoral fins barely enlarged; tail not distinctly marked off from the body sector

2 a. Snout extremely prolonged as a flat, narrow, and firm blade, edges of which are armed with respectively a single series of large tooth-like structures (Fig. 1) ..... Pristidae **(sawfishes)**

2 b. Snout wedge-shaped and much prolonged, but not as a blade and without lateral teeth (Fig. 2) ..... Rhinobatidae **(guitar-fishes)**

1 b. Body distinctly depressed, pectoral fins broadly enlarged; tail more or less sharply marked off from the body sector

3 a. Tail variable in shape and length, with or without armature of prickles, spines and thorns; if armed, no single greatly enlarged and saw-edged spine (or spines); pseudobranchial folds present at anterior wall of spiracles (Fig. 3)

4 a. Disc fleshy toward its margins and thicker than in most other batoids (Fig. 5); consistency of body soft and flabby; well developed electric organs along sides of head within anterior part of disc

5 a. Mouth arcuate and not entirely surrounded by a deep groove (Fig. 4a); shape of disc truncate or emarginate anteriorly (Fig. 4a and 5) ..... Torpedinidae **(electric rays)**

5 b. Mouth transverse and entirely surrounded by a deep groove; shape of disc rounded anteriorly (Fig. 4b) .. Narcinidae

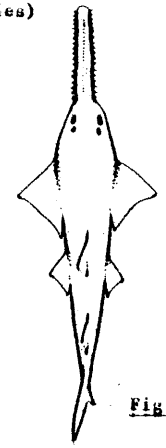


Fig. 1

Pristis

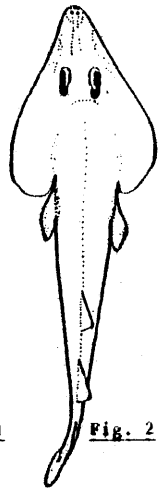
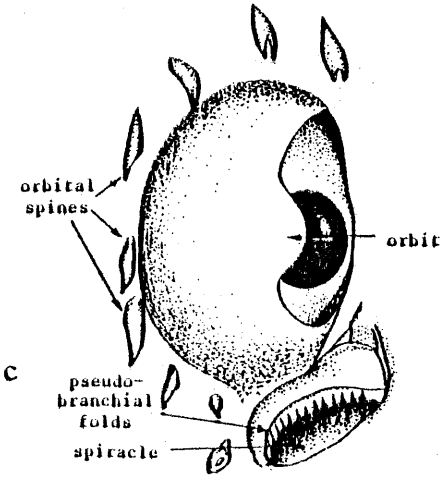


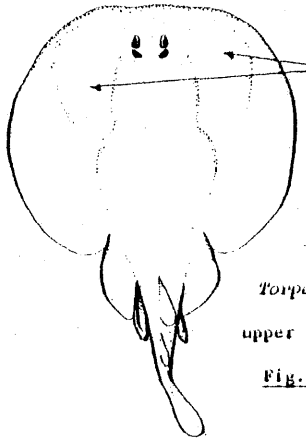
Fig. 2

Rhinobatos



right eye and spiracle

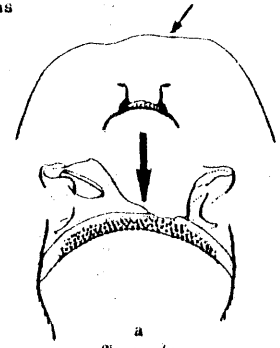
Fig. 3



Torpedo

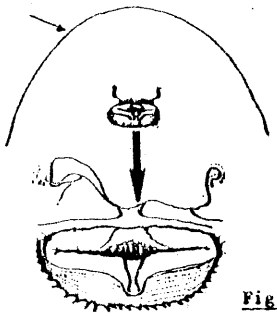
upper side

Fig. 5



a

Torpedo



b

Benthobatis

anterior portion of lower side

Fig. 4

4 b. Disc normally not very thick, margins thin and not fleshy; consistency of body mostly firm; electric organs, if present, in the tail region only and very low-powered

6 a. Pelvic fins with a single lobe

7 a. Pelvic fins with pointed outer angle; tip of snout with a very small filament (Fig. 6); no oronasal pits ..... Gurgesiellidae

7 b. Pelvic fins with broadly rounded outer angle; rostral filament distinctly prolonged and of worm-like shape (Fig. 7b) oronasal pits present (Fig. 7a) ..... Pseudorajidae

6 b. Pelvic fins bilobed

8 a. Lobes of pelvic fin separated by a more or less deep notch in their joint outer margin (Fig. 8) ..... Rajidae

8 b. Anterior lobe of pelvic fin forming a limb-like structure completely independent from the posterior lobe (Figs. 9, 10)

9 a. Tip of snout extended as a filament; no lateral tail folds; no dorsal fins; absolutely no trace of squamation on both surfaces except for alar thorns of adult males (Fig. 9) ..... Anacanthobatidae

9 b. Two dorsal fins present; disc and tail dorsally always armed with prickles and thorns, ventral side partly prickled; lateral tail folds developed; snout without extended filament at tip (Fig. 10).... Crurirajidae

3 b. Tail variable in shape and length; in many cases very long and like a whiplash toward its tip; upper surface of tail usually with one or more greatly enlarged and saw-edged spines; no pseudobranchial folds at anterior wall of spiracles (Figs. 11 to 16)

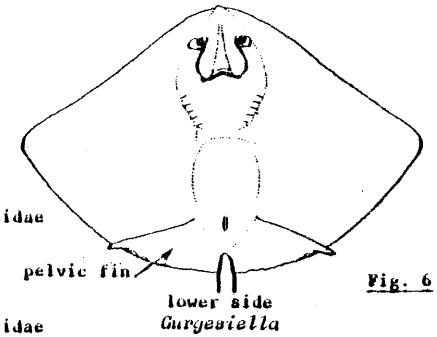
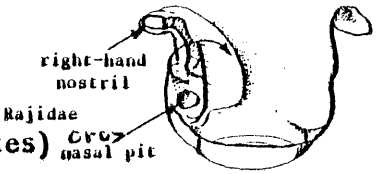


Fig. 6



Pseudoraja
oronasal region with right-hand nasal flap rolled back
Fig. 7a

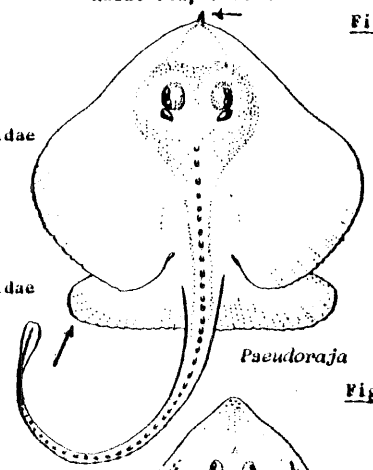


Fig. 7b

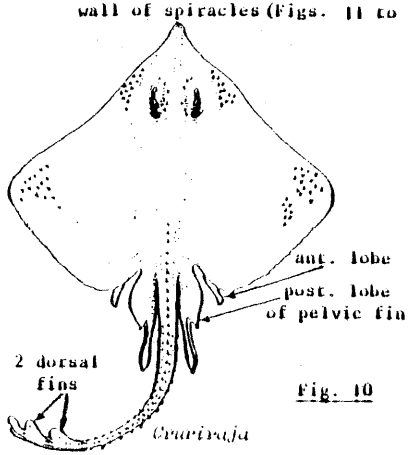


Fig. 10

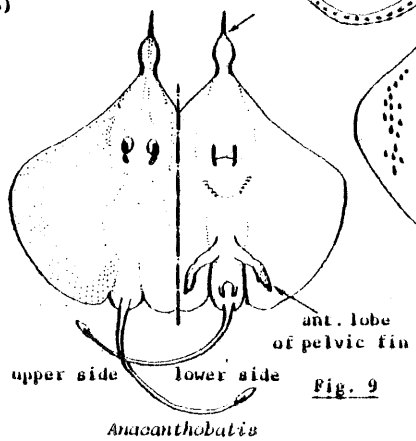


Fig. 9

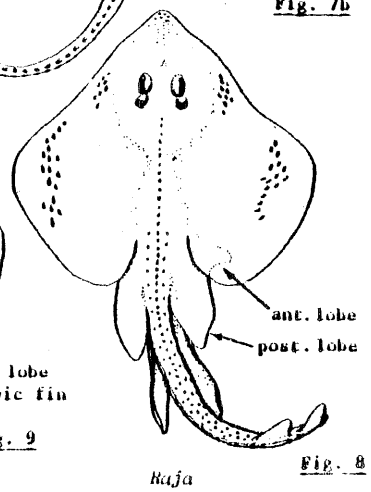


Fig. 8

10 a. Caudal fin well developed, supported by cartilaginous radials; tail broad and thick at base (Fig. 11) ..... Urolophidae (round sting-rays)

10 b. Caudal fin absent; tail very slender and often whiplash toward its tip

11 a. Eyes and spiracles on top of head; head part of disc, anterior margins of pectorals continuous along sides of head; no separate cephalic fins or rostral lobes

12 a. Disc at most 1.3 times as broad as long; tail (if complete) much longer than disc width (Fig. 12); transverse parts of nasal curtains with fringed margins; floor of mouth with several fleshy papillae ..... Dasyatidae (stingrays)

12 b. Disc more than 1.5 times as broad as long; tail distinctly shorter than disc width (Fig. 13); transverse parts of nasal curtains smooth-edged; no papillae on floor of mouth ..... Gymnuridae (butterfly rays)

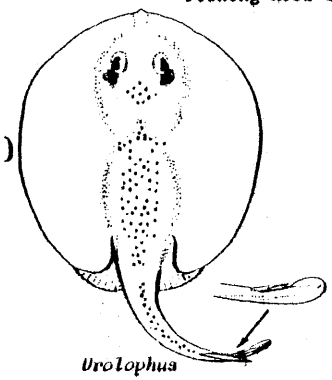
11 b. Eyes and spiracles on sides of head; head distinctly marked off from body, or anterior margins of pectorals forming separate lobes or fins

13 a. Anterior subdivisions of pectoral fins as two thin and widely separated cephalic fins (Fig. 14); teeth minute and in bands of many series ..... Mobulidae (mantas)

13 b. Anterior parts of pectoral fins forming one fleshy lobe extending below front of head, or this lobe with a more or less deep median notch, thus forming 2 basally connected lobes; teeth large, flat, and in a few series only

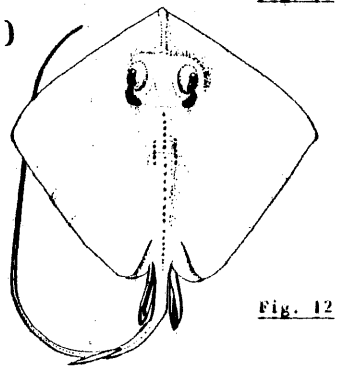
14 a. Subrostral lobe undivided (Fig. 15); floor or mouth with several fleshy papillae ..... Myliobatidae (eagle rays)

14 b. Subrostral lobe deeply incised in the midline, thus forming two basally continuous lobes (Fig. 16); floor of mouth without papillae ..... Rhinopteridae (cownose rays)



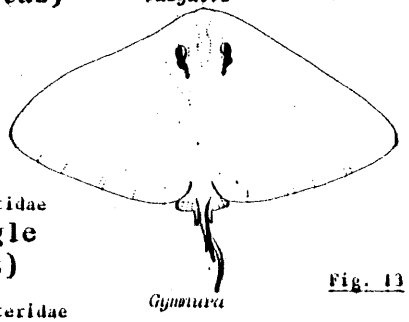
Urolophus

Fig. 11



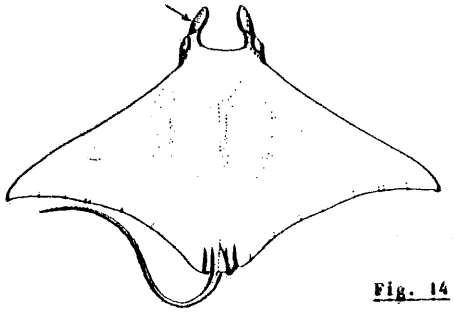
Dasyatis

Fig. 12



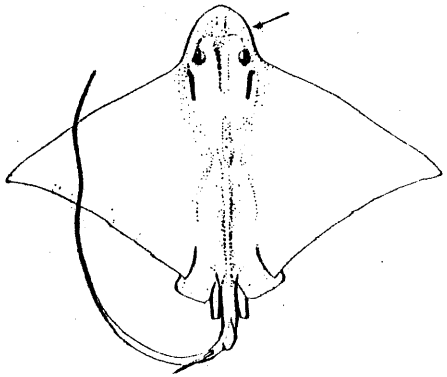
Gymnura

Fig. 13



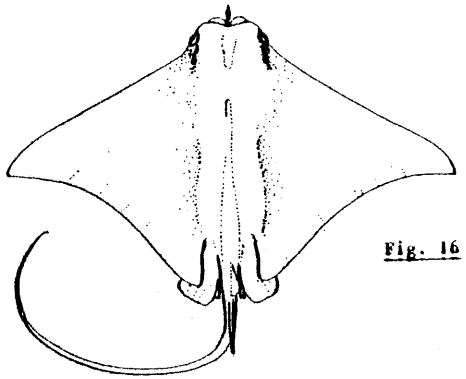
Mobula

Fig. 14



Myliobatis

Fig. 15



Rhinoptera

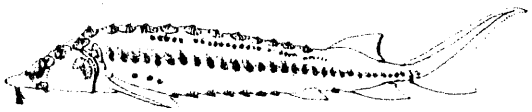
Fig. 16

STURGEONS AND ALLIES - Acipenseriformes

Mouth inferior; 4 barbels on underside of head; caudal fin asymmetrical; body with enlarged plate-like scutes

ACIPENSERIDAE Sturgeons

To 400 cm; mostly in freshwaters, and estuaries; a few species also in coastal marine waters; benthic; all species spawn in freshwater

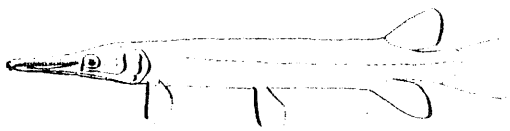


GARS AND ALLIES - Lepisosteiformes

Body elongate; snout and lower jaw prolonged, beak-like; dorsal and anal fins short; scales forming diamond-shaped, non-imbricated plates

LEPISOSTEIDAE Gars

To 300 cm; mostly in freshwaters and estuaries; a few species also in coastal marine waters usually near the surface; all species spawn in freshwater

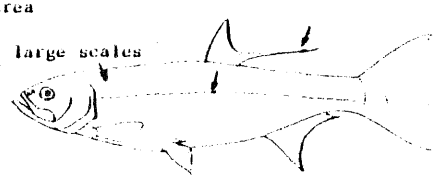


TARPONS AND ALLIES - Elopiformes

Fin-spines absent; a single dorsal fin located above middle of body; pelvic fins in abdominal position; colour silvery

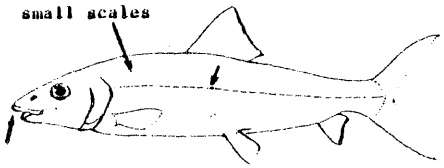
MEGALOPIDAE Tarpons

To 250 cm; in coastal marine waters, estuaries and freshwater; pelagic. A single species in the area



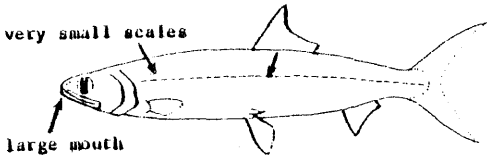
ALBULIDAE Bonefishes

To 90 cm; mainly in coastal marine waters, sometimes entering estuaries; demersal



ELOPIDAE Ladyfishes

To 100 cm; coastal marine waters, estuaries and freshwater; mainly pelagic. A single species in the area

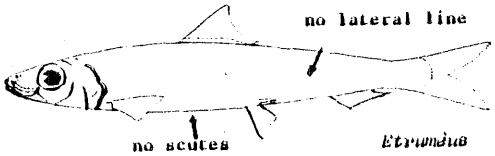


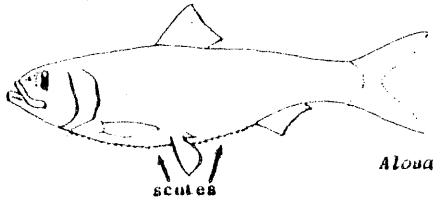
HERRINGS AND ALLIES - Clupeiformes

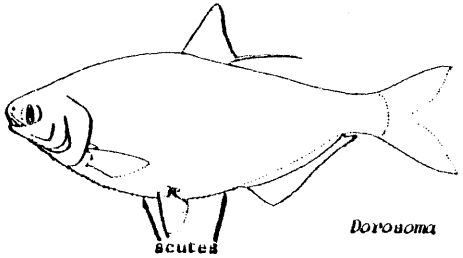
Fin-spines absent; a single dorsal fin located above middle of body; pelvic fins in abdominal position; lateral line absent; colour silvery

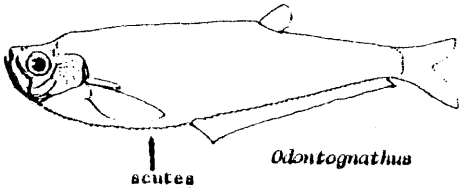
CLUPEIDAE Herrings, shads, menhadens, pilchards, piquitingas, sardines, sardinellas and pellonas

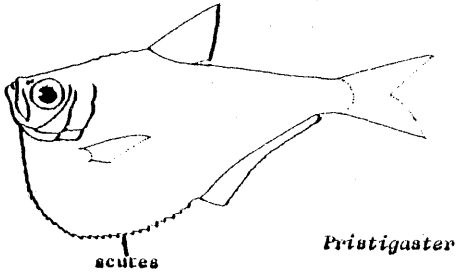
To 60 cm, but most species less than 25 cm; in coastal marine waters, estuaries and freshwater; mainly pelagic





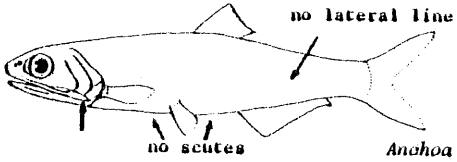


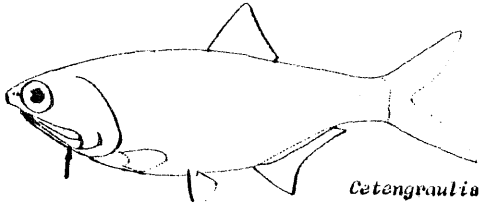




ENGRAULIDAE Anchovies

To 26 cm, but most species less than 15 cm; in coastal marine waters, estuaries and freshwater; off-bottom to pelagic



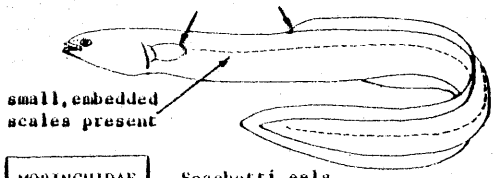


EELS - Anguilliformes

Body very elongate; fin-spines absent; pelvic fins absent; usually scaleless (minute scales present only in *Anguilla*)

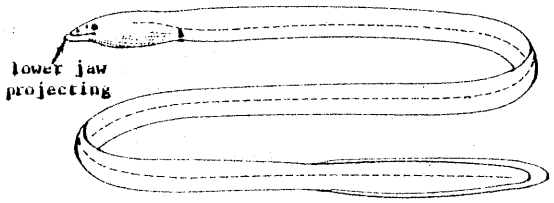
ANGUILLIDAE — Freshwater eels

To 150 cm; generally fresh and brackish waters but migrating into offshore marine waters for spawning; predominantly benthic. A single species in the area

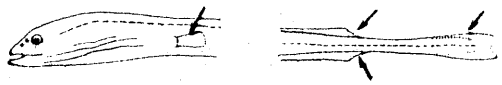


MORINGUIDAE — Spaghetti eels

To at least 50 cm; marine, mostly inshore waters; benthic (burrowing) by day, but pelagic at night; a strong sexual dimorphism



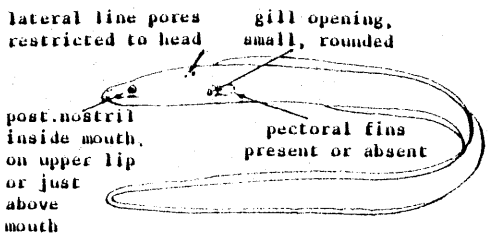
juveniles and immature adults

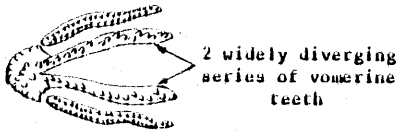


mature adults (Moringuidae)

XENOCONGRIDAE — False morays

To about 50 cm; marine from the shore to at least 350 m depth; benthic

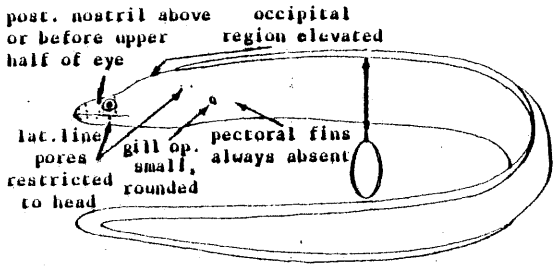




teeth on roof of mouth

MURAENIDAE — Morays

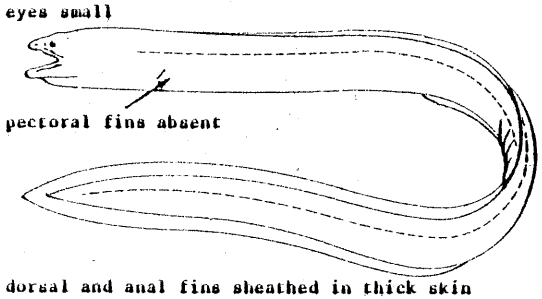
To about 200 cm; marine, from shallow coastal waters to about 400 m depth; benthic



HETERENCHELIDAE — Heterenchelids

To about 80 cm; in marine coastal waters and estuaries; benthic; burrowing in mud or sand

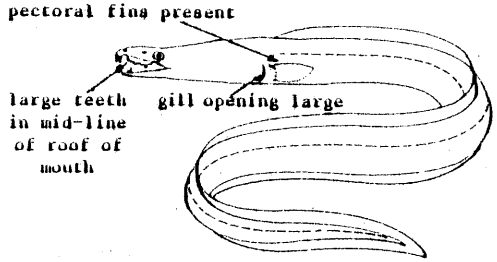
eyes small



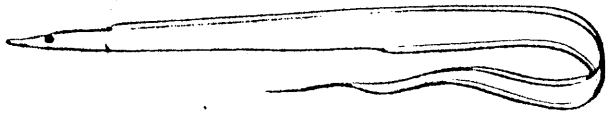
dorsal and anal fins sheathed in thick skin

MURAENESOCIDAE — Pike congers

To 150 cm; marine, from shallow coastal waters to at least 200 m depth; benthic



NETTASTOMATIDAE — Duckbill eels



CONGRIDAE — Conger eels

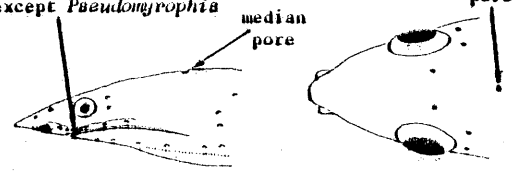
To 220 cm; marine from the shore to below 300 m depth; benthic

plain-coloured

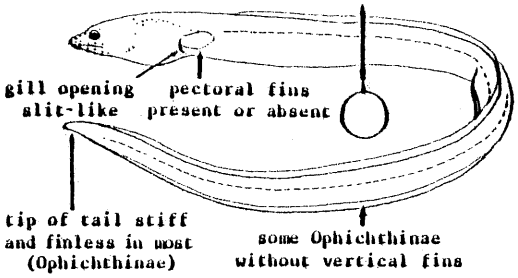
OPHICHTHIDAE — Snake eels and worm eels

To 210 cm; marine, from shallow coastal waters to below 750 m depth; occasionally in estuaries; most benthic, some pelagic

post. nostrils inside mouth, on upper lip or just above mouth in all, except *Pseudomyrophis*

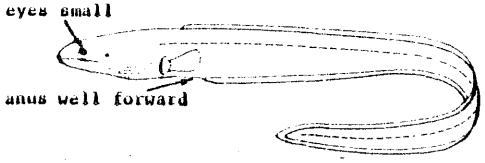


dorsal view of head

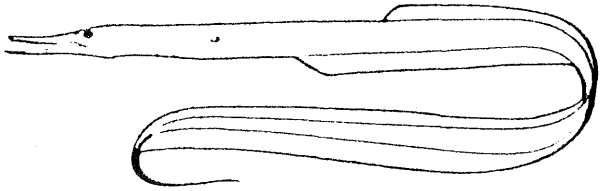


DYSOMMIDAE Arrowtooth eels

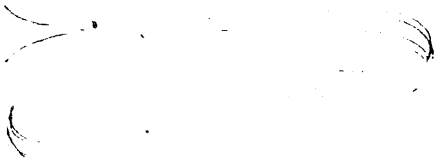
To at least 25 cm; marine coastal waters to below 4 000 m depth; benthic



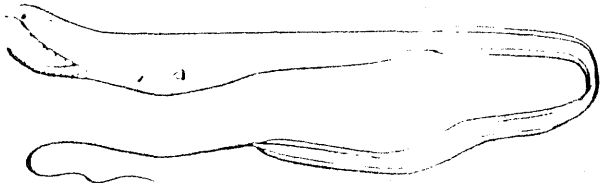
SERRIVOMERIDAE Serrivomerids



NEMICHTHYIDAE Snipe eels



SACCOPHARYNGIDAE Swallowers



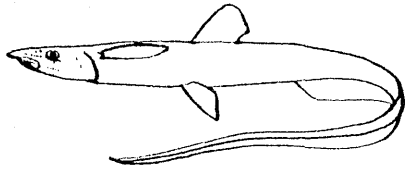
EURYPHARYNGIDAE Gulpers

SPINY EELS - Notacanthiformes

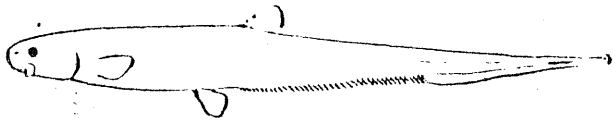
Body very elongate; snout projecting; either a series of spines along back, or a single short-based and soft-rayed dorsal fin; anal fin long

HALOSAURIDAE Halosaurs

To about 55 cm, marine, from about 400 to below 3 000 m depth; benthic

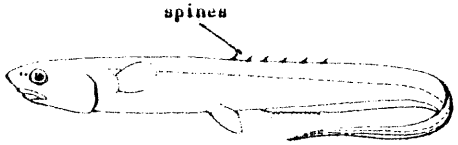


LIPOGENYIDAE Lipogenyids



NOTACANTHIDAE Spiny eels

To 45 cm; marine, from coastal waters to below 800 m depth; benthic

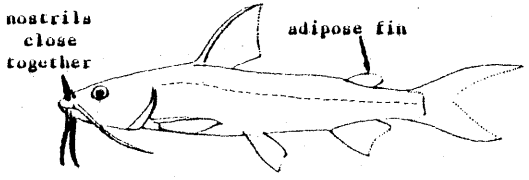


CATFISHES - Siluriformes

Barbels present around mouth; a strong spine usually present at front of dorsal and pectoral fins; an adipose fin often present; scales absent, but a bony head shield often present; body covered with hard bony plates in one family (Loricariidae)

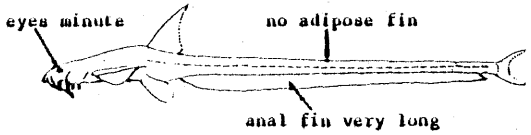
ARIIDAE — Sea catfishes

To over 100 cm; in coastal marine waters, estuaries and freshwater; benthic



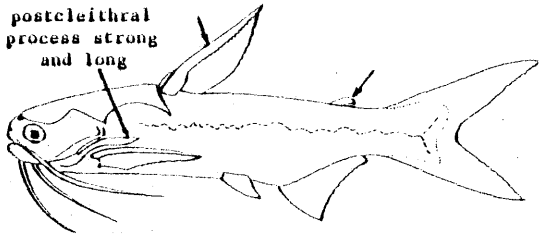
ASPREDINIDAE — Banjo catfishes

To about 40 cm; mostly in freshwater and estuaries; a few species may occur in coastal marine waters; benthic



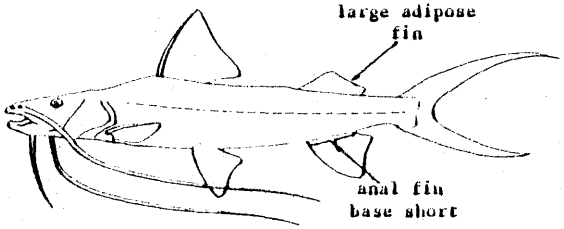
AUCHENIPTERIDAE — Auchenipterid catfishes

To about 30 cm; in freshwater and estuaries; benthic



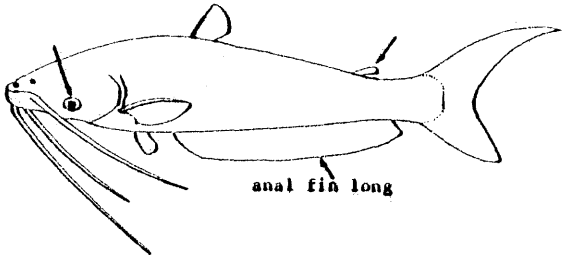
PIMELODIDAE — Pimelodid catfishes

To about 45 cm; mostly in freshwater, but some species in estuaries; benthic



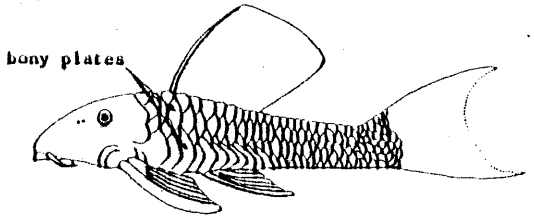
HYPOPHTHALMIDAE — Lookdown catfishes

To about 30 cm; in freshwater and estuaries; benthic. A single species in the area



LORICARIIDAE — Armoured catfishes

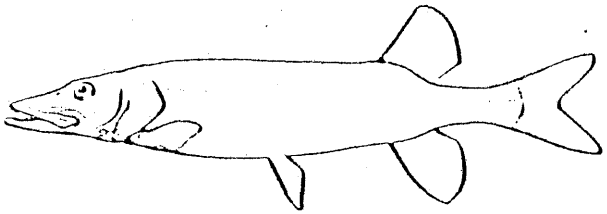
To about 40 cm; mostly in freshwater, but a few species in estuaries; benthic



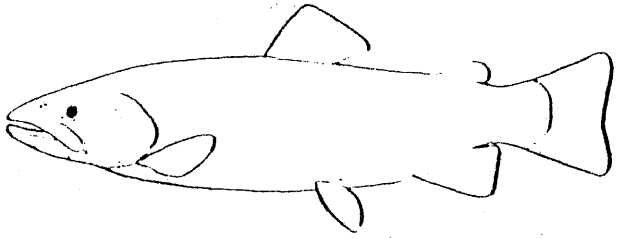
ARGENTINES AND ALLIES - Salmoniformes

A diverse assemblage of families characterized by the inclusion of the maxilla in the gape of mouth; fin-spines absent; adipose fin often present

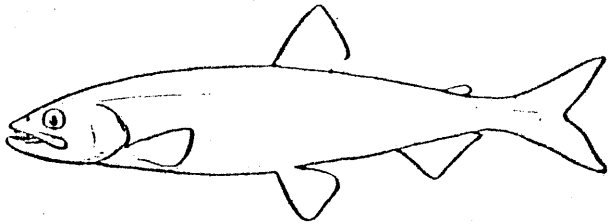
ESOCIDAE — Pikes



SALMONIDAE — Trouts

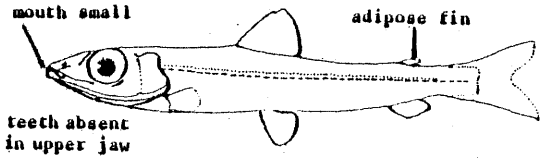


OSMERIDAE — Smelts

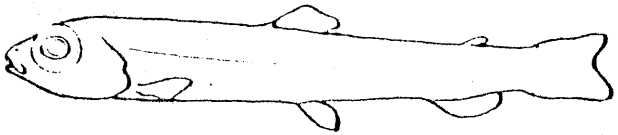


ARGENTINIDAE — Argentines

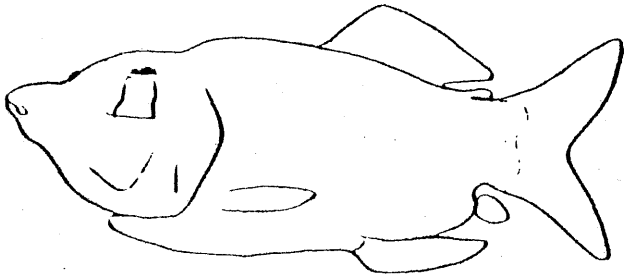
To about 20 cm; marine, from 80 to about 570 m depth; benthopelagic and pelagic



BATHYLAGIDAE — Deep-sea smelts

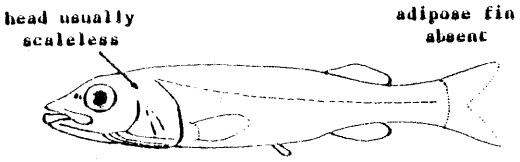


OPISTHOPROCTIDAE — Spookfishes

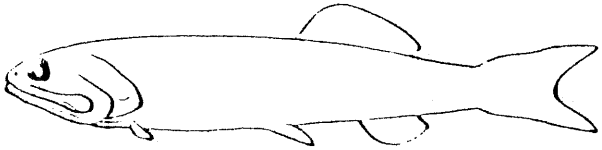


ALEPOCEPHALIDAE Slickheads

To about 55 cm; oceanic waters, most species below 1 000 m; benthopelagic to pelagic

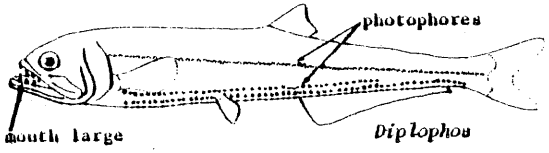


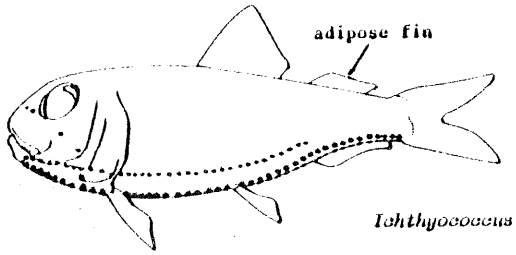
BATHYLACONIDAE Bonythroats



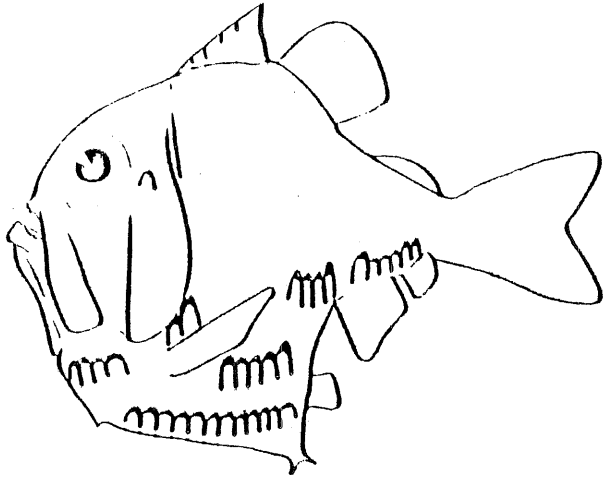
GONOSTOMATIDAE Bristlemouths

To about 25 cm; mostly in deep water (usually below 200 m), but some species coming up to about 50 m at night; mesopelagic to bathypelagic

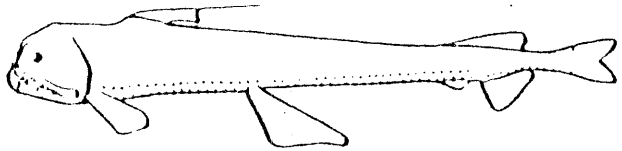




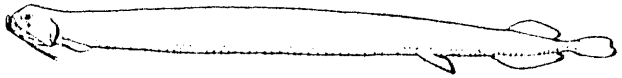
STERNOPTYCHIDAE Hatchetfishes



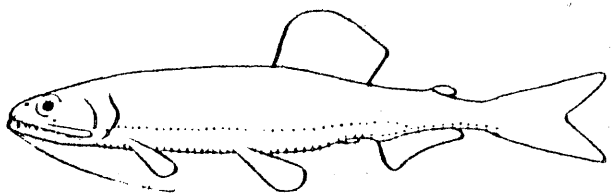
CHAULIODONTIDAE Viperfishes



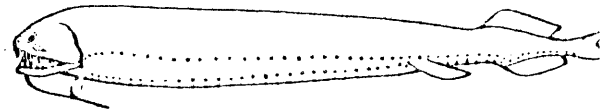
STOMIATIDAE Scaly dragonfishes



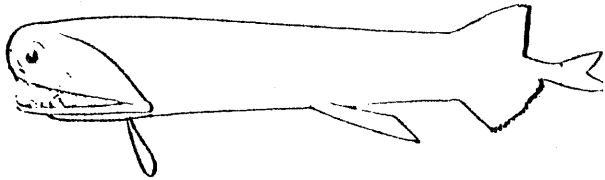
ASTRONESTHIDAE Snaggletooths



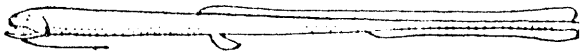
MELANOSTOMIIDAE Scaleless dragonf



MALACOSTEIDAE Loosejaws



IDIACANTHIDAE Black dragonfishes



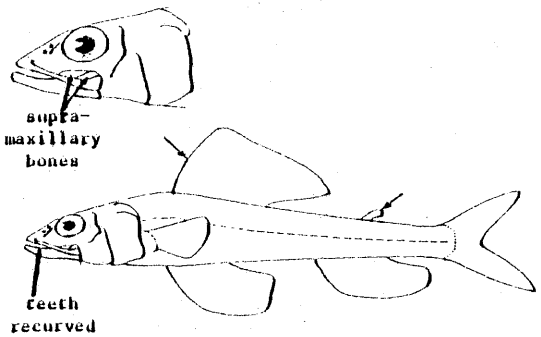
GIGANTURIDAE Giganturids

LANTERNFISHES AND ALLIES - Myctophiforme

Fin-spines absent; adipose fin present; light organs (photophores) sometimes present

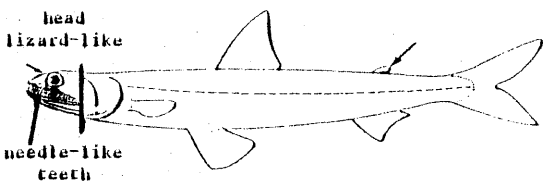
AULOPIDAE — Aulopids

To at least 25 cm; marine, from shallow waters to at least 150 m depth; benthic



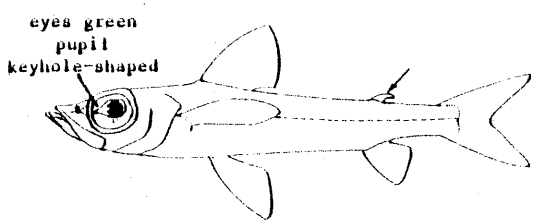
SYNODONTIDAE — Lizardfishes

To 55 cm; marine, from shallow waters to abyssal depths; benthic

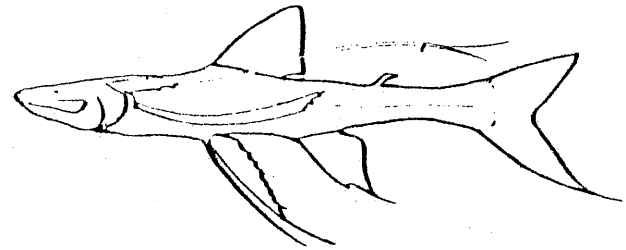


CHLOROPHTHALMIDAE — Greeneyes

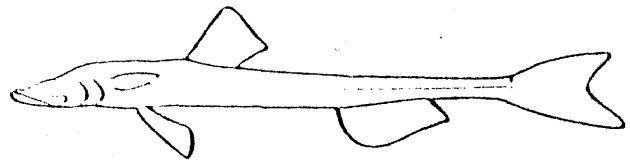
To 30 cm; marine, from about 75 to abyssal depths; benthic



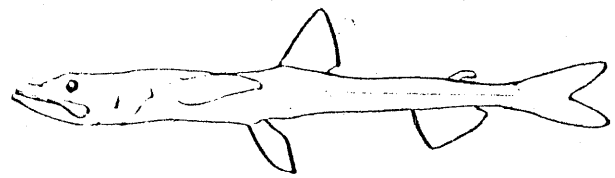
BATHYPTEROIDAE — Tripodfishes



IPNOPIDAE — Ipnopids

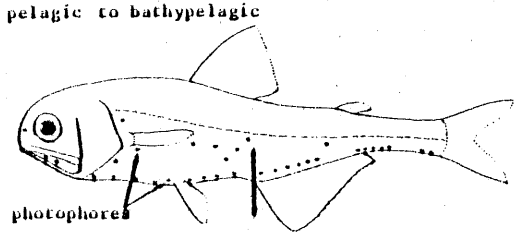


SCOPELOSAURIDAE — Scopelosaurids



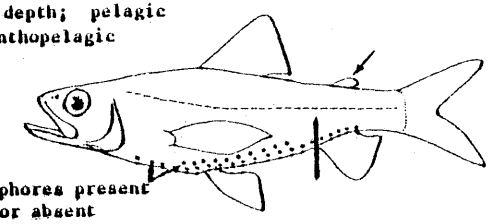
MYCTOPHIDAE — Lanternfishes

To 30 cm, but most species less than 10 cm; from the surface (at night) to below 2 000 m; mesopelagic to bathypelagic



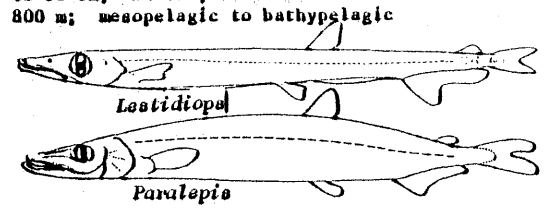
NEOSCOPELIDAE — Neoscopelids

To about 30 cm; marine, from the surface to below 500 m depth; pelagic or benthopelagic

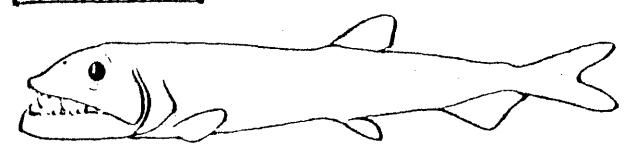


PARALEPIDIDAE — Barracudinas

To 50 cm; marine, from the surface to below 800 m; mesopelagic to bathypelagic

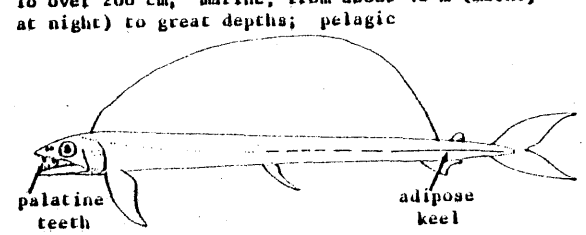


OMOSUDIDAE — Omosudids

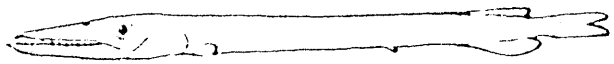


ALEPISAURIDAE — Lancetfishes

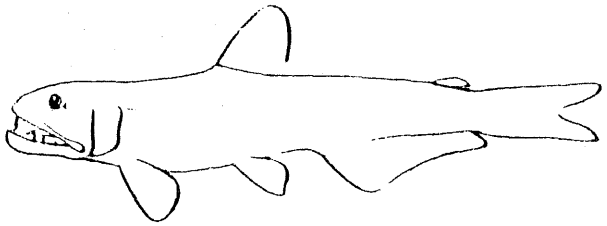
To over 200 cm; marine, from about 40 m (mainly at night) to great depths; pelagic



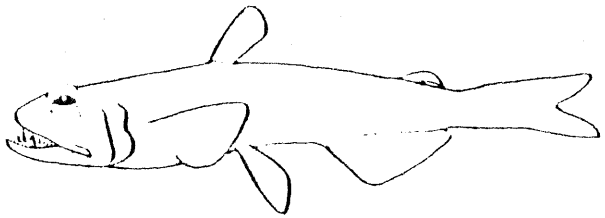
ANOTOPTERIDAE Daggertooths



EVERMANNELLIDAE Sabretooth fishes



SCOPELARCHIDAE Pearleyes

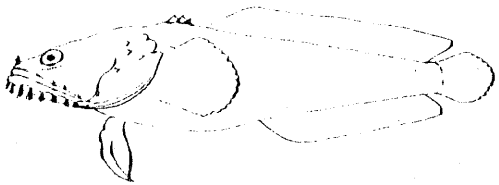


TOADFISHES - Batrachoidiformes

Head large and depressed, body compressed; two dorsal fins, the first with 2 or 3 spines; pelvic fins under throat; gill openings restricted to sides of head; one to several lateral lines on body

BATRACHOIDIDAE Toadfishes

to about 60 cm; in coastal marine waters to about 100 m depth; also in estuaries and freshwater; benthic

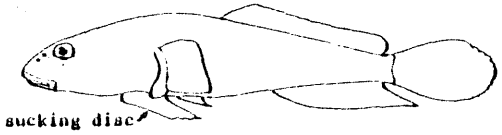


CLINGFISHES - Gobiesociformes

A sucking disc under anterior part of body (formed by pectoral and pelvic fins); a single dorsal fin without spines

GOBIESOCIDAE Clingfishes

To 15 cm, but most species less than 8 cm; littoral marine also in estuaries and freshwater;

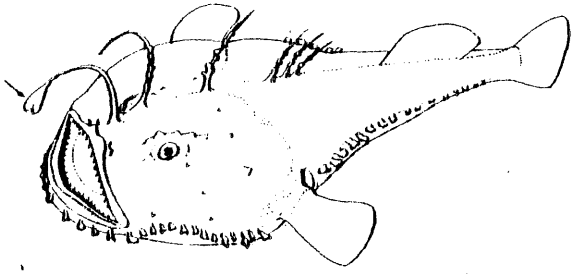


ANGLERFISHES AND ALLIES - Lophiiformes

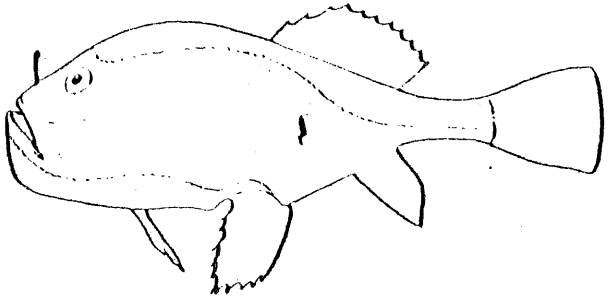
Body globose or depressed; first spine of dorsal fin modified to form a "fishing pole", gill openings small and circular, usually located below or behind pectoral fins

LOPHIIDAE Anglerfishes

To 120 cm; marine, from coastal waters to below 1 000 m depth; benthic

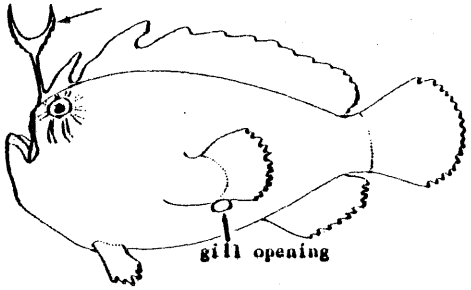


CHAUNACIDAE Sea Toads.



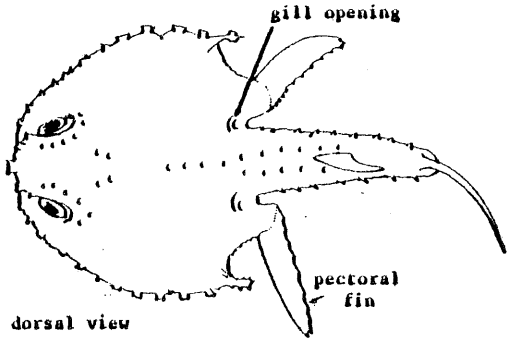
ANTENNARIIDAE Frogfishes

To 28 cm; marine, from coastal and surface waters to below 100 m depth; mostly benthic (except for Sargassum fish)



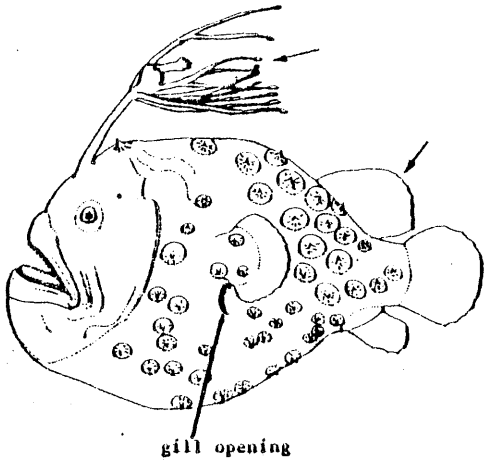
OGCOCEPHALIDAE Batfishes

To about 40 cm; marine from coastal waters to at least 90 m depth; benthic



HIMANTOLOPHIDAE Footballfishes

To about 60 cm; marine, from near the surface to below 500 m depth; pelagic



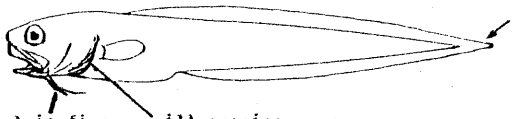
CUSKEELS, BROTULAS AND ALLIES - Ophidiiformes

No sharp spines in fins; pelvic fins absent in some species; when present, these fins are placed anterior to pectoral fins, sometimes far forward on undersurface of head; they are always close together and filamentous, each with no more than 2 rays; caudal fin separate or joined to dorsal and anal fins; snout without barbels (except for a single species)

pelvic fins close together when present

OPHIDIIDAE — Cusk eels

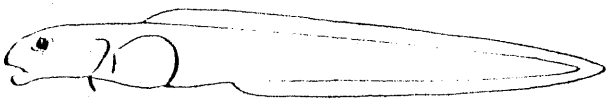
To 150 cm, but most around 30 cm; marine, from the shore to below 100 m depth; benthic



pelvic fins under ant. part of head

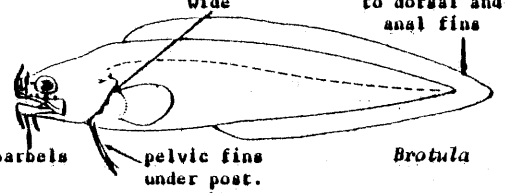
gill opening wide

ZOARCIDAE - Eelpouts.



BROTULIDAE/BYTHITIDAE Brotulas

To at least 100 cm; marine, from shallow coastal waters to great depths (below 8 000 m); also in estuaries; benthopelagic (burrowing) or pelagic (included in Ophidiidae by recent authors)



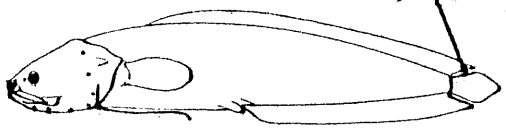
gill opening wide

caudal fin joined to dorsal and anal fins

barbels

pelvic fins under post. part of head

Brotula

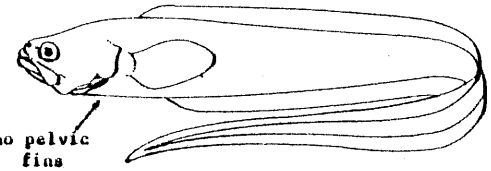


caudal fin separate

Ogilbia

CARAPIDAE — Pearlfishes

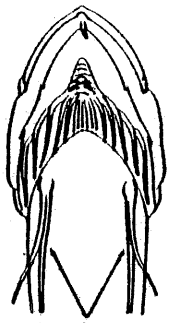
To about 20 cm; marine from shallow coastal waters to the continental slope; mostly benthic living, in sea cucumbers, clams, sea urchins, tunicates and starfish, but 1 species free-living



no pelvic fins

CODS, HAKES AND ALLIES - Gadiformes

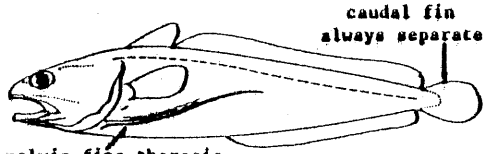
No sharp spines in fins (except in dorsal fin of some macrourids); pelvic fins below or anterior to pectoral fins and widely separated from each other, usually entire, but reduced to filaments in some species; barbels often present on chin (on snout of a single species)



pelvic fins widely separated underside of head

GADIDAE — Cods and codlings

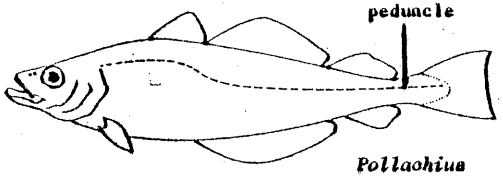
To about 55 cm; marine, from the shore to about 1 000 m depth; also in estuaries; benthic, benthopelagic or pelagic



caudal fin always separate

pelvic fins thoracic

Urophycis

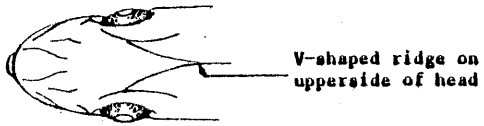


broad caudal peduncle

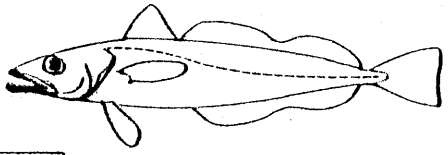
Pollachius

MERLUCCIIDAE — Hakes

To 70 cm; marine, from coastal waters to about 1 000 m depth; benthopelagic or pelagic

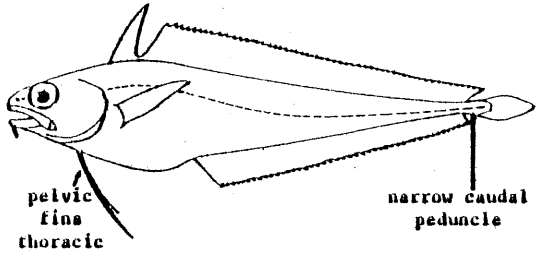


V-shaped ridge on upperside of head



MORIDAE — Moras

To over 100 cm, but most species less than 50 cm; marine, from about 200 to Below 1 000 m depth; benthopelagic

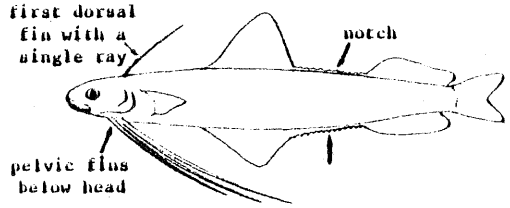


pelvic fins thoracic

narrow caudal peduncle

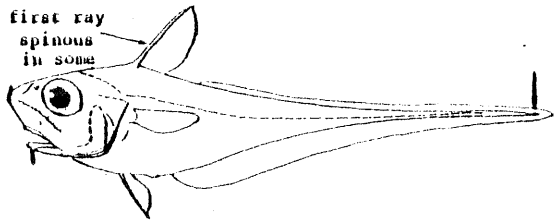
BREGMACEROTIDAE Codlets

To 10 cm, but usually smaller; marine in oceanic waters from the surface to below 1 000 m depth; pelagic



MACROURIDAE Grenadiers

To about 80 cm; marine, from about 300 to below 2 000 m depth; benthopelagic

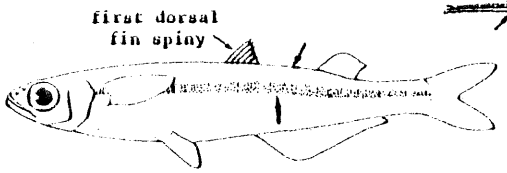


SILVERSIDES AND ALLIES - Atheriniformes - Atherinoidei

Small fishes; 2 well separated dorsal fins, the first spiny, but often inconspicuous; a silvery stripe on sides

ATHERINIDAE Silversides

To about 15 cm, but usually smaller; in coastal marines waters, estuaries, coastal lagoons and freshwater; near the surface

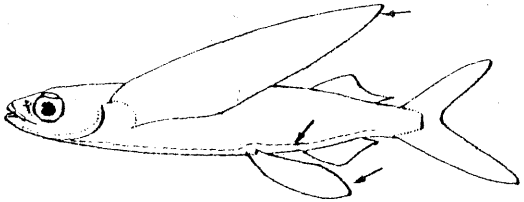


FLYINGFISHES AND ALLIES - Atheriniformes - Exocoetoidei

Either snout beak-like with upper and/or lower jaws greatly prolonged (except in 2 genera), or with enlarged, wing-like, pectoral and sometimes also pelvic fins; lateral line near ventral profile of body; a single dorsal fin consisting of soft rays; pelvic fins abdominal

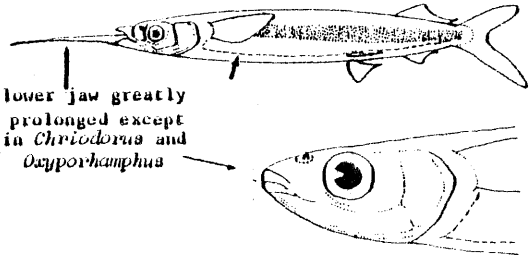
EXOCOETIDAE Flyingfishes

To 35 cm; marine; pelagic in surface waters



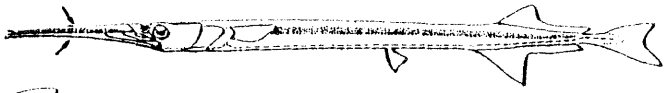
HEMIRAMPHIDAE Halfbeaks

To about 50 cm; in marine, coastal and offshore waters, estuaries and freshwater, near the surface



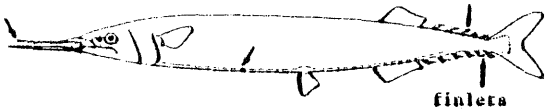
BELONIDAE Needlefishes

To about 120 cm; in marine coastal and offshore waters, estuaries, coastal lagoons and freshwater; pelagic close to the surface



SCOMBERESOCIDAE Sauries

To 50 cm; marine, pelagic in surface waters

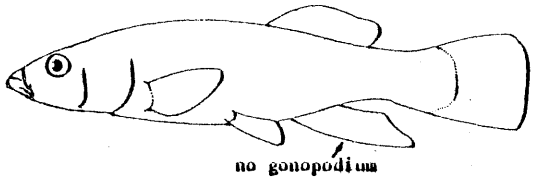


KILLIFISHES AND ALLIES - Atheriniformes - Cyprinodontoidei

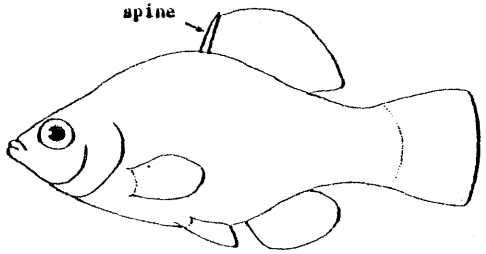
Generally small fishes with upward-directed mouths, single dorsal and anal fins, and rounded to emarginate caudal fins; lateral line reduced to a series of separate pit organs along sides of body

CYPRINODONTIDAE Killifishes

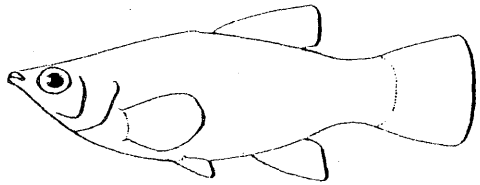
To 32 cm, but usually smaller; in freshwater, estuaries, coastal lagoons and very shallow coastal marine waters, just off the bottom or near the surface. Oviparous



Fundulus (male)



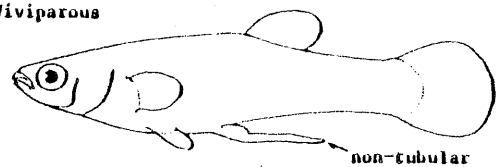
Jordanella

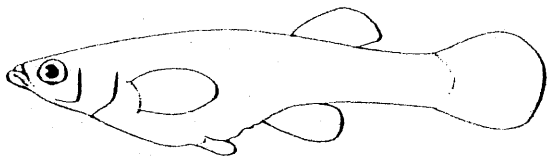


Adinia

POECILIIDAE Live-bearing topminnows

To about 22 cm; in freshwater, estuaries, coastal lagoons and shallow coastal marine waters, just off the bottom or near the surface. Viviparous

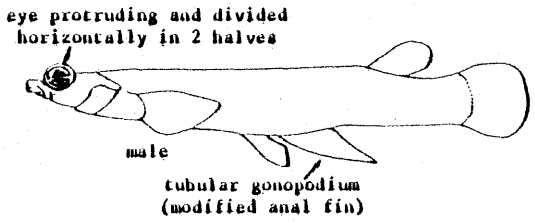




female

ANABLEPIDAE Four-eyes

To 30 cm; in freshwater, estuaries, coastal lagoons and shallow coastal marine waters, at the surface

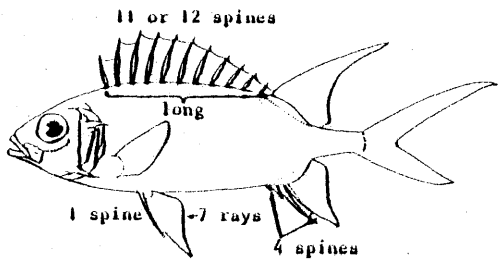


SQUIRRELFISHES AND ALLIES - Beryciformes

Head spines and/or crests well developed; fin-spines well developed except in Diretmidae: scales heavy and strongly ctenoid (rough)

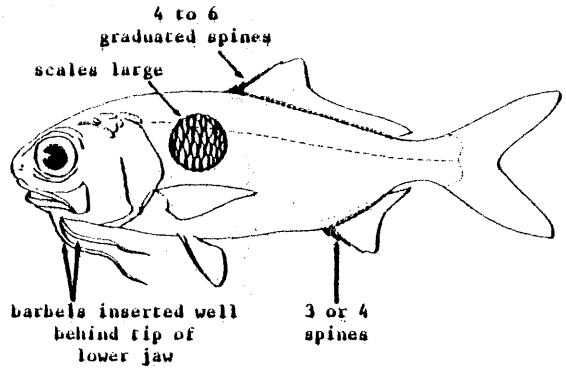
HOLOCENTRIDAE Squirrelfishes and soldierfishes

To at least 35 cm, but possibly to 60 cm; marine, from shallow coastal waters to below 500 m depth; benthic



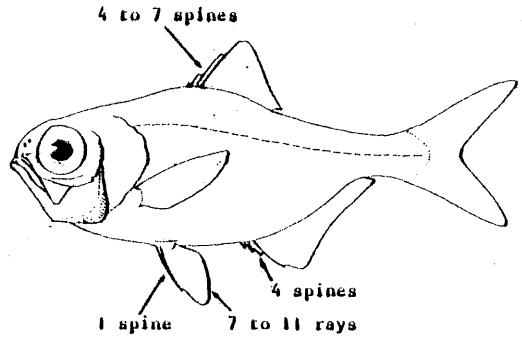
POLYMIXIIDAE Beardfishes

To about 32 cm; marine, from about 80 (but usually from 270) to 650 m depth; benthic



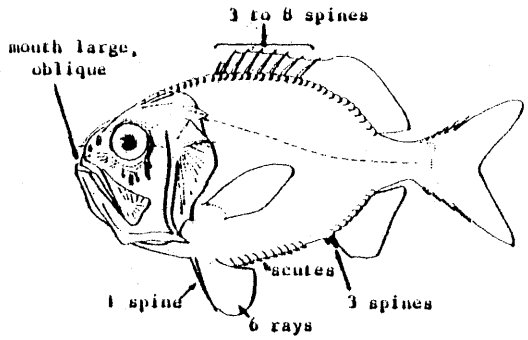
BERYCIDAE Alfonsinos

To about 37 cm; marine, from about 150 to below 500 m depth; benthic



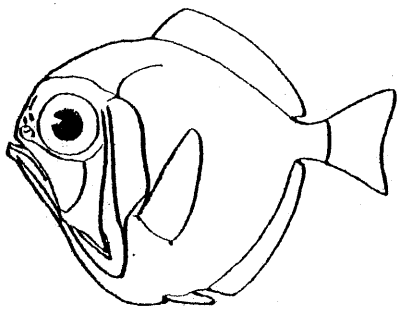
TRACHICHTHYIDAE Slimeheads

To about 48 cm (but apparently only to 35 cm in the Western Central Atlantic); marine, from about 75 to 550 m depth, rarely below 800 m; benthic



DIRETMIDAE Spinyfins

To about 40 cm, but usually smaller; marine, from 220 to below 2 000 m depth; benthic

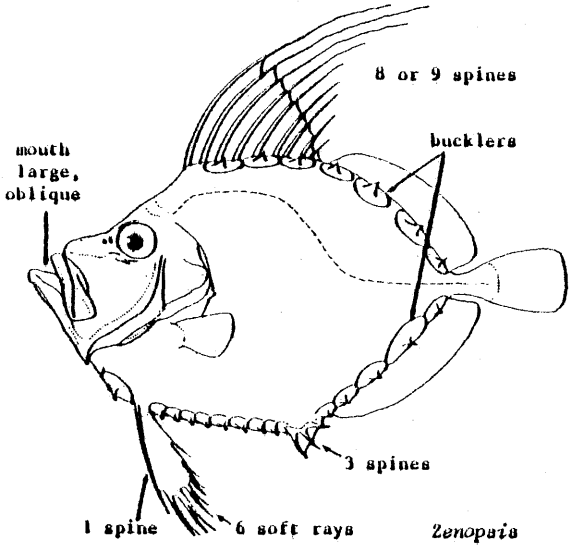


DORIES AND ALLIES - Zeiformes

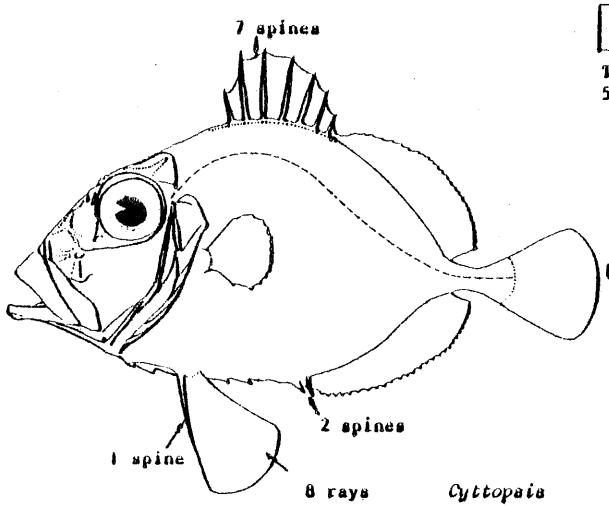
Body usually compressed and deep; jaws greatly distensible; prominent spines in anterior part of dorsal fin

ZEIDAE Dories

To about 60 cm; marine, mostly from 100 to 400 m depth; benthic to benthopelagic

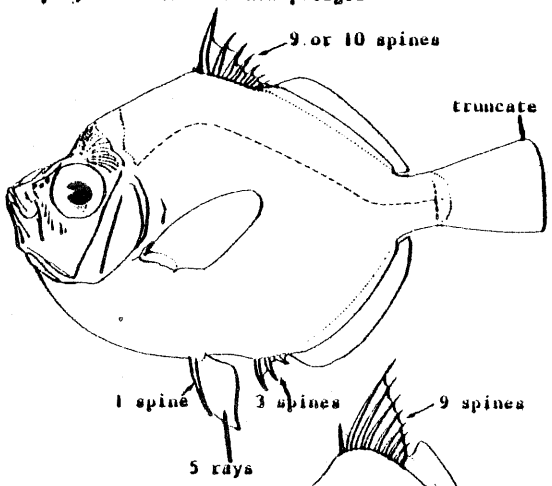


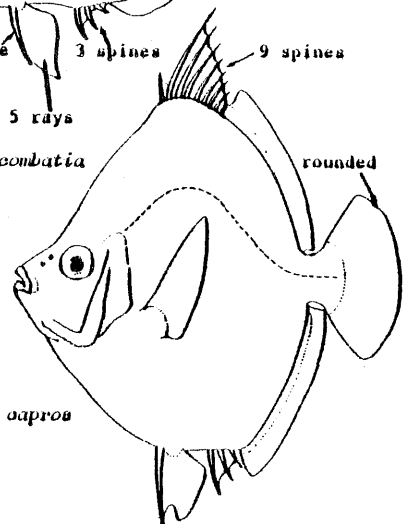
Zenopsis



CAPROIDAE Boarfishes

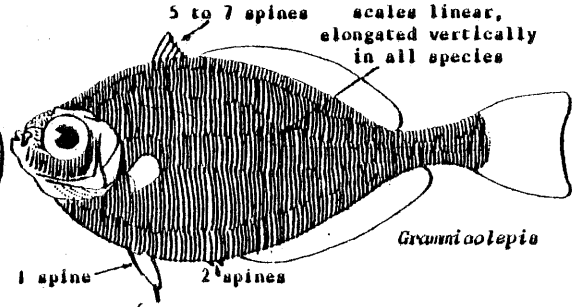
To about 22 cm; marine, from 65 to about 600 m depth; benthic to benthopelagic

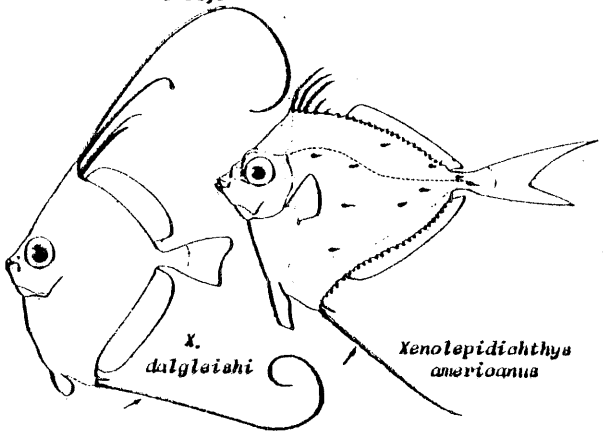




GRAMMICOLEPIDAE Diamond dories

To about 20 cm; marine, from about 200 to below 500 m depth; benthopelagic



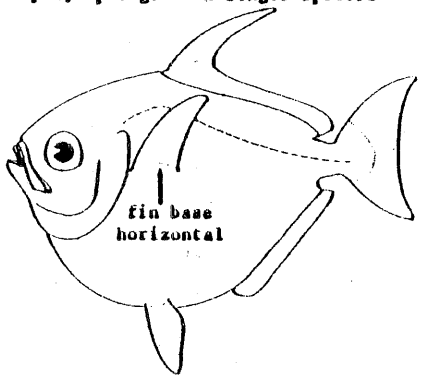


OPAHS AND ALLIES - Lampridiformes

Body shape highly variable with the families; no spines in fins; jaws protrusible

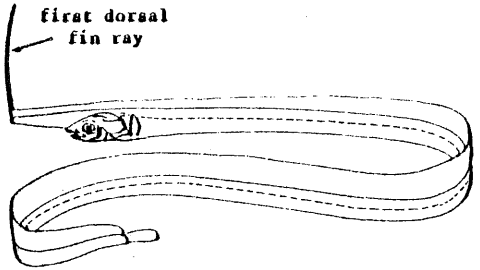
LAMPRIDIDAE Opahs

To 185 cm; marine, from the surface to about 200 m depth; pelagic. A single species



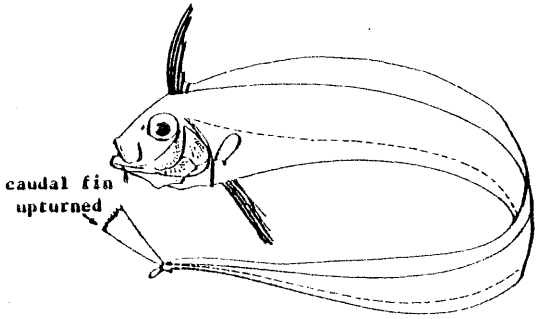
LOPHOTIDAE Crestfishes and unicornfishes

To 180 cm; marine, from about 200 to below 600 m depth; pelagic



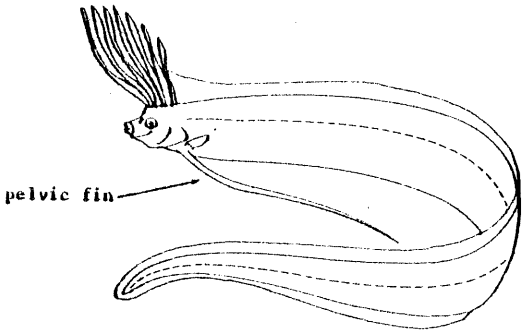
TRACHIPTERIDAE Ribbonfishes

To about 200 cm; marine, from about 180 to nearly 1 000 m depth; pelagic



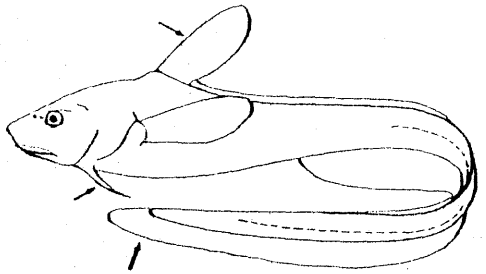
REGALECIDAE Oarfishes

To about 800 cm, but average size about 300 cm; marine, adults from about 300 to 600 m depth, juveniles nearer to the surface; pelagic



ATELEOPODIDAE Ateleopids

To over 60 cm; marine, from about 180 to 550 m depth; pelagic

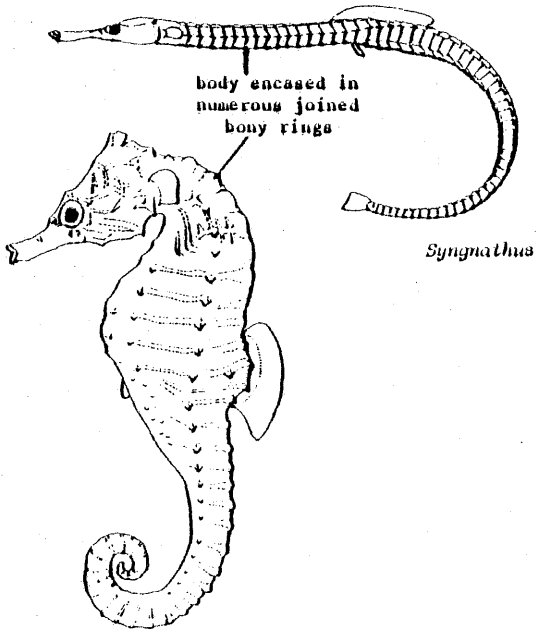


PIPEFISHES AND ALLIES - Gasterosteiformes

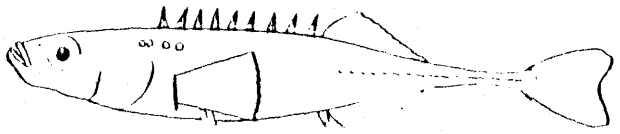
Body elongate, snout tube-like; scales sometimes modified to form series of bony plates

SYNGNATHIDAE Pipefishes

To about 30 cm; in freshwater, estuaries, coastal lagoons, littoral pools and coastal marine waters to about 90 m depth; mostly benthic (at least one species pelagic)

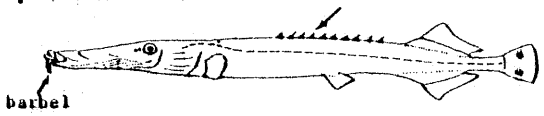


GASTEROSTEIDAE Sticklebacks



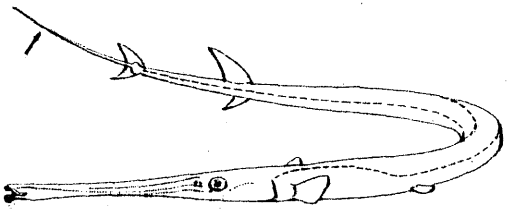
AULOSTOMIDAE Trumpetfishes

To 75 cm; marine in shallow and clear coastal waters; often drifting head down. A single species in the area



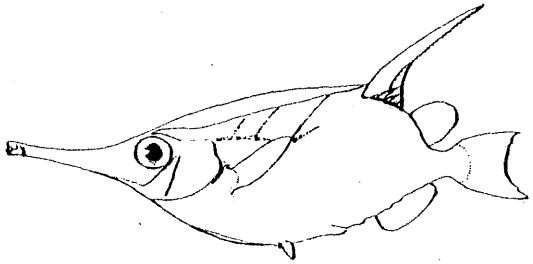
FISTULARIIDAE Cornetfishes

To 200 cm; marine, in shallow coastal waters



MACRORHAMPHOSIDAE Snipefishes

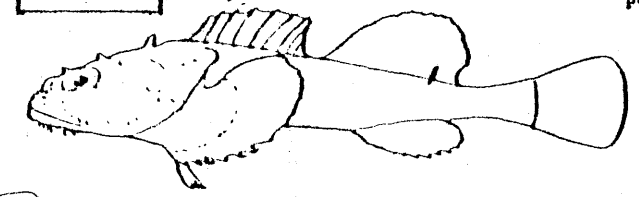
To about 15 cm; marine, from 25 to 600 m depth; benthopelagic. A single species in the area



SCORPIONFISHES AND ALLIES - Scorpaeniformes

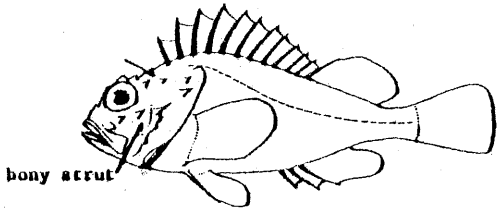
Cheeks with a bony strut (posterior extension of suborbital bone to preopercle); usually well developed spines on head and prominent spines in dorsal fin; pectoral fins usually rounded; membranes between lower rays often incised; caudal fin rarely forked

COTTIDAE Sculpins.



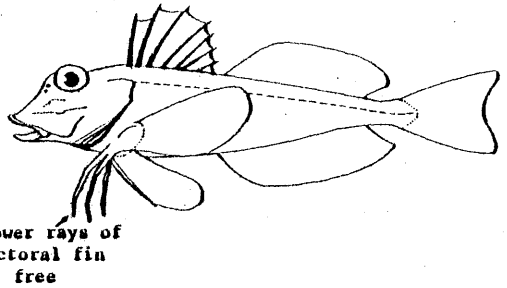
SCORPAENIDAE Scorpionfishes, rockfishes and rosefishes

To over 50 cm; marine, from the coastline to below 600 m depth; benthic; often with venomous spine



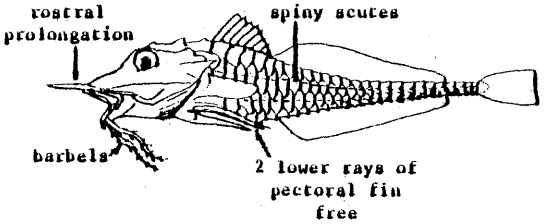
TRIGLIDAE Searobins

To about 45 cm; marine, from the coastline to about 180 m depth; benthic



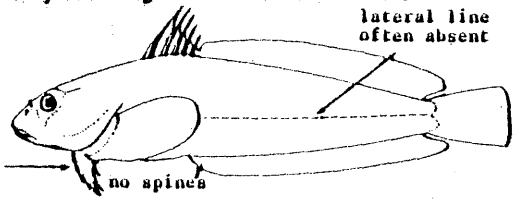
PERISTEDIIDAE Armoured searobins

To at least 40 cm; marine, from about 80 to 400 m depth; benthic



CYCLOPTERIDAE (including Liparidae) Lumpfishes and Snailfishes

To about 50 cm, but usually smaller; marine, from the coastline to below 1 400 m depth; benthic to benthopelagic. Only 1 or 2 species of *Liparis* possibly entering the area from the north

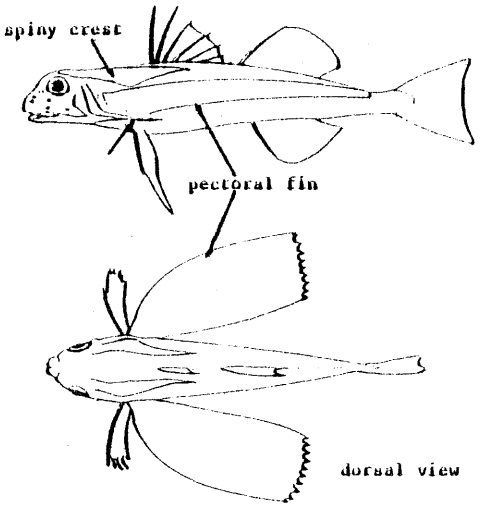


FLYING GURNARDS - Dactylopteriformes

Greatly enlarged pectoral fins; head encased in a bony shield with a spiny crest from nape to below base of first dorsal fin

DACTYLOPTERIDAE Flying gurnards

To at least 45 cm; marine, in shallow coastal waters; benthic. A single species

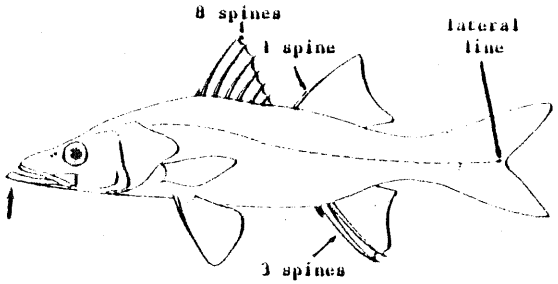


PERCH-LIKE FISHES - Perciformes - Percoidei

Shape extremely variable; either 2 dorsal fins, or 1 dorsal fin with the anterior elements being sharp spines; pelvic fins with 1 spine and 5 soft rays, placed well forward on ventral surface of body; maxillary bone not included in gape of mouth but dorsal to the tooth-bearing premaxilla

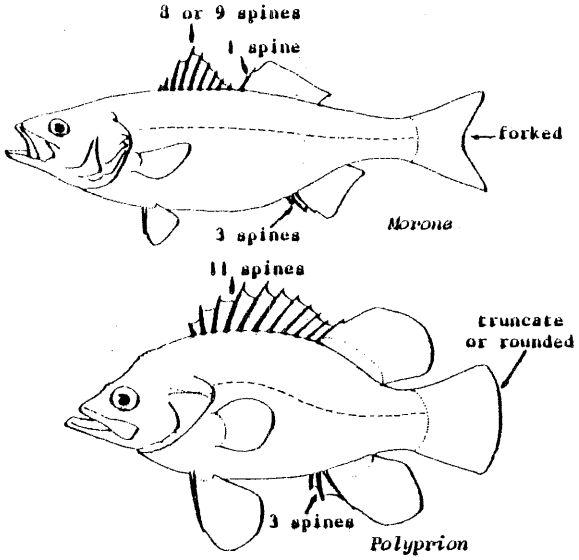
CENTROPOMIDAE Snooks

To 130 cm; in shallow coastal waters (usually less than 30 m depth), estuaries and brackish-water lagoons, penetrating freshwater; benthic



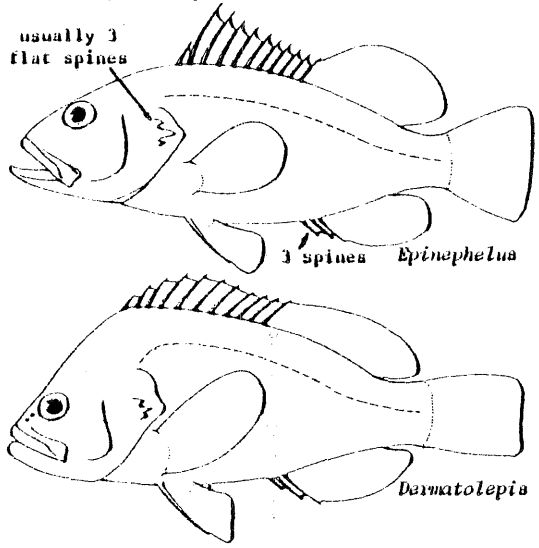
PERCICHTHYIDAE Temperate basses

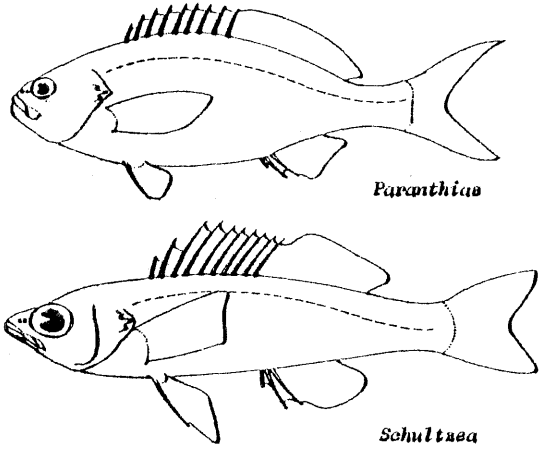
To over 180 cm; in freshwater, estuaries and coastal marine waters to about 140 m depths; one species, *Polyprion americanus*, is entirely marine; dwelling near the bottom or close to the surface. This family represents a heterogenous assemblage of probably unrelated groups and must hence be regarded as a provisional taxon



SERRANIDAE Groupers, hinds, hamlets, seabasses and creolefishes

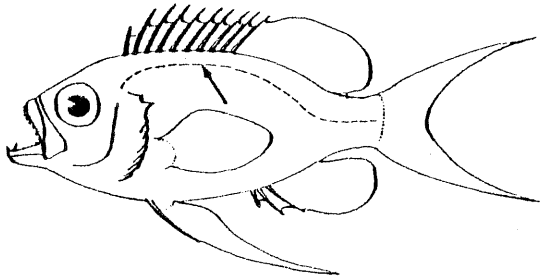
To over 300 cm; marine, from the coastline to depths below 300 m; also in the lower reaches of estuaries; mostly benthic





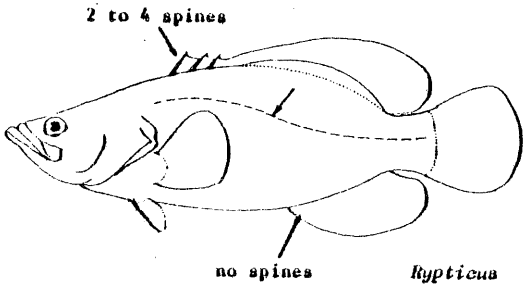
ANTHIIDAE Anthiids

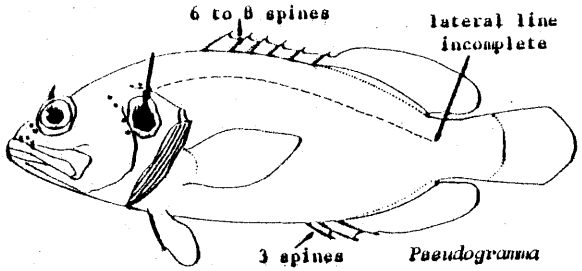
To about 20 cm; marine in coastal waters; mostly benthic. Considered by many authors as a subfamily (Anthiinae) of Serranidae



GRAMMISTIDAE Soapfishes

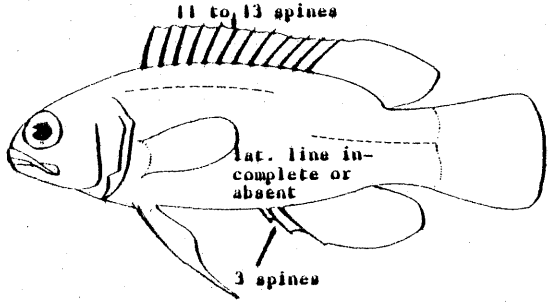
To about 32 cm; marine, from shallow coastal waters to about 50 m depth; benthic (some burrowing)





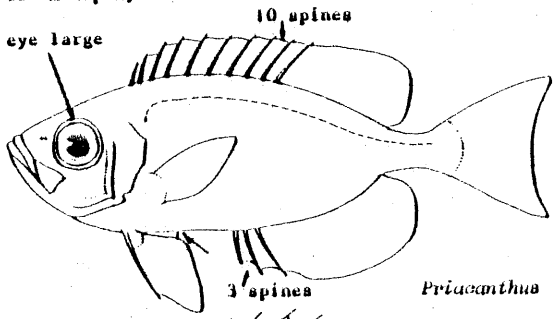
GRAMMIDAE Fairy basslets

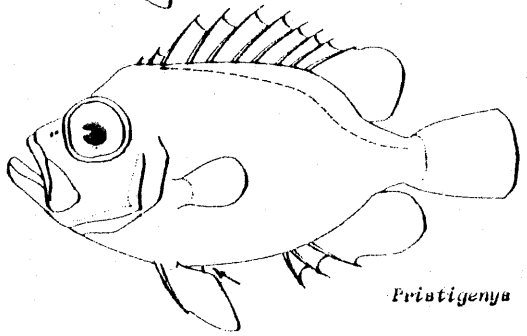
To about 10 cm; marine, from the coastline to about 80 m depth; benthic



PRIACANTHIDAE Bigeyes

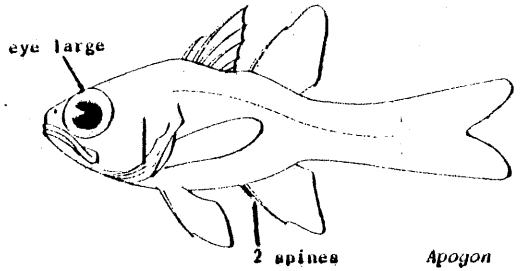
To 40 cm; marine, from the coastline to about 200 m depth; benthic

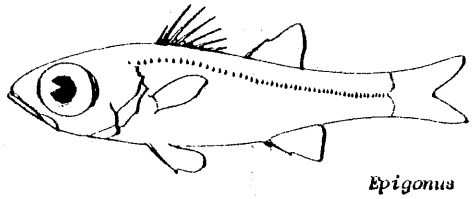




APOGONIDAE Cardinalfishes

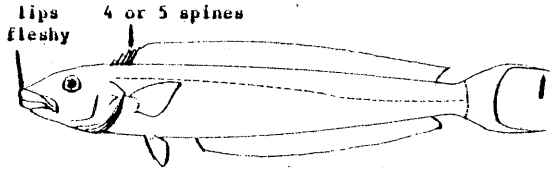
To about 20 cm, but most species smaller than 12 cm; marine, from the coastline to about 1 000 m depth; also in brackish waters and freshwater; mostly benthic





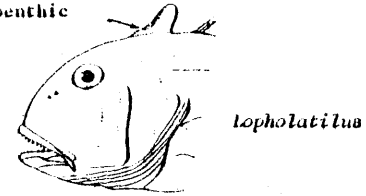
MALACANTHIDAE Sand tilefishes

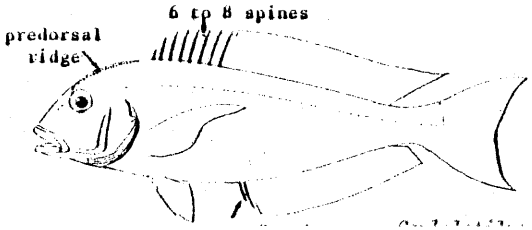
To 60 cm; marine, from shallow coastal waters to about 150 m depth; benthic. A single species in the area



BRANCHIOSTEGIDAE Tilefishes

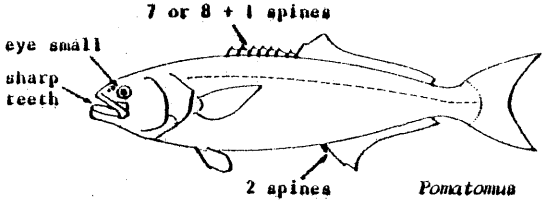
To about 50 cm; marine, from 20 to 600 m depth; benthic

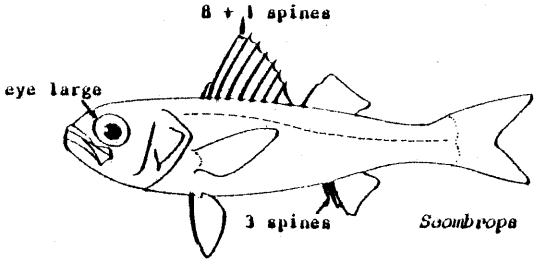




POMATOMIDAE Bluefishes

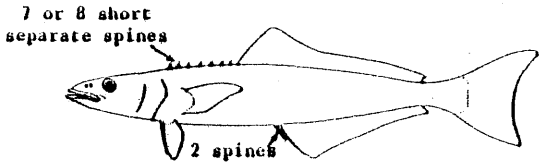
To 110 cm; marine, from the surface *(Pomatomus)* to below 250 m depth *(Scombrops)*; pelagic. The inclusion of *Scombrops* in this family is provisional





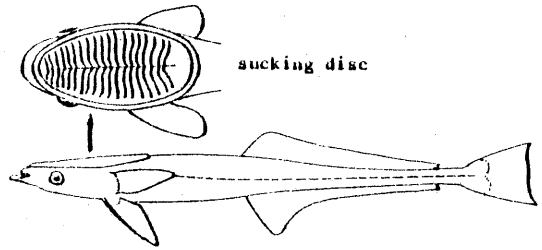
RACHYCENTRIDAE Cobias

To 200 cm; marine; pelagic in offshore waters (near the surface) but also over shallow reefs and occasionally in estuaries. A single species



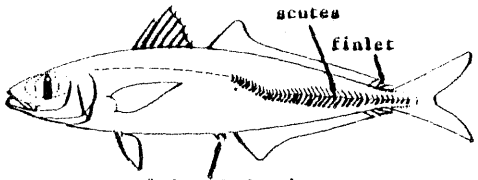
ECHENEIDAE Remoras

To about 100 cm; marine, pelagic and attached to larger marine organisms (sharks, turtles, marine mammals, etc.)

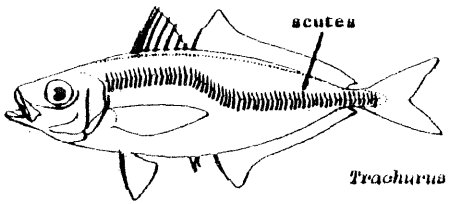


CARANGIDAE Jacks, pompanos, runners, bumpers, scads, pilotfishes, rudderfishes, lookdown, moonfishes, amberjacks, leatherjacks

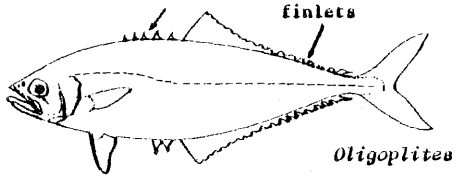
To about 140 cm; marine, from the coastline to below 200 m depth; a few species entering brackish waters; benthic, coastal-pelagic, or oceanic-pelagic



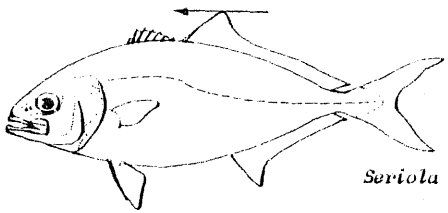
Decapterus



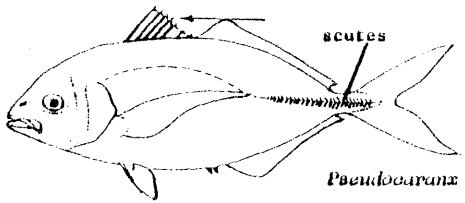
Trachurus



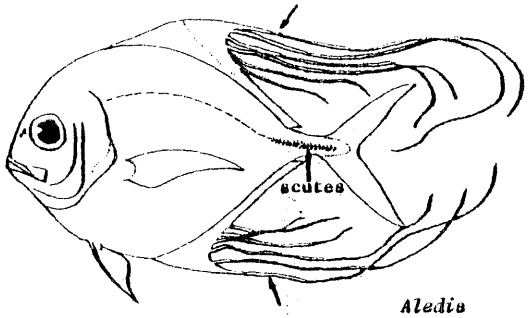
Oligoplites



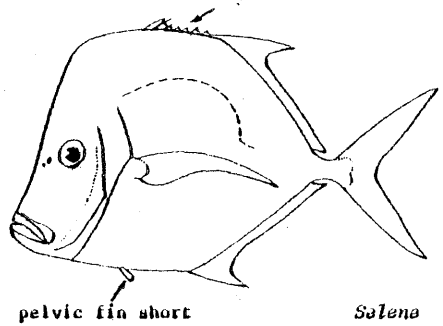
Seriola



Pseudocaranx



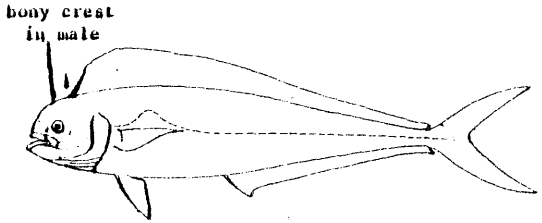
Aledis



Selene

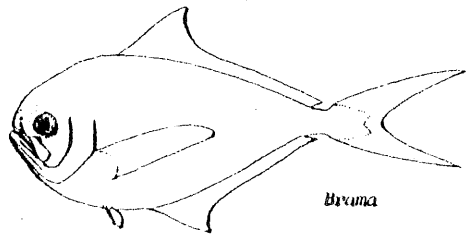
CORYPHAENIDAE Dolphinfishes

To 200 cm; marine, oceanic-pelagic, but sometimes approaching the coast.

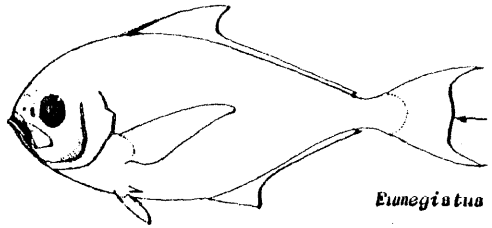


BRAMIDAE Pomfrets

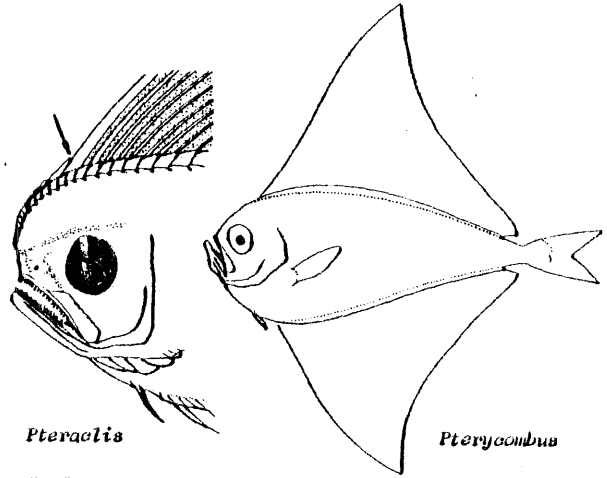
To about 100 cm; marine, mostly epi- or mesopelagic to below 300 m depth; one genus *(Eumegistus)* possibly deep benthic



Brama



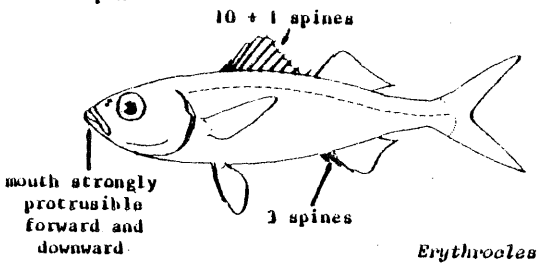
Eumegistus



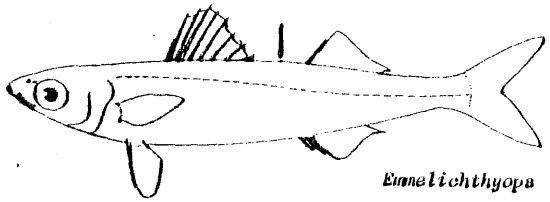
Pteraclis *Pterycombus*

EMMELICHTHYIDAE Bonnetmouths /rovers

To about 40 cm; marine, oceanic-pelagic to about 300 m depth



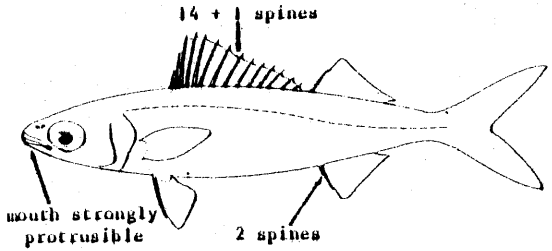
Erythrocles



Emmelichthyops

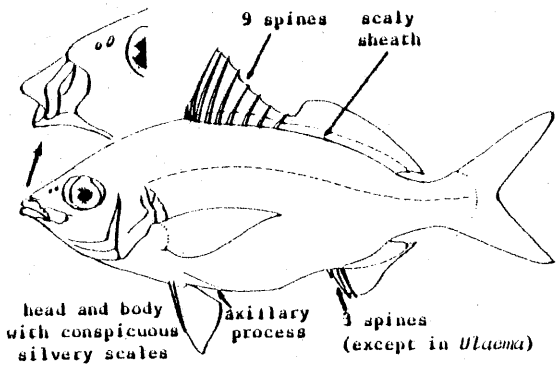
INERMIIDAE Bogas

To about 22 cm; marine, oceanic-pelagic or around islands, to about 30 m depth. A single species in the area



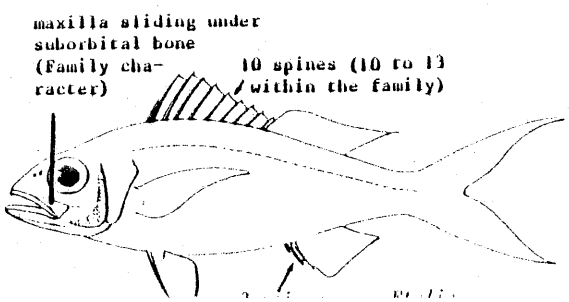
GERREIDAE Mojarras

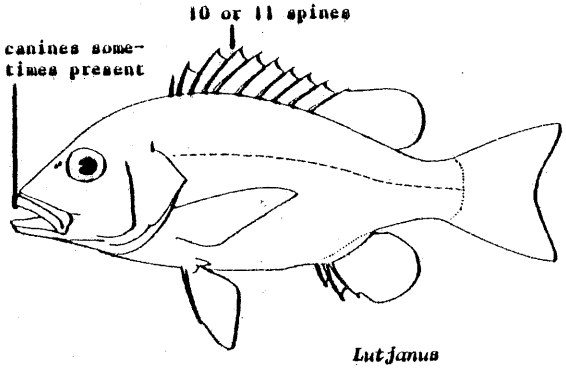
To 40 cm; coastal marine waters to about 50 m depth; also in estuaries, coastal lagoons and freshwater; benthic



LUTJANIDAE Snappers

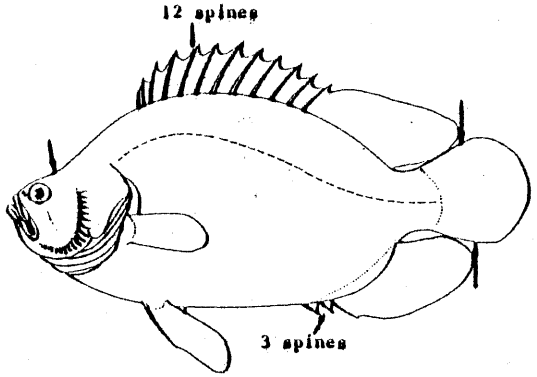
To 160 cm; mostly marine, from the coastline to 450 m depth; some species enter estuaries and even rivers; a few may enter hypersaline lagoons; benthic





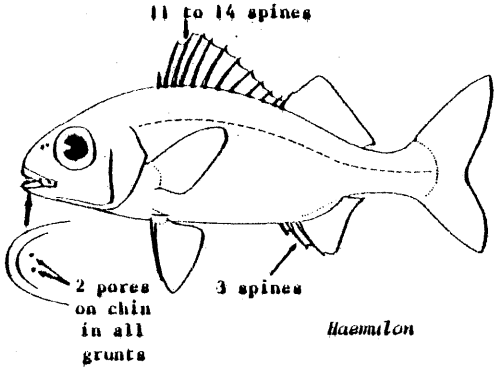
LOBOTIDAE Tripletails

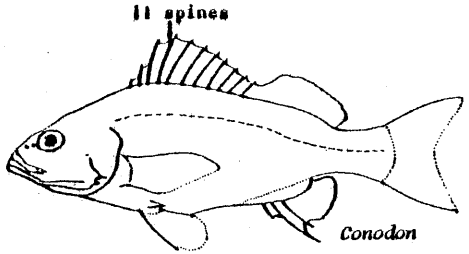
To over 100 cm; marine, oceanic-pelagic drifting near the surface. A single species in the area

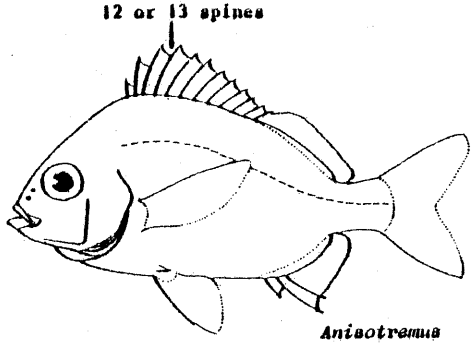


POMADASYIDAE Grunts and margates

To 60 cm; mostly marine, from the coastline to about 100 m depth, and in brackish waters; one species may be found well up rivers; benthic

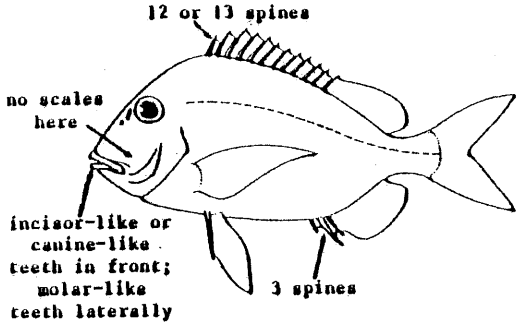






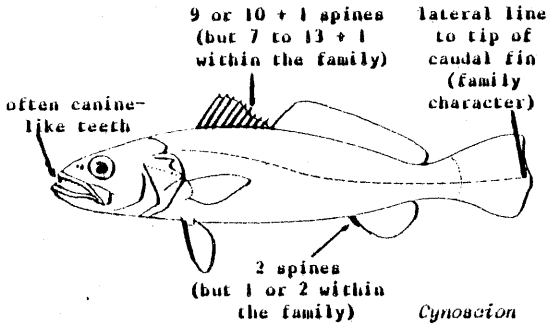
POMADASYIDAE/HAEMULIDAE Grunts

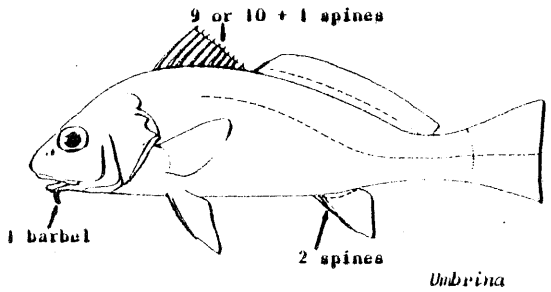
To 75 cm; marine, from the coastline to about 120 m depth; occasionally entering estuaries; benthic

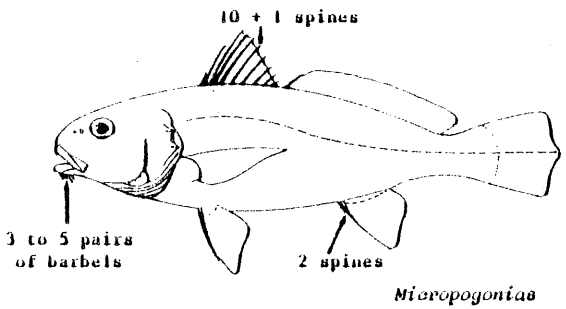


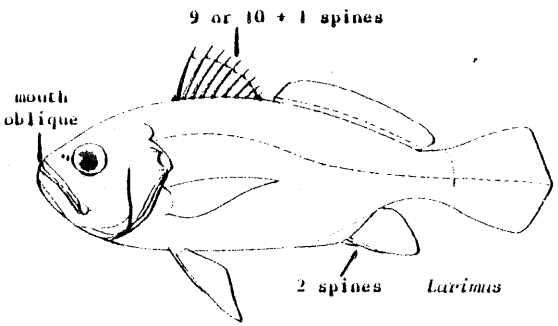
SCIAENIDAE Croakers, drums, weakfishes and stardrums

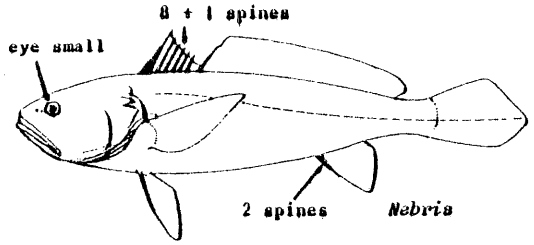
To 155 cm; marine, from the coastline to 600 m depth; also in estuaries and some species in freshwater; benthic

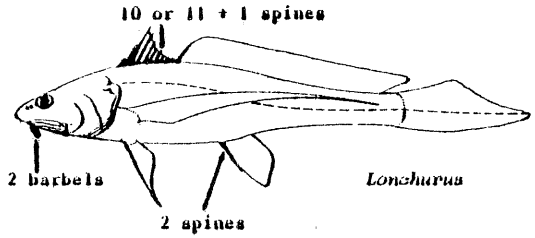


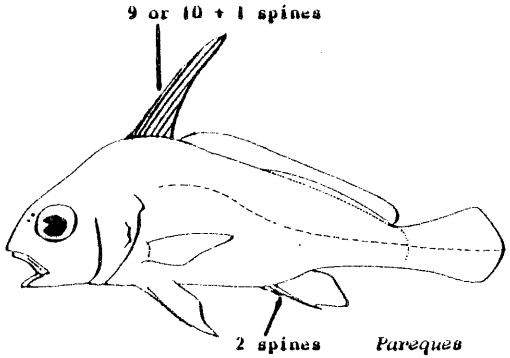






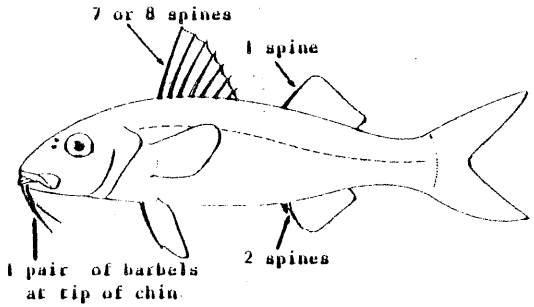






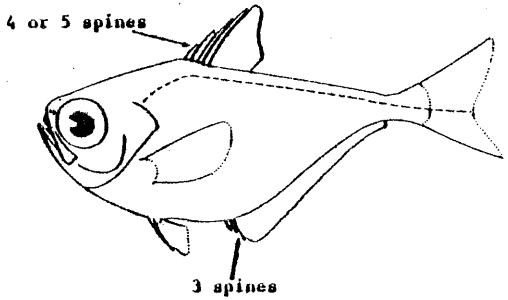
MULLIDAE Goatfishes

To 40 cm; in marine, from the coastline to about 100 m depth; occasionally in estuaries; benthic



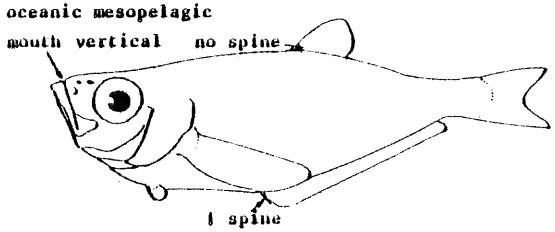
PEMPHERIDAE Sweepers

To about 15 cm; marine, from the coastline to about 80 m depth; some enter river estuaries; mostly benthic



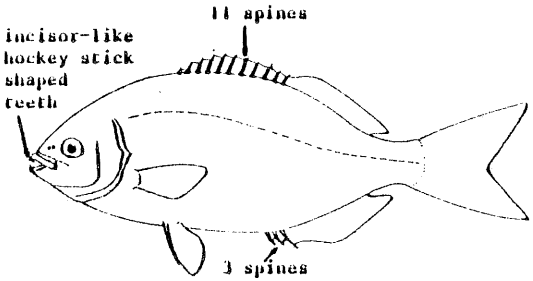
BATHYCLUPEIDAE Bathyclupeids

To about 20 cm; marine, mostly between 350 and 800 m, but occasionally at lesser depths; oceanic mesopelagic



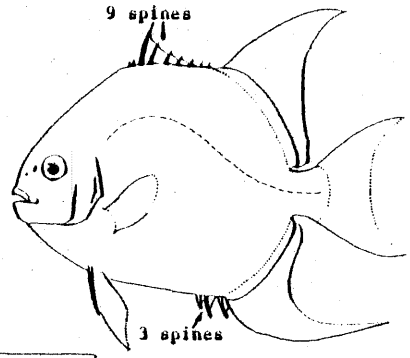
KYPHOSIDAE Seachubs

To 76 cm; marine in shallow coastal waters (usually less than 50 m) on seagrass beds and reefs or pelagic among floating sargassum weeds



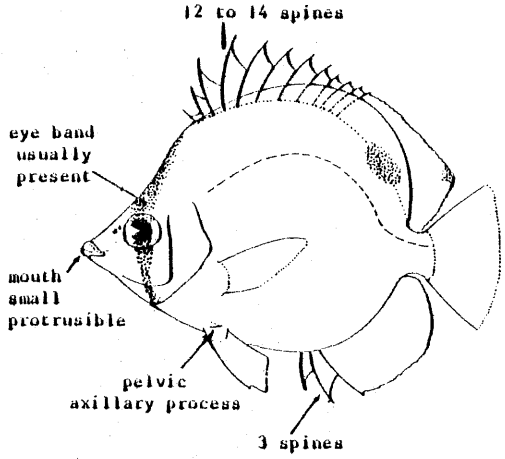
EPHIPPIDAE Spadefishes

To 90 cm; marine in shallow waters (to about 30 m depth); benthic. A single species in the area



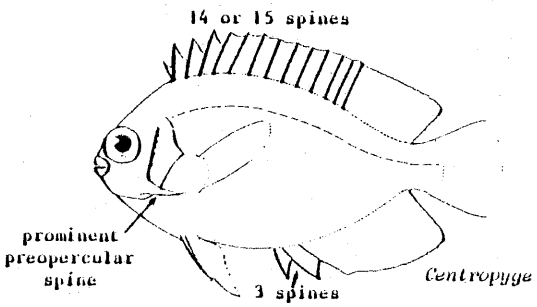
CHAETODONTIDAE Butterflyfishes

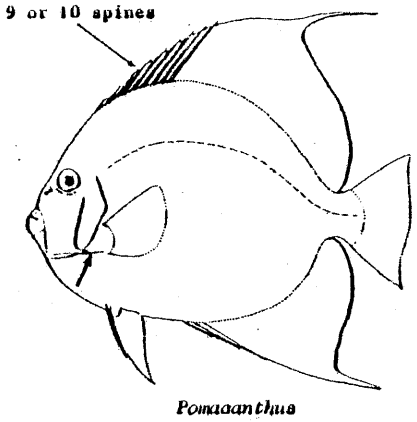
To 20 cm; marine, usually in shallow waters but occasionally extending to about 100 m depth; benthic



POMACANTHIDAE Angelfishes

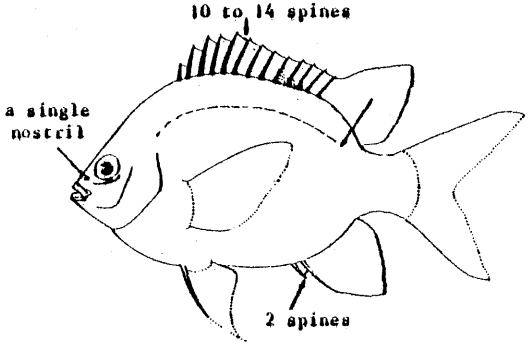
To 60 cm; marine, from the coastline to about 50 m depth; benthic





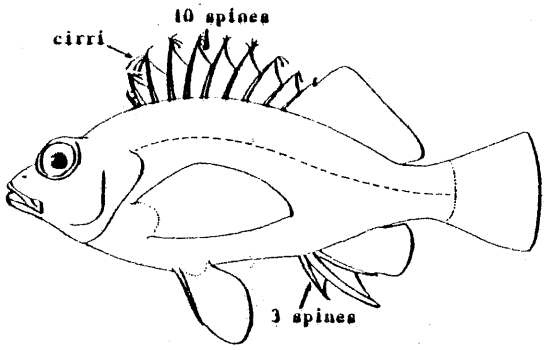
POMACENTRIDAE Damselfishes, majors, sergents and chromis

To 25 cm; marine in coastal waters, usually at less than 15 m depth; also in estuaries; mostly benthic



CIRRHITIDAE Hawkfishes

To about 9 cm; marine in shallow waters, usually less than 20 m depth; benthic. A single species in the area

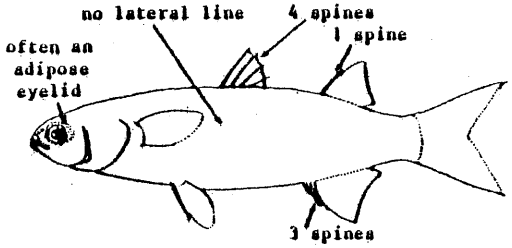


MULLETS - Perciformes - Mugiloidei

Body elongate; head flattened, mouth small; pectoral fins high on body; 2 dorsal fins, sides silvery; no lateral line

MUGILIDAE Mullets

To about 80 cm; in freshwater, estuaries, brackish and hypersaline lagoons and coastal marine waters at shallow depths (less than 20 m); mostly benthic in their food habits, but usually found near the surface

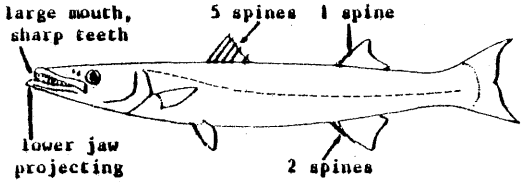


BARRACUDAS - Perciformes - Sphyraenoidei

Body elongate, generally silvery on sides; head and snout both very long; teeth strong; 2 dorsal fins

SPHYRAENIDAE Barracudas and sennets

To 200 cm; marine, from the coastline to about 100 m depth; ranging from just off the bottom to pelagic

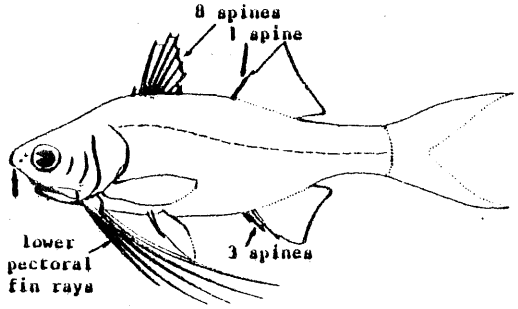


THREADFINS - Perciformes - Polynemoidei

Snout conical, projecting beyond mouth; pectoral fins in two parts, the lower with 3 or more free filamentous rays

POLYNEMIDAE Threadfins

To about 45 cm; shallow marine coastal waters (usually less than 30 m depth), estuaries, coastal lagoons and freshwater; benthic

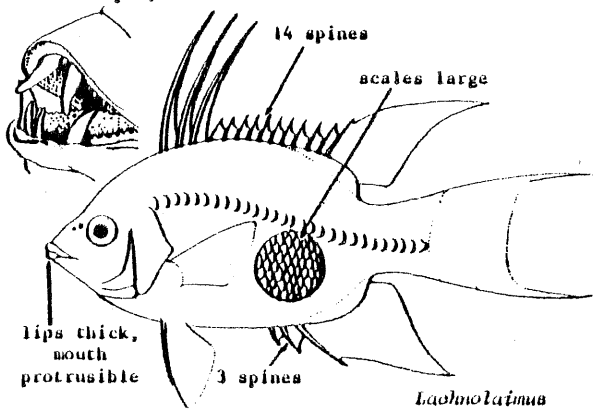


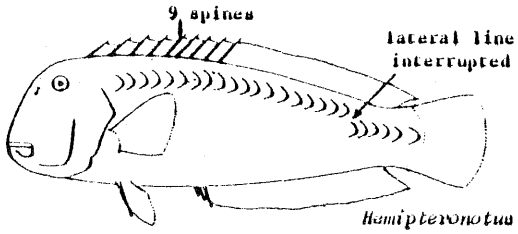
WRASSES AND ALLIES - Perciformes - Labroidei

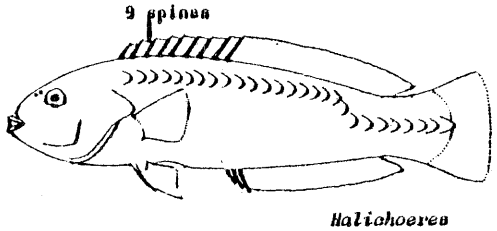
Well developed teeth, coalesced into plates in the parrotfishes; scales usually large and cycloid (smooth); body compressed; usually colourful species

LABRIDAE Wrasses, hogfishes and razor-fishes

To 70 cm; marine, from the coastline to about 120 m depth; benthic

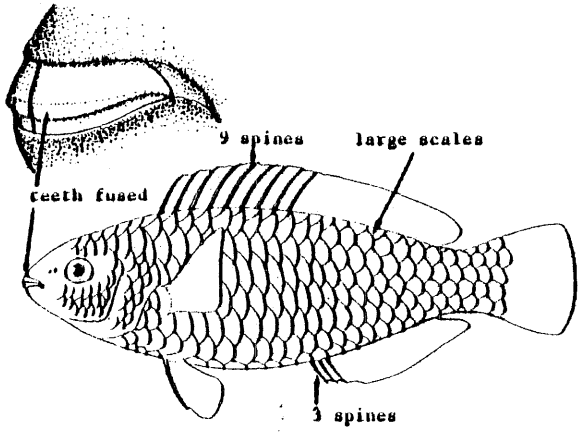






SCARIDAE Parrotfishes

To 95 cm; marine, in shallow waters rarely below 60 m depth; benthic

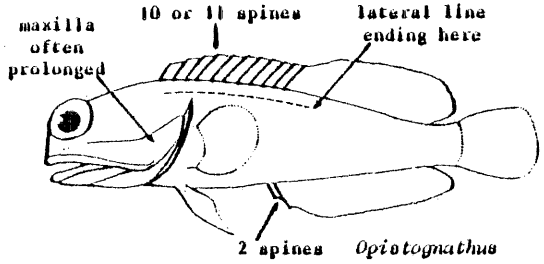


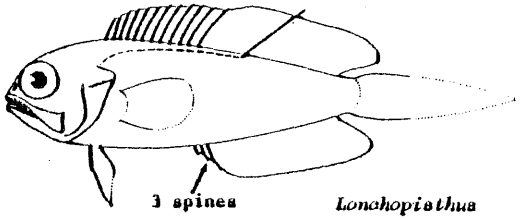
JAWFISHES AND ALLIES - Perciformes - Trachinoidei

A diverse assemblage of families difficult to characterize as a group; this suborder must be regarded as provisional

OPISTOGNATHIDAE Jawfishes

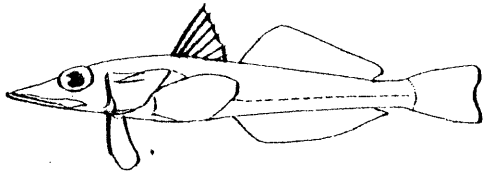
To 19 cm; marine from the coastline to about 200 m depth; benthic, some species burrowing





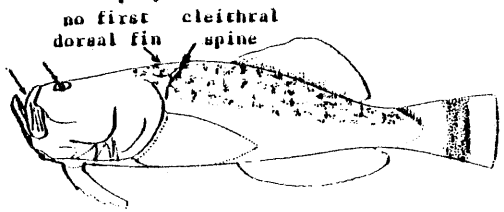
PERCOPHIDIDAE Flatheads

To at least 35 cm; marine, from about 100 to 400 m depth; benthic



URANOSCOPIDAE Stargazers

To about 45 cm; marine, from the coastline to about 550 m depth; benthic

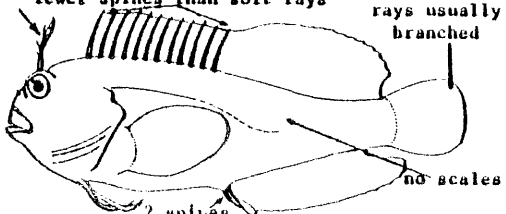


BLENNIES AND ALLIES - Perciformes - Blennioidei

Dorsal fin long; pelvic fins reduced, with 1 hidden spine and 2 to 4 soft rays, located ahead of pectoral fins; tentacles often present on head; two anal-fin spines (one of them sometimes difficult to see)

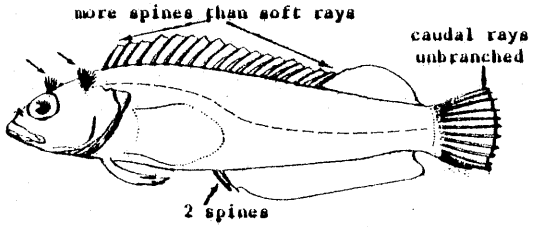
BLENNIIDAE Combtooth blennies

To 12 cm; in marine coastal waters (usually at less than 20 m depth), estuaries and coastal lagoons; benthic



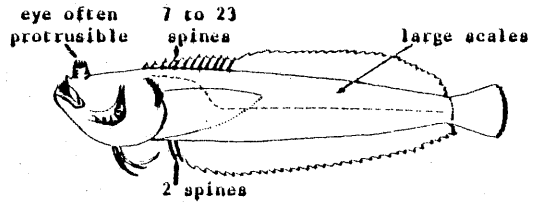
CLINIDAE Clinids

To about 20 cm; marine, usually in shallow waters, but a few species in deeper water (to below 100 m); benthic



DACTYLOSCOPIDAE Sand stargazers

To about 18 cm; marine, from the coastline to at least 140 m depth; benthic

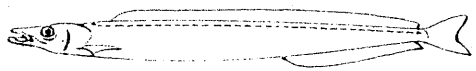


SANDLANCES - Perciformes - Ammodytoidei

Body very elongate; dorsal fin long; lateral line high on body, close to dorsal profile; teeth absent; pelvic fins usually absent

AMMODYTIDAE Sandlances

To about 30 cm; marine, from the coastline to about 50 m depth; benthic, burrowing into sand, or pelagic; a cold-water group rarely entering Fishing Area 31 from the north

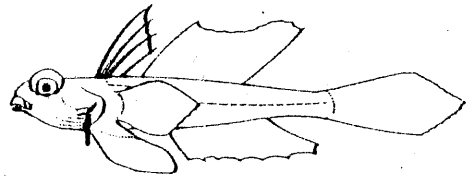


DRAGONETS - Perciformes - Callyonimoidei

A sharp preopercular spine; a small gill opening on upper part of head; size usually under 20 cm

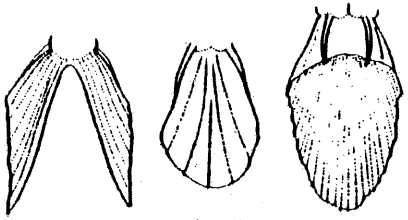
CALLIONYMIDAE Dragonets

To about 20 cm; marine, from coastal waters to below 200 m depth; benthic



GOBIES AND ALLIES - Perciformes - Gobioidei

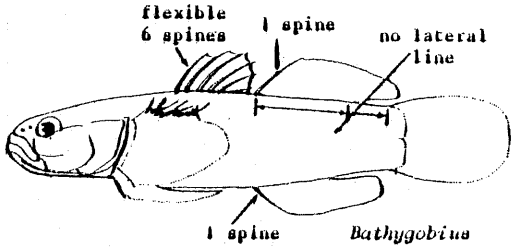
Usually small fishes with pelvic fins <u>either</u> very close together, <u>or</u> united into a single cup-like structure

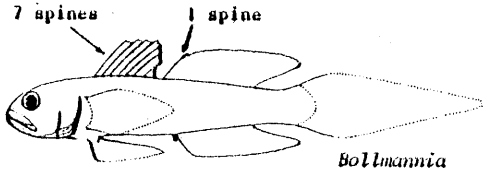


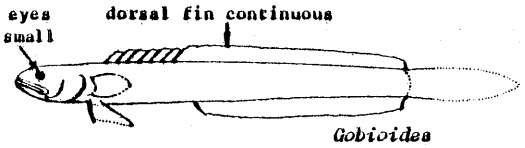
pelvic fins viewed from below

GOBIIDAE Gobies

To about 40 cm, but most species less than 10 cm; marine and brackish waters, occasionally freshwater; usually in very shallow waters, but a few species to below 150 m depth; benthic

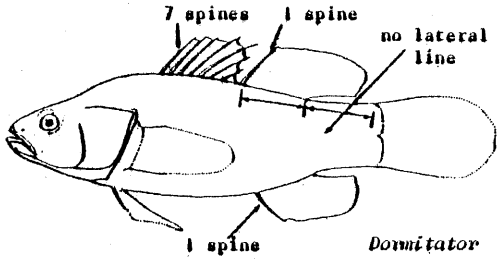


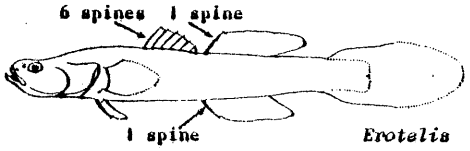




ELEOTRIDAE Sleepers

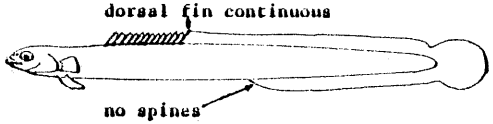
To about 30 cm; adults generally in freshwater, but entering brackish and coastal marine waters and hypersaline lagoons; benthic





MICRODESMIDAE Wormfishes

To 28 cm; marine in shallow coastal waters (less than 40 m depth); benthic, burrowing



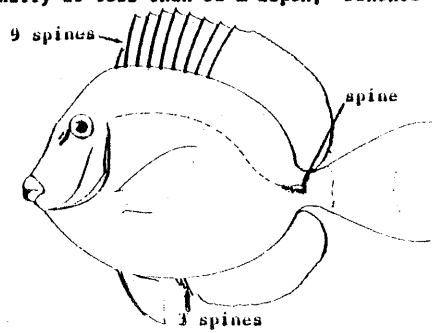
STICHAEIDAE—Pricklebacks.

SURGEONFISHES - Perciformes - Acanthuroidei

Small scales; a strong, movable, forward-projecting spine mid-laterally on caudal peduncle

ACANTHURIDAE Surgeonfishes

To about 40 cm; marine, in shallow waters, usually at less than 50 m depth; benthic

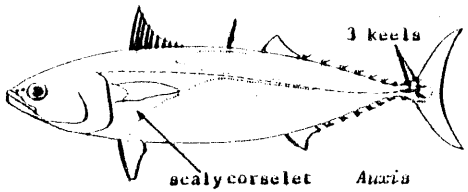


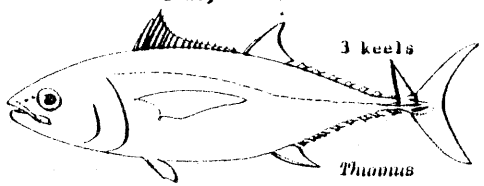
TUNAS AND ALLIES - Perciformes - Scombroidei

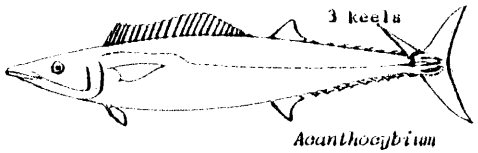
Finlets frequently present at posterior ends of dorsal and anal fins; 1 to 3 keels on either side of caudal peduncle (except in most species of Gempylidae); billfishes with an elongate snout

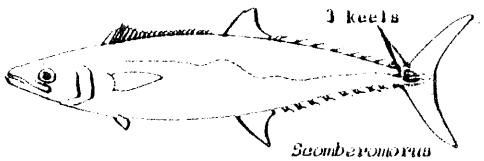
SCOMBRIDAE Mackerels, tunas, wahoos, bonitos, ceros and albacores

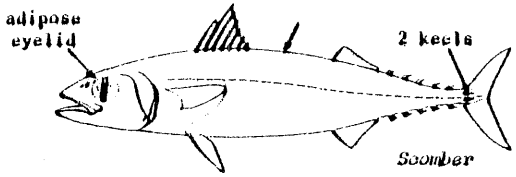
To over 300 cm; marine, from surface waters to below 100 m depth; pelagic





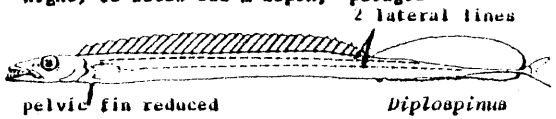


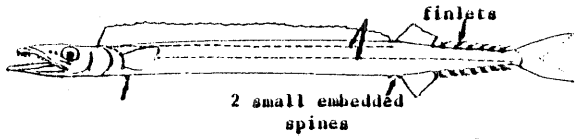


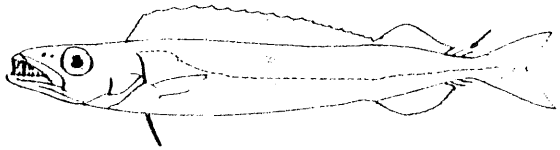


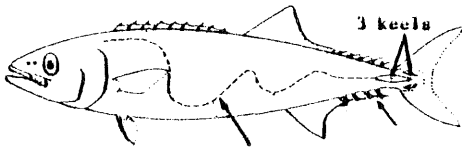
GEMPYLIDAE Snake mackerels, escolars and oilfishes

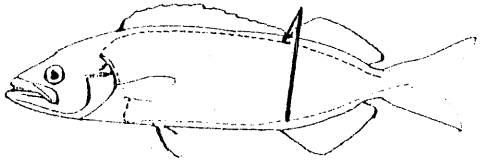
To about 300 cm; marine, from the surface (at night) to below 200 m depth; pelagic





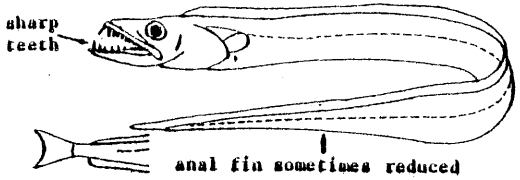






TRICHIURIDAE Cutlassfishes and hairtails

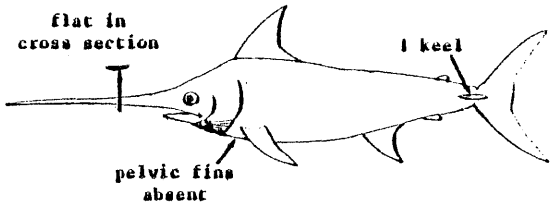
To 150 cm; marine, from the surface (mainly at nigth) to below 200 m depth; benthic and pelagic



SWORDFISHES AND ALLIES - Perciformes - Xiphioidei

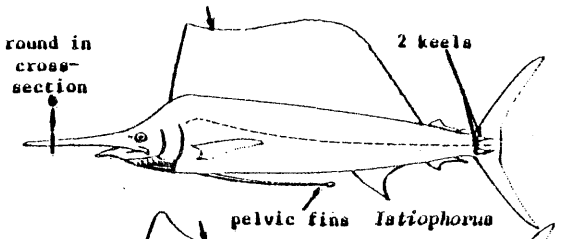
XIPHIIDAE Swordfishes

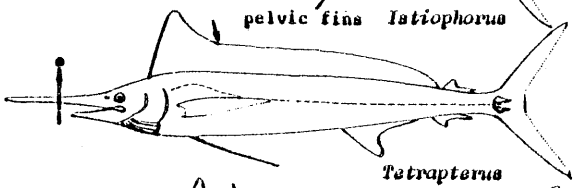
To 450 cm; marine, from surface waters to below 200 m depth; pelagic

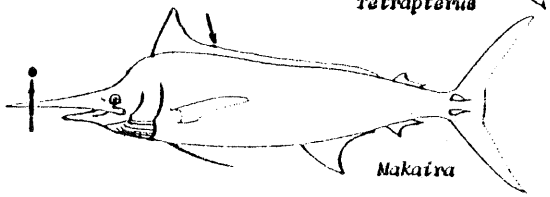


ISTIOPHORIDAE Billfishes, marlins, spearfishes and sailfishes

To 400 cm; marine, pelagic oceanic, usually above the thermocline



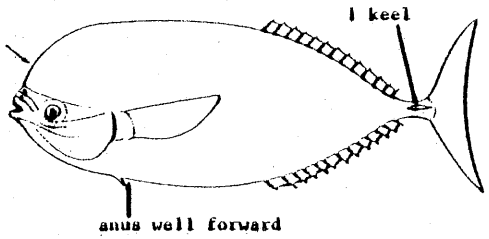




LOUVARS - Perciformes - Luvaroidei

LUVARIDAE Louvars

To about 190 cm; marine, from the surface to below 150 m; pelagic oceanic. A single species

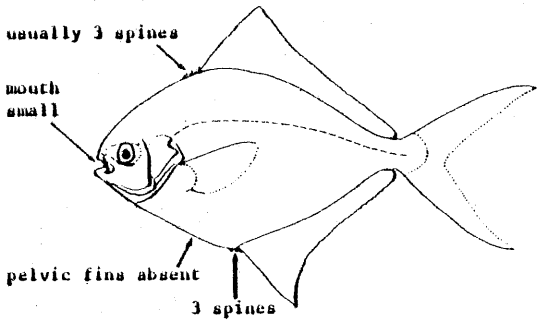


HARVESTFISHES AND ALLIES - Perciformes - Stromateoidei

Shape variable; snout blunt and thick; toothed saccular outgrowths (pharyngeal sacs) present in the gullet immediately behind the last gill arch; teeth small, approximately uniserial

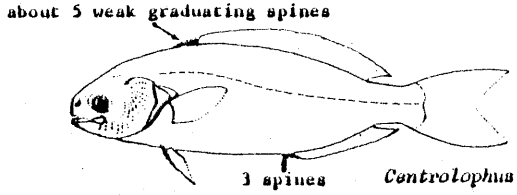
STROMATEIDAE Harvestfishes and butterfishes

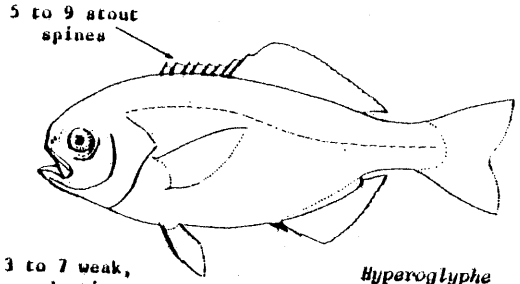
To about 30 cm; marine, but sometimes entering estuaries; from near the surface to about 200 m depth; pelagic

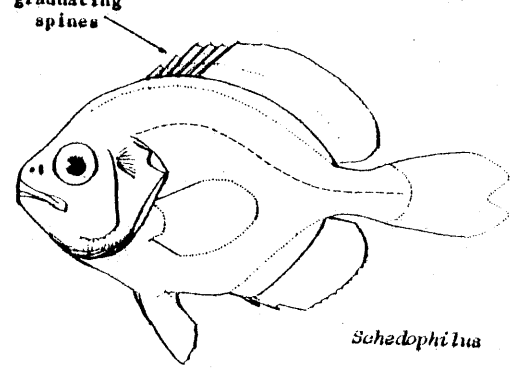


CENTROLOPHIDAE Ruffs

To about 120 cm; marine, from near the surface to below 200 m depth; pelagic

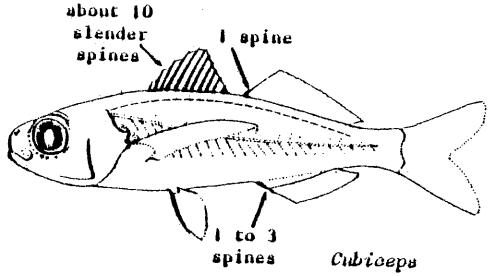


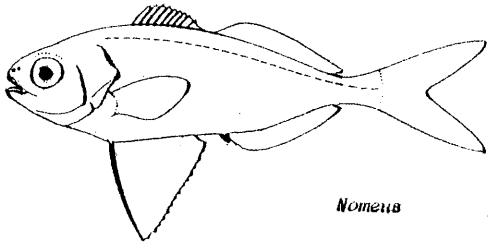


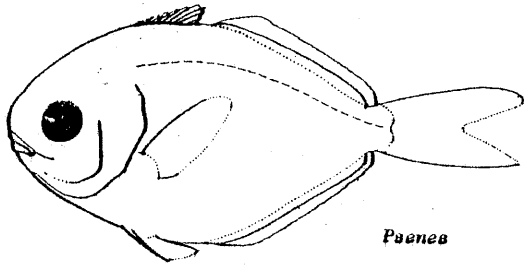


NOMEIDAE Man-of-war fishes

To 100 cm; marine, from near the surface (especially the young) to below 200 m depth; usually pelagic, but some species may be deep benthic

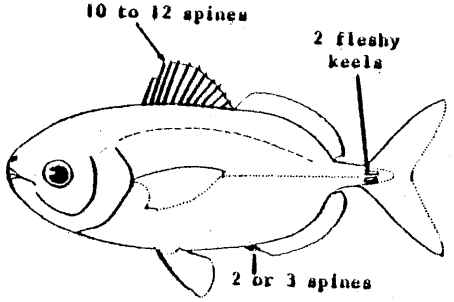






ARIOMMIDAE Driftfishes

To about 25 cm; marine, from the surface (the young) to below 500 m depth; mostly benthic to to benthopelagic

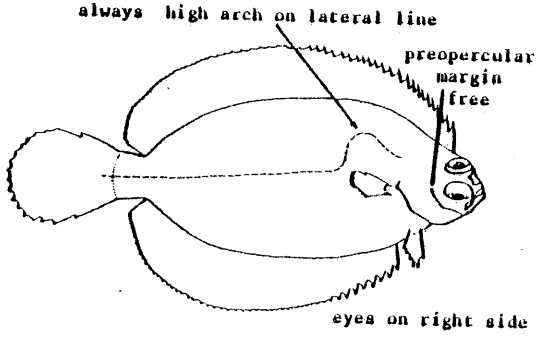


FLATFISHES - Pleuronectiformes

Flattened body shape; eyes present on one side of body only

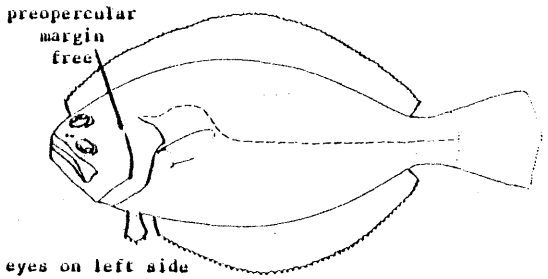
PLEURONECTIDAE Righteye flounders

To about 18 cm; marine, from about 180 to 1 600 m depth; benthic



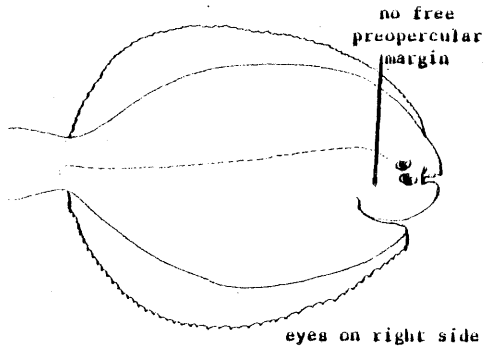
BOTHIDAE Lefteye flounders

To about 75 cm; marine, from the coastline to below 200 m depth; benthic



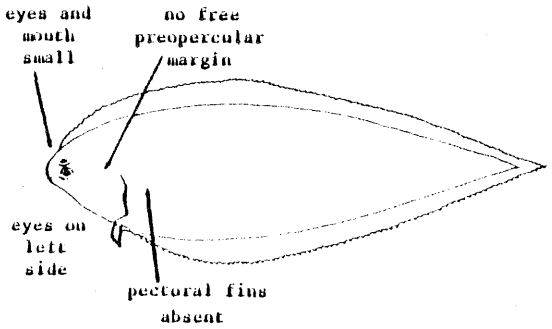
SOLEIDAE Soles

To about 25 cm; marine, from the coastline to about 300 m depth; some species in estuaries and freshwater; benthic



CYNOGLOSSIDAE Tonguefishes

To about 25 cm; marine, from shallow coastal waters to about 200 m depth; benthic

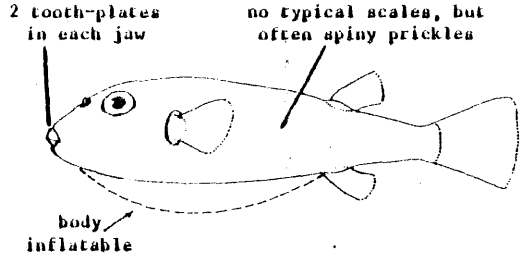


PUFFERFISHES AND ALLIES - Tetraodontiformes

Pelvic fins absent or strongly reduced (except in Triacanthodidae); a small mouth with strong teeth frequently coalesced into a biting plate; a small gill opening; skin thick or rough, sometimes with prickles, spines or scale plates

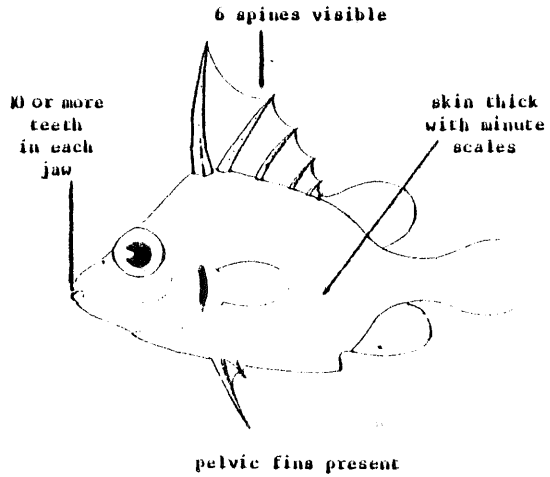
TETRAODONTIDAE Puffers

To about 100 cm; in coastal marine waters, estuaries, brackish and hypersaline lagoons and occasionally in freshwater; from the coastline to about 60 m depth; benthic



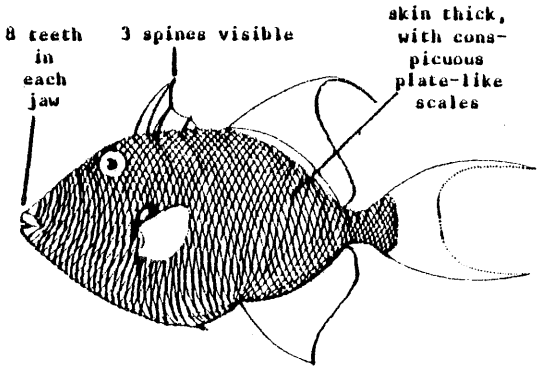
TRIACANTHODIDAE Spikefishes

To 20 cm; marine from 35 to about 900 m depth; predominantly benthic (1 species bathypelagic)



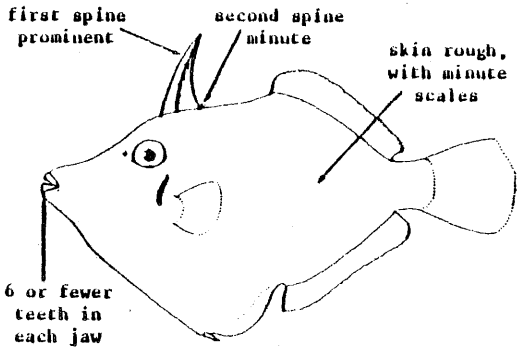
BALISTIDAE Triggerfishes and durgons

To about 50 cm; marine, from the coastline to about 100 m depth; mostly benthic



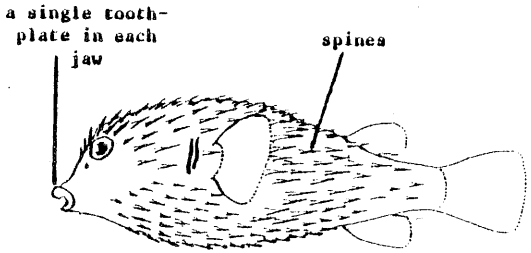
MONACANTHIDAE Filefishes and leatherjackets

To about 60 cm; marine, from the coastline to about 100 m depth; mostly benthic



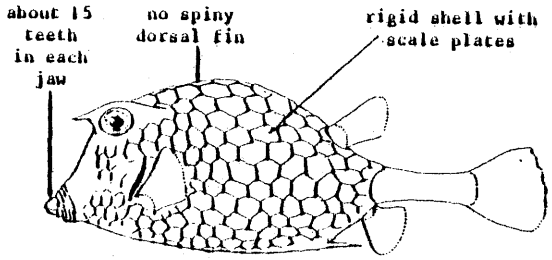
DIODONTIDAE Porcupinefishes and burrfishes

To about 65 cm; marine, from the coastline to about 100 m depth; benthic to pelagic



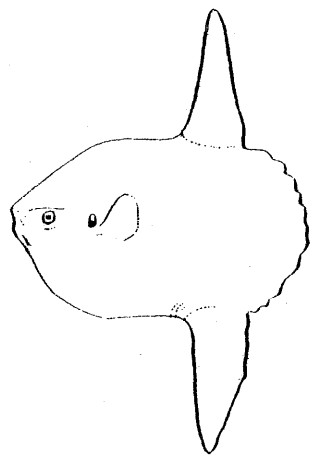
OSTRACIIDAE Trunkfishes, boxfishes and cowfishes

To about 35 cm; marine, from the coastline to about 100 m depth; benthic



MOLIDAE Molas and sunfishes

To about 400 cm; marine, from the surface to about 360 m depth; pelagic oceanic



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Modified by
Donald D. Flescher
1982

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