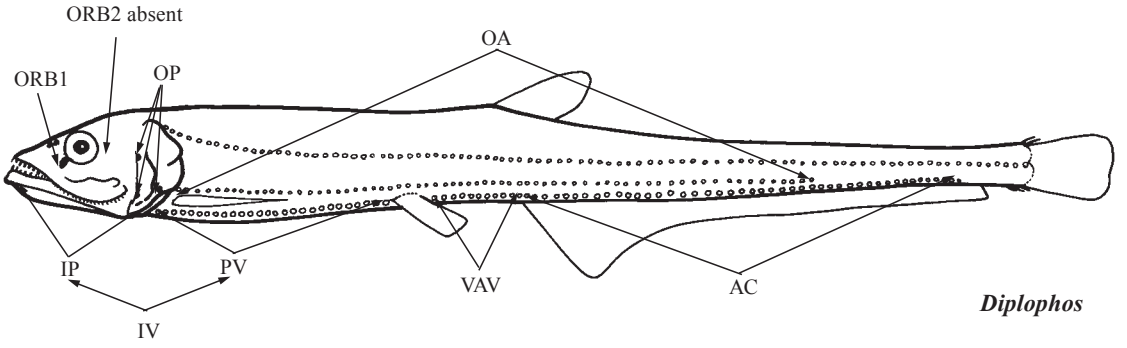
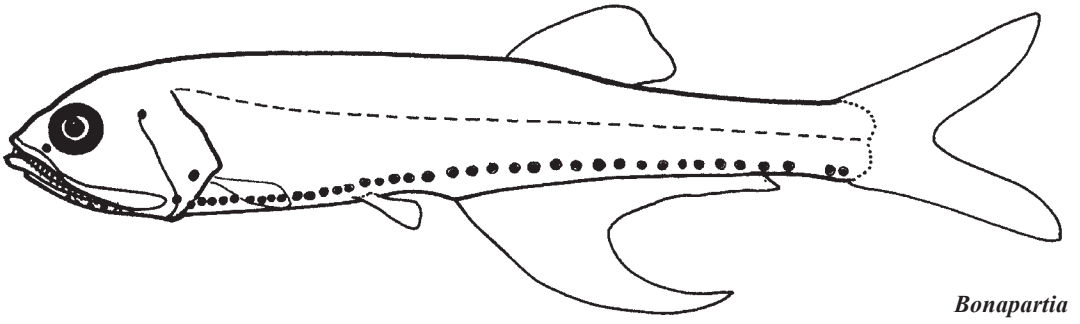
Order STOMIIFORMES
GONOSTOMATIDAE
Bristlemouths

by A.S. Harold, Grice Marine Biological Laboratory, South Carolina, USA

Diagnostic characters: Maximum size about 36 cm. Body moderately elongate; head and body compressed. Relative size of head highly variable. Eye very small to moderately large. Nostrils high on snout, prominent in dorsal view. Mouth large, angle of jaw well posterior to eye. Premaxillary teeth uniserial (except in *Triplophos*); dentary teeth biserial near symphysis. **Chin barbel absent**. Gill openings very wide. Branchiostegals 12 to 16 (4 to 6 on posterior ceratohyal). **Gill rakers well developed**. Pseudobranchiae usually absent (present in *Diplophos* and *Margrethia*). **Dorsal fin at or slightly posterior to middle of body (except in *Triplophos* in which it is anterior)**. Anal-fin base moderately to very long. Dorsal fin with 10 to 20 rays; anal fin with 16 to 68 rays; caudal fin forked; pectoral fin rays 8 to 16; pelvic fin rays 5 to 9. **Dorsal adipose fin present or absent**; ventral adipose fin absent. Scales deciduous. **One or more rows of discrete photophores on body; isthmus photophores (IP) present or absent; postorbital photophore (ORB 2) absent**. Parietals well developed; epioccipitals separated by supraoccipital. Four pectoral-fin radials (except *Cyclothone*, which has 1). **Colour:** skin varying from colourless through brown to black; black and silvery pigmentation associated with photophores.



Diplophos

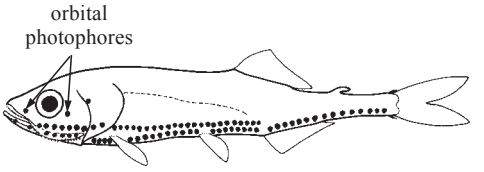


Bonapartia

AC - ventral series posterior to anal-fin origin
BR - series on the branchiostegal membranes
IP - ventral series anterior to pectoral-fin base
IV - ventral series anterior to pelvic-fin base
OA - lateral series
OP - opercular photophores
ORB - anterior (ORB1) and posterior (ORB2) to eye
PV - ventral series between bases of pectoral and pelvic fins
VAV - ventral series between pelvic-fin base and origin of anal fin

Habitat, biology, and fisheries: Mesopelagic and bathypelagic, oceanic. Development, especially of photophores, protracted. Diet consists of other fishes and crustaceans. Sexual dimorphism and/or hermaphroditism present in many species.

Remarks: The family has undergone considerable revision since Grey's (1964) treatment, primarily by Weitzman (1974). Some genera were moved to the Sternoptychidae while others to a completely new family, the Photichthyidae (=Phosichthyidae of this account) (Weitzman, 1974).



Phosichthyidae

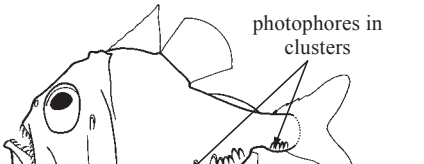
Similar families occurring in the area

Phosichthyidae: row of photophores on isthmus (IP); usually 2 orbital photophores (posterior of the 2 [postorbital] lacking in *Polymetme* and *Yarrella*); photophores Gamma type; 3 bony pectoral-fin radials.

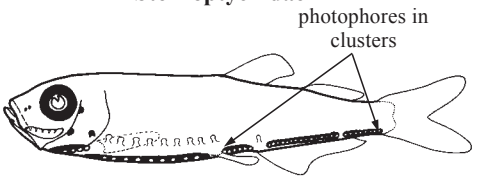
Sternoptychidae: pseudobranch present; ventral photophore series with disjunct clusters of 2 or more photophores; branchiostegal photophores (BR) 6 or 7; 4 bony pectoral-fin radials.

Astronesthidae, Chauliodontidae, Idiacanthidae, Malacosteidae, Melanostomiidae, and Stomiidae: body generally more elongate; chin barbel usually present but reduced or absent in Chauliodontidae, absent in males of Idiacanthidae, and absent in *Malacosteus* and *Photostomias* (Malacosteidae); jaw teeth greatly enlarged, fang-like; gill rakers absent in adults; usually 3 bony pectoral-fin radials.

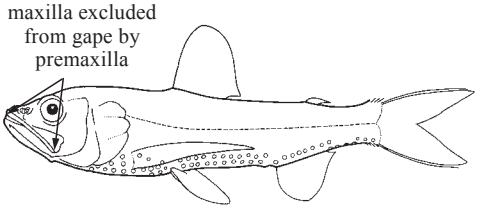
Myctophidae and Neoscopelidae: myctophiform families with photophores but usually with a less elongate body and the maxilla is toothless and completely excluded from the gape by the premaxilla; ventral photophores are usually more widely spaced and in less regular rows.



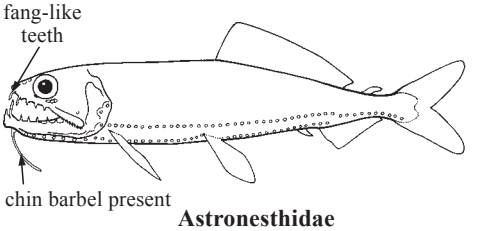
Sternoptychidae



Sternoptychidae



Neoscopelidae



Astronesthidae

Key to the genera of Gonostomatidae occurring in the area

Remarks on key characters: Gonostomatids are quite delicate and the skin and photophores are frequently damaged or lost during capture in commercial deep-water trawls. However, presence or absence of certain photophore groups, fin positions, and ray counts in conjunction with general body form will usually be adequate for identification.

1a. Anal-fin rays 36 to 39; dorsal-fin origin well in advance of anal-fin origin, posterior insertion of dorsal fin directly above or slightly anterior to anal-fin origin; IP photophores present on isthmus (Fig. 1); IV photophores 24 to 50 . . . . . → *2*

1b. Anal-fin rays 16 to 31; dorsal-fin origin not well in advance of anal-fin origin; IP photophores not present on isthmus; IV photophores 13 to 17. . . . . → *4*

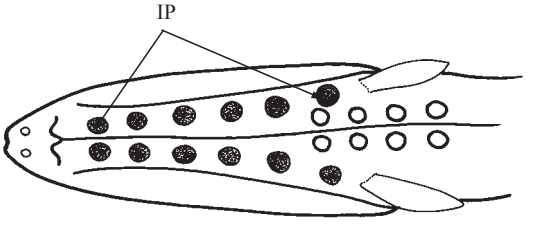


Fig. 1 ventral view of head

2a. Dorsal fin at or behind midpoint of body; VAV photophores 12 to 17 (Fig. 2); ORB photophore below or slightly ahead of anterior margin of eye; lower gill rakers 7 to 10; a row of small photophores on posterior 1/2 of lower jaw; pseudobranchs present; IV photophores 29 to 51 . . . . . → ***3***

2b. Dorsal fin well ahead of midpoint of body; VAV photophores 5 to 7 (Fig. 3); ORB photophore below centre of eye; lower gill rakers 12 to 16; no photophores on posterior 1/2 of lower jaw; pseudobranchs absent; IV photophores 24 to 30 . . . . . ***Triplophos***

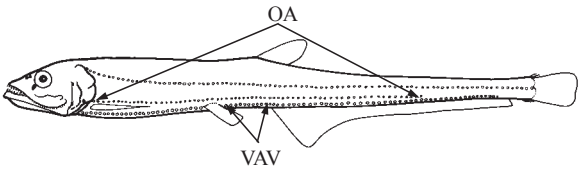


Fig. 2 ***Diplophos***

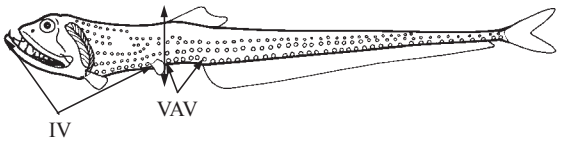


Fig. 3 ***Triplophos***

3a. OA photophores 60 to 77 (Fig. 2); IV photophores 31 to 51; AC photophores 32 to 51; IC photophores 76 to 119; distance from tip of snout to anal-fin origin usually about 47.5 to 51.2% standard length (61.2 to 64.4% standard length in *D. rebainsi*) . . . . . ***Diplophos***

3b. OA photophores 45 to 48 (Fig. 4); IV photophores 29 to 33; AC photophores 28 to 39; IC photophores 69 to 86; distance from tip of snout to anal-fin origin about 59.0 to 63.0% standard length . . . . . ***Manducus***

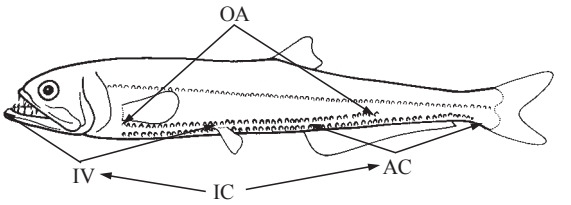


Fig. 4 ***Manducus***

4a. Dorsal-fin origin anterior to anal-fin origin (Fig. 5); pseudobranchiae well developed . . . ***Margrethia***

4b. Dorsal-fin origin above or posterior to anal-fin origin (Fig. 6); pseudobranchiae inconspicuous or absent . . . . . → ***5***

5a. Anal fin with elongate anterior rays (Fig. 6); OA photophores absent; pectoral-fin rays 14 to 16 . . . . . ***Bonapartia***

5b. Anterior rays of dorsal and anal fins not elongate; OA photophores present (6 to 16); pectoral-fin rays 7 to 13 . . . . . → ***6***

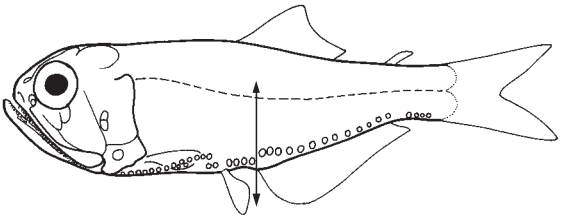


Fig. 5 ***Margrethia***

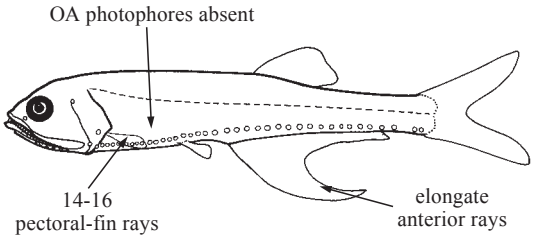


Fig. 6 ***Bonapartia***

6a. Eyes moderate to small (Fig. 7a); OA photophores 11 to 21; SO photophore usually present (absent in *G. bathyphilum*); maxilla with a series of elongate, teeth separated by a series of shorter, subequal teeth (Fig. 8a); palatine teeth in a single row; anal-fin rays 20 to 32 **. *Gonostoma***

6b. Eyes very small (Fig. 7b); OA photophores 6 to 10; SO photophore absent; maxillary teeth short but enlarging posteriorly or with occasional slightly longer teeth distributed at roughly equal intervals (Fig. 8b); palatine teeth in an anterior patch; anal-fin rays 16 to 21**. . . . . *Cyclothone***

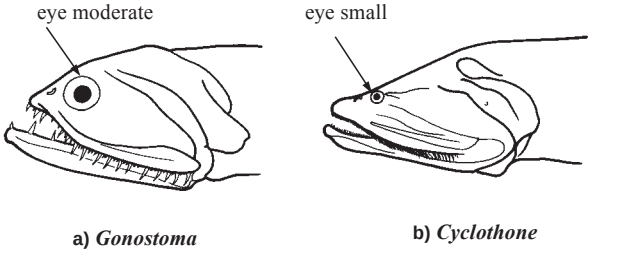


Fig. 7 lateral view of head

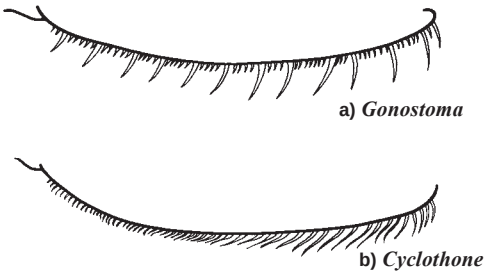


Fig. 8 teeth on maxilla (upper jaw)

List of species occurring in the area

Bonapartia pedaliota Goode and Bean, 1896. To 72 mm. Subtropical to temperate Atlantic.

Cyclothone acclinidens Garman, 1899. To 36 mm. Worldwide, tropical to temperate.
Cyclothone alba Brauer, 1906. To 34 mm. Worldwide, tropical to temperate.
Cyclothone braueri Jespersen and Tåning, 1926. To 38 mm. Worldwide, Subtropical to temperate.
Cyclothone microdon (Günther, 1878). To 66 mm. Worldwide, subtropical to temperate.
Cyclothone obscura Brauer, 1902. To 60 mm. Circumtropical.
Cyclothone pallida Brauer, 1902. To 70 mm. Worldwide, tropical to subtropical.
Cyclothone parapallida Badcock, 1982. To 69 mm. Worldwide, tropical to temperate.
Cyclothone pseudopallida Mukacheva, 1964. To 58 mm. Worldwide, tropical to temperate.

Diplophos taenia Günther, 1873. To 276 mm. Worldwide, tropical to subtropical.

Gonostoma atlanticum Norman, 1930. To 66 mm. Tropical to subtropical Atlantic and Pacific.
Gonostoma bathyphilum (Vaillant in Filhol, 1884). To 150 mm. Tropical to temperate Atlantic.
Gonostoma denudatum Rafinesque, 1810. To 140 mm. Subtropical to temperate N Atlantic and Mediterranean.
Gonostoma elongatum Günther, 1878. To 275 mm. Worldwide, tropical to subtropical.

Manducus maderensis (Johnson, 1890). To 220 mm. Tropical to subtropical Atlantic.

Margrethia obtusirostra Jespersen and Tåning, 1919. To 83 mm. Tropical to temperate N Atlantic.

Triplophos hemingi (McArdle, 1901). To 360 mm. Worldwide in the tropics.

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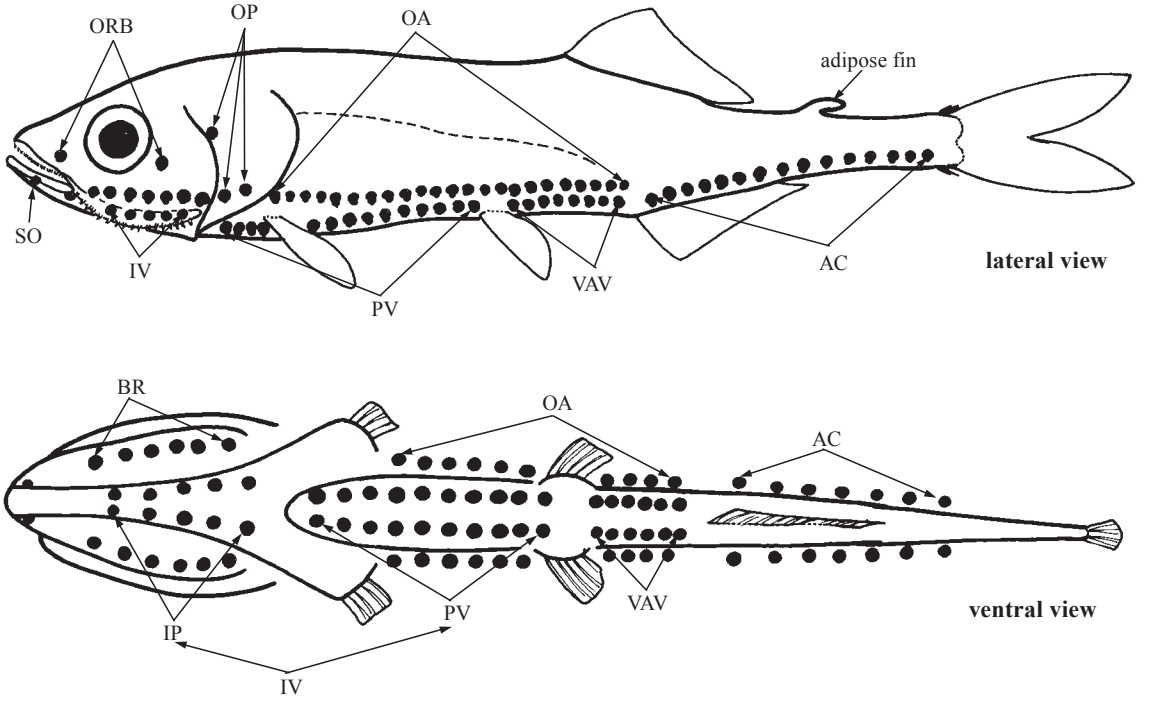
PHOSICHTHYIDAE

Lightfishes (lighthousefishes)

by A.S. Harold, Grice Marine Biological Laboratory, South Carolina, USA

Diagnostic characters: Maximum size about 30 cm. Body generally moderately elongate, somewhat deep-bodied in some *Ichthyococcus* species, head small to moderately large. Head and body compressed. Mouth large; **teeth** ranging in size from small to large but **not highly elongate and fang-like. Chin barbel absent**. Eleven to 22 branchiostegal rays, 4 to 7 on posterior ceratohyal. **Gill rakers well developed (but true gill rakers restricted to angle of arch in *Woodsia*)**. Pseudobranchiae absent, except *Woodsia meyerwaardeni*. **Dorsal fin usually near middle of body, its origin well in advance of that of anal fin (except *Pollichthys* which has dorsal-fin orgin immediately above that of anal fin). Dorsal adipose fin present (except *Yarrella*). Anal fin with moderately long base but terminating posteriorly ahead of most constricted portion of caudal peduncle. Dorsal fin with 10 to 16 rays; anal fin with 12 to 33 soft rays; caudal fin forked; pectoral-fin soft rays 7 to 11; pelvic-fin soft rays 6 to 8.** Scales present, deciduous. Two ventrolateral rows of well-developed photophores on body, rows of accessory photophores dorsal to main rows in *Yarrella*; OA 17 to 53; IV 19 to 28; VAV 7 to 17; AC 12 to 28; **paired row of photophores on isthmus (IP); 2 orbital photophores, except *Polymetme* and *Yarrella* which lack the posterior (ORB 2)**. Three pectoral-fin radials. Usually 2 supramaxillae. **Colour:** skin varying from light brown in *Pollichthys* to dark brown or nearly black in *Yarrella*.



AC	-	ventral series posterior to anal-fin origin	OP	-	opercular photophores
BR	-	on the branchiostegal membranes	ORB	-	anterior (ORB1) and posterior (ORB2) to eye
IP	-	ventral series anterior to pectoral-fin base	PV	-	ventral series between bases of pectoral and pelvic fins
IV	-	ventral series anterior to pelvic-fin base	SO	-	paired photophores near symphysis of lower jaw
OA	-	lateral series	VAV	-	ventral series between pelvic-fin base and anal-fin origin

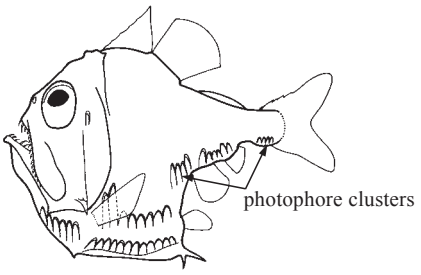
abbreviated terminology of photophores

Habitat, biology, and fisheries: Mesopelagic and bathypelagic adults (*Yarrella* and *Polymetme* may be benthopelagic). Larvae nearer surface than adults. Diet consists mainly of zooplankton, crustaceans in particular.

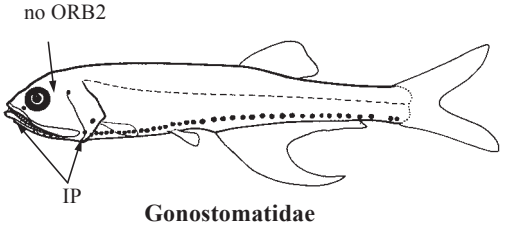
Similar families occurring in the area

Gonostomatidae: photophores present on isthmus (IP) (*Diplophos, Manducus,* and *Triplophos*) or absent (*Bonapartia, Cyclothone, Gonostoma,* and *Margrethia*); posterior orbital (ORB2) photophore absent; 4 bony pectoral-fin radials.

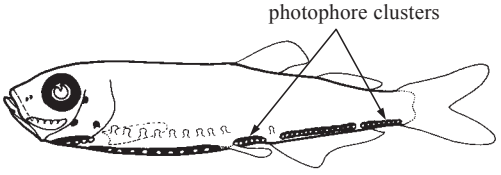
Sternoptychidae: pseudobranch present; ventral photophore series with clusters of 2 or more photophores; posterior orbital (ORB2) photophore absent; 4 bony pectoral-fin radials.



Sternoptychidae



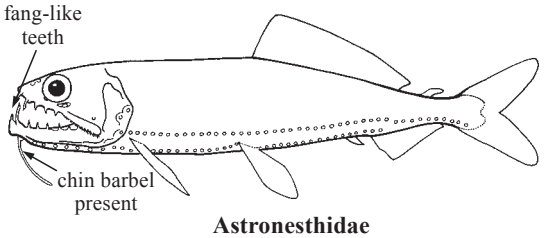
Gonostomatidae



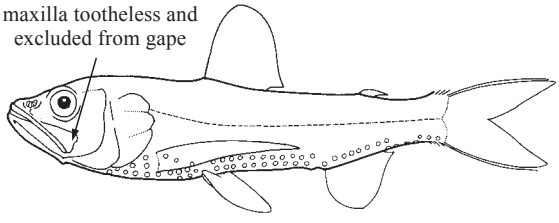
Sternoptychidae

Astronesthidae, Chauliodontidae, Idiacanthidae, Malacosteidae, Melanostomiidae, and Stomiidae: similar arrangement of photophores but body generally more elongate; chin barbel usually present but reduced or absent in Chauliodontidae, absent in males of Idiacanthidae, and absent in *Photostomias* and *Malacosteus* (Malacosteidae); jaw teeth greatly enlarged, fang-like; gill rakers absent in adults.

Myctophidae and Neoscopelidae: maxilla toothless and completely excluded from gape by premaxilla.



Astronesthidae



Neoscopelidae

Key to the genera and monotypic species of Phosichthyidae occurring in the area

(adapted from Grey, 1964 and Badcock, 1984)

1a. Two ORB photophores, 1 anteroventral, 1 midventral to posteroventral to eye; premaxillary teeth uniserial . . . . . → *2*

1b. One ORB photophore, anteroventral to eye; premaxillary teeth biserial . . . . . → *5*

2a. Anal-fin origin beneath or close behind last dorsal-fin ray base; BR photophores 8 or 9 . . . . . → *3*

2b. Anal-fin origin well behind last dorsal-fin ray base; BR photophores 11 to 18 . . . . . → *4*

3a. Anal- and dorsal-fin bases about equal in length; anal-fin rays 12 to 16 (Fig. 1); AC photophores 12 to 16, with 6 or 7 over anal fin . . . . . ***Vinciguerria***

3b. Anal-fin base length more than twice dorsal-fin base (Fig. 2); anal-fin rays 22 to 30; AC photophores 19 to 21, with 13 to 15 over anal fin . . . . . ***Pollichthys***

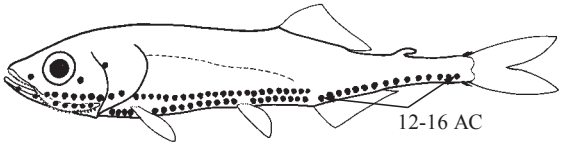


Fig. 1 ***Vinciguerria***

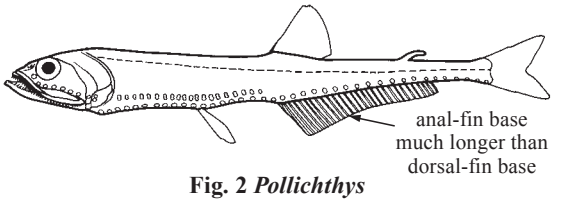


Fig. 2 ***Pollichthys***

4a. Pelvic-fin base posterior to dorsal-fin origin (Fig. 3); posterior ORB photophore midventral to eye; eyes tubular; dorsal adipose-fin base long, about length of anal-fin base . . . . ***Ichthyococcus***

4b. Pelvic-fin base anterior to dorsal-fin origin (Fig. 4); posterior ORB photophore posteroventral to eye; eyes lateral, not tubular; dorsal adipose-fin base short, much shorter than anal-fin base length . . . . . ***Woodsia***

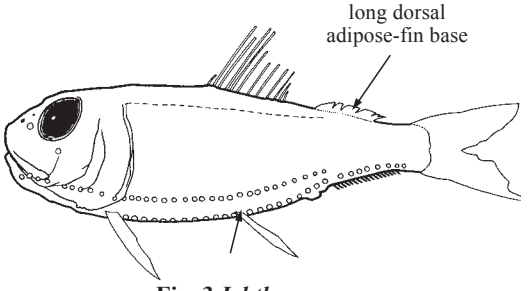


Fig. 3 ***Ichthyococcus***

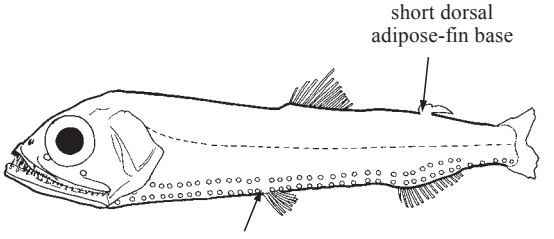


Fig. 4 ***Woodsia***

5a. Body with 2 rows of serial photophores; dorsal adipose fin present (Fig. 5); VAV photophores 7 or 8; ninth or tenth IV photophore elevated; 1 or 2 anterior AC photophores elevated; dorsal-fin rays 11 to 13 . . . . . ***Polymetme***

5b. Body with more than 2 rows of serial photophores; dorsal adipose fin absent (Fig. 6); VAV photophores 9 to 12; IV and AC photophore series straight, no photophores elevated; dorsal-fin rays 14 to 17 . . . . . ***Yarrella***

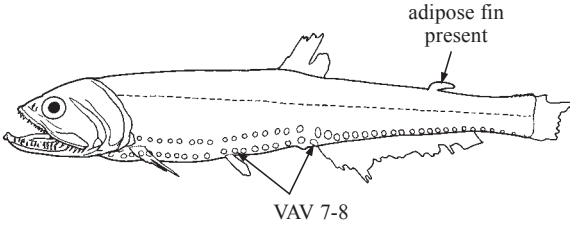


Fig. 5 ***Polymetme***

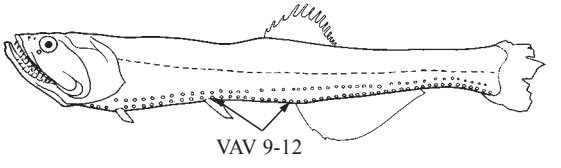


Fig. 6 ***Yarrella***

List of species occurring in the area

Ichthyococcus ovatus (Cocco, 1838). To 6 cm. Circumglobal in subtropics.

Pollichthys mauli (Poll, 1953). To 6 cm. Tropical and subtropical Atlantic, W Pacific.

Polymetme thaeocoryla Parin and Borodulina, 1990. To 22 cm. Tropical to temperate Atlantic.

Vinciguerria attenuata (Cocco, 1838). To 5 cm. Tropical and subtropical Atlantic.
Vinciguerria nimbaria (Jordan and Williams, 1895). To 5 cm. Tropical and subtropical Atlantic, W Indian.
Vinciguerria poweriae (Cocco, 1838). To 4 cm. Tropical and subtropical N Atlantic, Pacific.

Woodsia nonsuchae (Beebe, 1932). To 9 cm. Subtropical N Atlantic, Pacific.

Yarrella blackfordi Goode and Bean, 1896. To 32 cm. Tropical and subtropical Atlantic.

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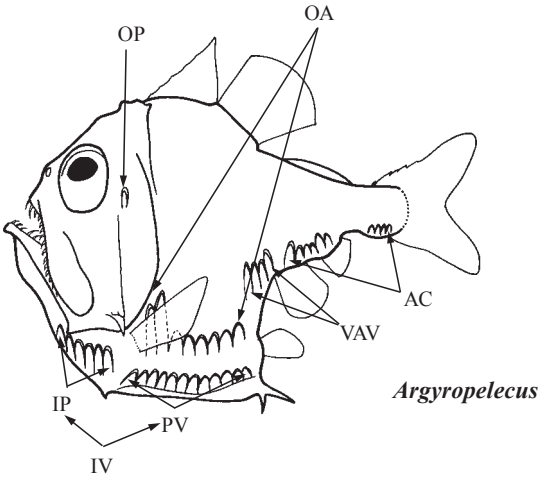
STERNOPTYCHIDAE

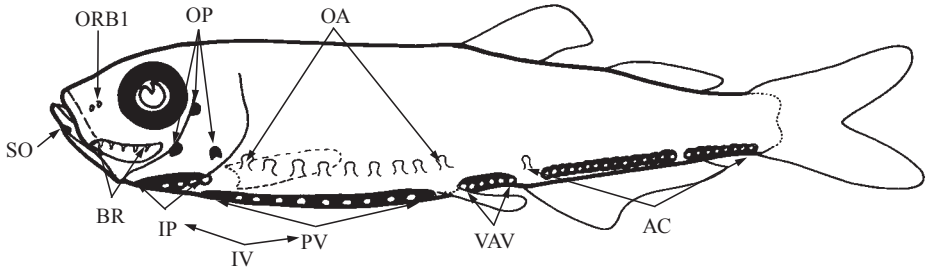
Hatchetfishes

by A.S. Harold, Grice Marine Biological Laboratory, South Carolina, USA

Diagnostic characters: Maximum size about 10 cm standard length. Elongate to deep-bodied. Head moderate to very large, more than 1/3 of standard length in *Sternoptyx*. Eye large, up to about half of head length, directed vertically and telescopic in some *Argyropelecus*. Snout short. Mouth small to moderate in size, terminal, oblique to nearly vertical; jaw teeth generally small, some *Argyropelecus* species with well-developed canine teeth. Chin barbel absent. Branchiostegals 6 to 10. **Pseudobranch present**. Gill rakers well-developed. Dorsal-fin origin usually near middle of body (anterior in *Danaphos*, posterior in *Araiophos*). Anal fin moderate to long-based, interrupted centrally by a group of photophores in some genera (e.g., *Argyripnus*, *Argyropelecus*, *Polyipnus*). Dorsal fin with 6 to 20 soft rays; anal fin with 17 to 38 soft rays; caudal fin forked; pectoral fin with 11 to 18 soft rays; pelvic fin with 5 to 7 soft rays. Dorsal adipose fin usually present. Scales present, deciduous. **Ventral photophore series with disjunct clusters of 2 or more photophores**. Two ventrolateral rows of photophores on body; OA 0 to 10; IV 10 to 24; VAV 3 to 32; AC 3 to 51; paired row of photophores on isthmus (IP); branchiostegal photophores 6 (7 in *Sonoda*); 1 orbital photophore present (ORB1), posterior orbital photophore (ORB2) absent. **Three branchiostegal rays originating on posterior ceratohyal**. Four pectoral-fin radials. **Colour:** skin light to dark brown, often with reflective guanine pigment on side of body; silvery and black pigmentation usually associated with photophores. Some species with dark dorsum pigment and/or with saddle-like markings and lateral bars or incomplete stripes as in *Polyipnus*.



Argyropelecus



AC	-	ventral series posterior to anal-fin origin	OP	-	opercular photophores
BR	-	on the branchiostegal membranes	ORB1	-	anterior to eye
IP	-	ventral series anterior to pectoral-fin base	PV	-	ventral series between bases of pectoral and pelvic fins
IV	-	ventral series anterior to pelvic-fin base	SO	-	paired photophores near symphysis of lower jaw
OA	-	lateral series	VAV	-	ventral series between pelvic-fin base and anal-fin base

abbreviated terminology of photophores

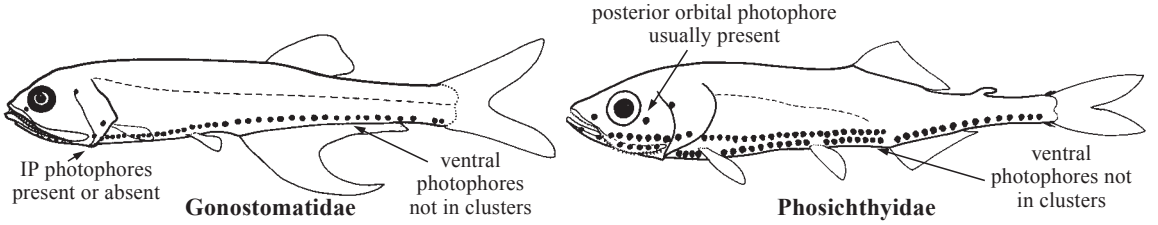
Habitat, biology, and fisheries: Mainly mesopelagic as adults, occasionally bathypelagic or benthopelagic (*Argyripnus, Sonoda, Polyipnus*). Development, especially of photophores, protracted. Diet consists of small fishes and zooplankton, including crustaceans, annelids, chaetognaths, and molluscs.

Remarks: The family Sternoptychidae as recognized here is consistent with Weitzman's (1974) revision. The elongate species had previously (Grey, 1964) been placed with the Gonostomatidae, with which they bore superficial resemblance. Specialized photophore structure and other details of anatomy described by Weitzman (1974) indicated they should be placed with the deep-bodied hatchetfishes in an expanded Sternoptychidae.

Similar families occurring in the area

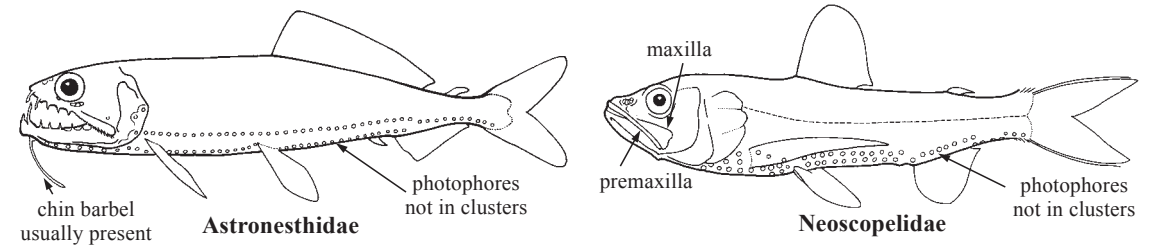
Gonostomatidae: pseudobranchiae usually absent (present in *Diplophos* and *Margrethia*); IP photophores present or absent (*Bonapartia*, *Cyclothone*, *Gonostoma,* and *Margrethia*); postorbital photophore absent; ventral photophore series (AC) not in clusters.

Phosichthyidae: pseudobranchiae absent; usually 2 orbital photophores but postorbital lacking in *Polymetme* and *Yarrella*; ventral photophore series not in clusters; 3 bony pectoral-fin radials.



Astronesthidae, Chauliodontidae, Idiacanthidae, Malacosteidae, Melanostomiidae, and Stomiidae: similar arrangement of photophores but body generally more elongate; chin barbel usually present but reduced or absent in Chauliodontidae, absent in males of Idiacanthidae, and absent in *Photostomias* and *Malacosteus* (Malacosteidae); jaw teeth greatly enlarged, fang-like; gill rakers absent in adults; usually three bony pectoral-fin radials.

Myctophidae and Neoscopelidae: maxilla toothless and completely excluded from gape by premaxilla. Photophores, when present, not in clusters.



Key to the genera of Sternoptychidae occurring in the area (modified from Badcock, 1984)

1a. Body laterally compressed, deep, greatest body depth 0.8 to 2.0 in standard length; exposed bony dorsal blade ahead of dorsal fin; iliac or postabdominal spines present . . . . . → ***2***

1b. Body fusiform, greatest body depth 3.7 to 7.7 in standard length; dorsal blade and iliac spines absent . . . . . → ***4***

2a. Eyes tubular, directed dorsally (Fig. 1); PV photophores 12 . . . . . ***Argyropelecus***

2b. Eyes not tubular, directed laterally; PV photophores 10 . . . . . → ***3***

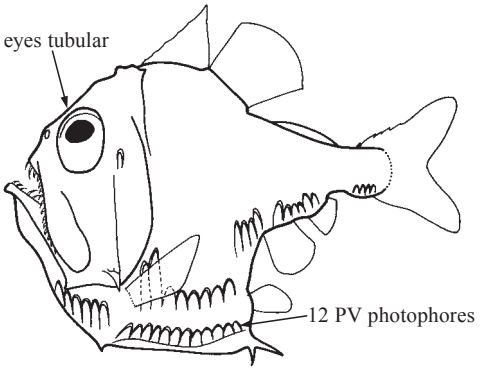


Fig. 1 ***Argyropelecus***

3a. Dorsal blade a single median flattened spine and prominent; BR photophores 3, IP 5 (Fig. 2) . . . . . ***Sternoptyx***

3b. Dorsal blade comprising 2 posteriorly-directed spines, reduced; BR photophores 6, IP 6 (Fig. 3). . . . . ***Polyipnus***

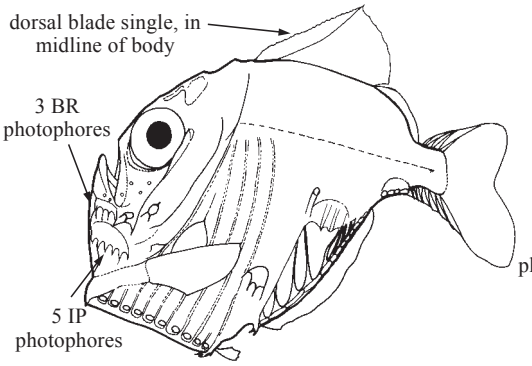


Fig. 2 ***Sternoptyx***

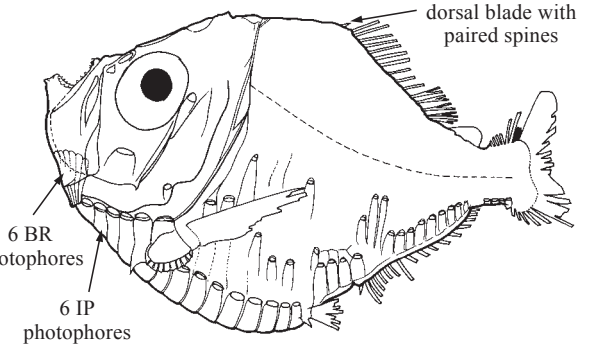


Fig. 3 ***Polyipnus***

4a. AC photophores in 3 to 6 groups, each of 2 to 4 photophores (Fig. 4); IP in 2 groups, of 3 and 4 photophores; gill rakers on first arch 12 or 13 on upper limb and 2 to 4 on lower limb, total 14 to 16 . . . . . ***Valenciennellus***

4b. AC with 2 or 3 groups of 5 or more photophores; IP in a single group of 6 (rarely 7) photophores; gill rakers on first arch 11 to 22 on upper limb and 3 to 8 on lower limb, total 15 to 30 . . . . . ***→ 5***

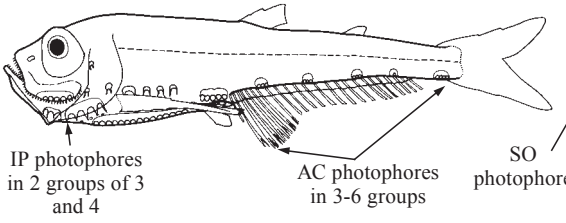


Fig. 4 ***Valenciennellus***

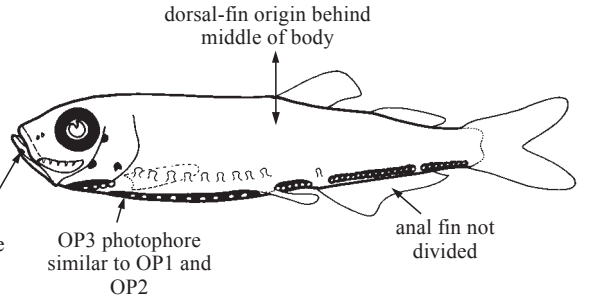


Fig. 5 ***Maurolicus***

5a. Dorsal-fin origin behind middle of body (Fig. 5); anal fin not divided by a cluster of AC photophores into 2 distinctly separate parts; SO photophore present; OP3 similar to other OP photophores, directed ventrally . . . . . ***Maurolicus***

5b. Dorsal-fin origin at or ahead of middle of body; anal fin divided by a cluster of AC photophores into 2 distinctly separate parts (Figs 6,7); SO photophore absent; OP3 greatly enlarged relative to other OP photophores, elongated dorsoventrally . . . . . ***→ 6***

6a. VAV and anterior AC photophores (ACA) form continuous photophore group, extending over anterior anal-fin rays (Fig. 6); anterior group of anal-fin rays 11 to 15 (rarely 10) rays; dorsal adipose fin present . . . . . ***Argyripnus***

6b. VAV separate from AC photophores, no photophores over anterior few anal-fin rays (Fig. 7); anterior group of anal-fin rays 8 to 10; dorsal adipose fin absent . . . . . ***Sonoda***

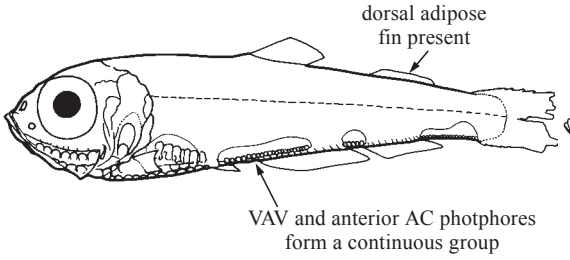


Fig. 6 ***Argyripnus***

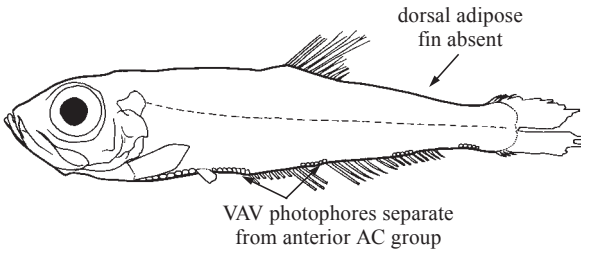


Fig. 7 ***Sonoda***

List of species occurring in the area

Argyripnus atlanticus Maul, 1952. To 7 cm. Areas W31 and E34.

Argyropelecus aculeatus Valenciennes in Cuvier and Valenciennes, 1850. To 8 cm. Circumglobal, tropical to temperate.
Argyropelecus affinis Garman, 1899. To 7 cm. Circumglobal, tropical to temperate.
Argyropelecus gigas Norman, 1930. To 12 cm. Circumglobal, tropical to temperate except N Pacific.
Argyropelecus hemigymnus Cocco, 1829. To 4 cm. Circumglobal, tropical to temperate.
Argyropelecus sladeni Regan, 1908. To 7 cm. Circumglobal, tropical to temperate.

Maurolicus weitzmani Parin and Kobyliansky, 1993. To 5 cm. Areas SW21, NW and SE31, and S34.

Polyipnus asteroides Schultz, 1938. To 8 cm. Tropical NW Atlantic, Caribbean Sea.
Polyipnus clarus Harold, 1994. To 6 cm. Tropical to temperate NW Atlantic.
Polyipnus laternatus Garman, 1899. To 4 cm. Tropical to temperate NW Atlantic.

Sonoda megalophthalma Grey, 1959. To 6 cm. W Caribbean.
Sonoda paucilampa Grey, 1960. To 7 cm. Area W31.

Sternoptyx diaphana Hermann, 1781. To 5 cm. Circumglobal, tropical to temperate.
Sternoptyx pseudobscura Baird, 1971. To 6 cm. Circumglobal, tropical to temperate.

Valenciennellus tripunctulatus (Esmark, 1871). To 8 cm. Tropical to temperate Atlantic and Pacific.

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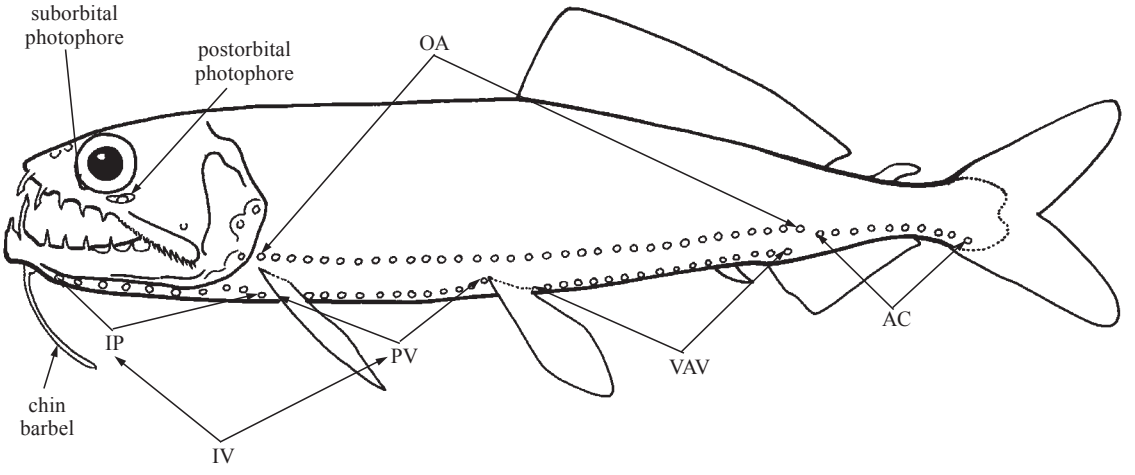
ASTRONESTHIDAE

Snaggletooths (stareaters)

by A.S. Harold, Grice Marine Biological Laboratory, South Carolina, USA

Diagnostic characters: Maximum size to about 22 cm, but rare at lengths greater than 15 cm. Body fusiform and slightly compressed. Head moderately large, about 25% of standard length. Eye small, less than 1/4 of head length. Snout short to moderate, its length at most twice eye diameter. Mouth large with a small number of teeth ranging in size from small to large and fang-like. Vomerine and palatine teeth present. **Chin barbel present**; terminal bulb present or absent. Branchiostegal rays 14 to 25. Gill rakers rudimentary in adults. **Dorsal fin usually near middle of body, its origin about over pelvic fins**. Anal fin terminating posteriorly on constricted portion of caudal peduncle. Dorsal fin with 9 to 21 soft rays; anal fin with 12 to 28 soft rays; caudal fin forked; pectoral fin with 6 to 9 soft rays; pelvic fin with 5 to 9 soft rays. **Dorsal adipose fin present (except in *Rhadinesthes*)**. Scales absent, no hexagonal areas on body. Two ventrolateral rows of photophores on body; OA 11 to 56; IV 9 to 46; VAV 7 to 28; AC 6 to 18; **anterior portion of lower row (PV) curving upward at pelvic-fin base and appearing disjunct from posterior portion of row (VAV)**; row of photophores on isthmus (IP); many small photophores covering much of body and head, their greatest concentration ventrally; suborbital photophore small, inconspicuous, located at anteroventral margin of eye; **postorbital photophore prominent, located posteroventrally to eye**. Three pectoral-fin radials. Stomach usually large and black, intestine originating near its anterior end; 1 or 2 pyloric caecae present. **Colour:** skin usually black, silvery pigmentation occasionally present on flank; **patches of luminous tissue on body in many species.**



AC	-	ventral series posterior to anal-fin origin
IP	-	ventral series anterior to pectoral-fin base
IV	-	ventral series anterior to pelvic-fin base
OA	-	lateral series
PV	-	ventral series between bases of pectoral and pelvic fins
VAV	-	ventral series between pelvic-fin base and origin of anal fin

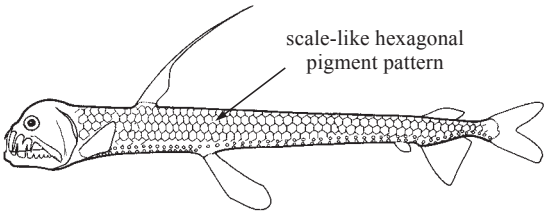
abbreviated terminology of photophores

Habitat, biology, and fisheries: Mainly mesopelagic adults (some species benthopelagic), juveniles have been caught at the surface at night. Diet consists of other mesopelagic fishes and crustaceans.

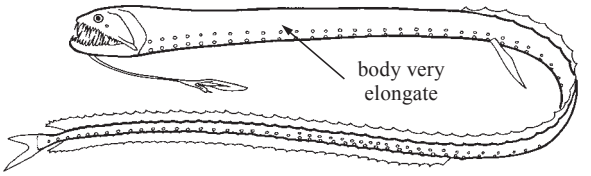
Similar families occurring in the area

Chauliodontidae: chin barbel reduced or absent in adults; dorsal fin well anterior, its origin about 1 head length behind pectoral girdle; scale-like hexagonal pigment pattern on body.

Idiacanthidae: body highly elongate, eel-like; dorsal fin with very long base (54 to 74 rays).



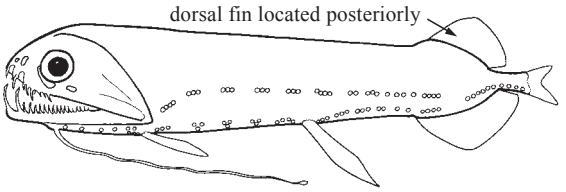
Chauliodontidae



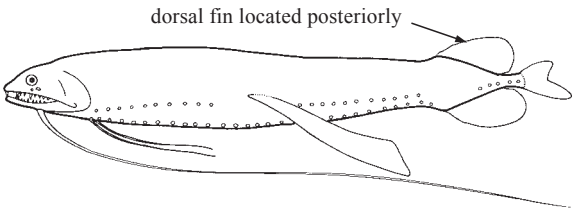
Idiacanthidae

Malacosteidae: no membrane in floor of mouth; dorsal fin located posteriorly, just ahead of caudal fin and above anal fin.

Melanostomiidae: dorsal fin located posteriorly, just ahead of caudal fin and above anal fin.



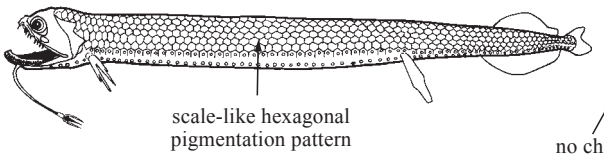
Malacosteidae



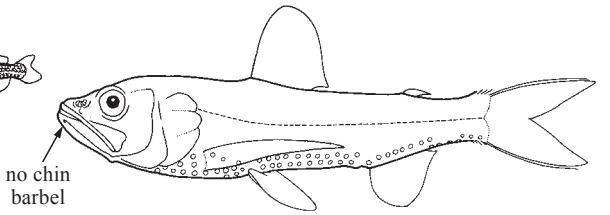
Melanostomiidae

Stomiidae: scale-like hexagonal pigment pattern on body; dorsal fin located posteriorly, just ahead of caudal fin and above anal fin.

Gonostomatidae, Phosichthyidae, and Sternoptychidae: gill rakers as adults, lacks both a chin barbel and greatly enlarged, fang-like jaw teeth.



Stomiidae



Phosichthyidae

Key to the genera and species of Astronesthidae occurring in the area (adapted from Gibbs, 1964, 1984)

1a. Anal-fin soft rays 22 to 27; snout appearing upturned at tip; gill bars with closely-spaced needle-like spines anteriorly along their length (Fig. 1) . . . . . ***Neonesthes***

1b. Anal-fin soft rays 20 or fewer; snout not appearing upturned at tip; gill bars with separated groups of short spines anteriorly along their length (Fig. 2) . . . . . → ***2***

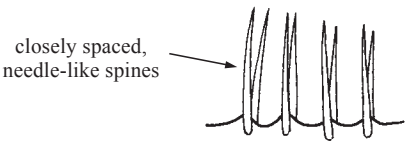


Fig. 1 gill bars (*Neonesthes*)

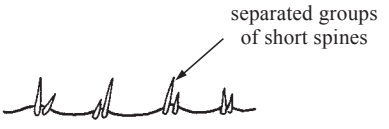


Fig. 2 gill bars

2a. Ventral series of photophores arranged in irregular groups of 1 to 5; PV photophores more than 32; OV more than 33 . . . . . ***Heterophotus ophistoma***

2b. Ventral series of photophores arranged in regular, continuous rows; PV photophores 26 or fewer . . . . . ***→ 3***

3a. Teeth on maxilla (posterior portion of upper jaw) comb-like, closely spaced, slanting backward (Fig. 3) . . . . . ***Astronesthes***

3b. Teeth on maxilla slender, distinctly separated, not slanting backward . . . . . ***→ 4***

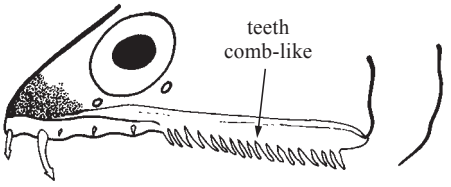


Fig. 3 teeth on maxilla (*Astronesthes*)

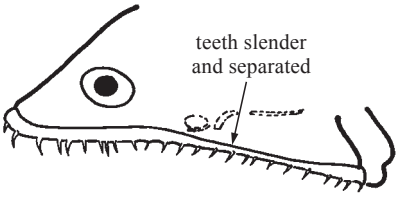


Fig. 4 teeth on maxilla (*Rhadinesthes decimus*)

4a. Greatest body depth less than 10% standard length; teeth in jaws all short and slender, no large fang-like teeth (Fig. 4); dorsal adipose fin absent . . . . . ***Rhadinesthes decimus***

4b. Greatest body depth almost always greater than 10% standard length; long, fang-like teeth in anterior portion of upper and lower jaws; dorsal adipose fin present . . . . . ***Borostomias***

List of species occurring in the area

Astronesthes atlanticus Parin and Borodulina, 1996. To 16 cm. Tropical and subtropical Atlantic.
Astronesthes cyclophotus Regan and Trewavas, 1929. To 3 cm. Subtropical to temperate N Atlantic.
Astronesthes gemmifer Goode and Bean, 1896. To 16 cm. N Atlantic.
Astronesthes leucopogon Regan and Trewavas, 1929. To 5 cm. Temperate N Atlantic.
Astronesthes longiceps Regan and Trewavas, 1929. To 3 cm. Central N Atlantic.
Astronesthes macropogon Goodyear and Gibbs, 1970. To 16 cm. Areas 31, 34, N41, N47.
Astronesthes micropogon Goodyear and Gibbs, 1970. To 8 cm. Tropical and subtropical Atlantic.
Astronesthes neopogon Regan and Trewavas, 1929. To 17 cm. Temperate N Atlantic.
Astronesthes nigra Richardson, 1845. To 6 cm. Tropical to temperate Atlantic.
Astronesthes richardsoni (Poey, 1852). To 15 cm. Tropical to subtropical N Atlantic.
Astronesthes similus Parr, 1927. To 15 cm. Area W31.
Astronesthes zharovi Parin and Borodulina, 1998. To 11 cm. Tropical Atlantic.

Borostomias elucens (Brauer, 1906) To 19 cm. Circumglobal, tropical.
Borostomias mononema (Regan and Trewavas, 1929). To 26 cm. Subtropical to temperate N Atlantic, W Indian.

Heterophotus ophistoma Regan and Trewavas, 1929. To 30 cm. Tropical to subtropical N Atlantic.

Neonesthes capensis (Gilchrist and von Bonde, 1924). To 15 cm. Tropical to temperate Atlantic.

Rhadinesthes decimus (Zugmayer, 1911). To 32 cm. Temperate N Atlantic.

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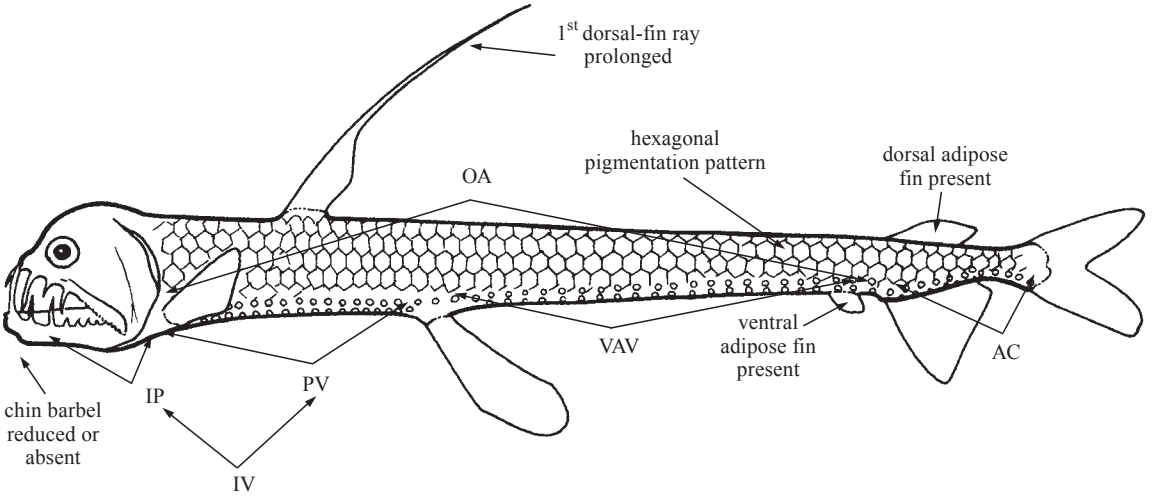
CHAULIODONTIDAE

Viperfishes

by A.S. Harold, Grice Marine Biological Laboratory, South Carolina, USA

Diagnostic characters: Maximum size about 30 cm standard length. **Body long, slender, covered by a gelatinous membrane** (usually lost during capture) with luminous inclusions, **maximum depth of body at back of head**. Head short and about as deep as long. Eye diameter about 4 times into head length. Snout short, its length less than eye diameter. Mouth large with numerous very large teeth on premaxilla and dentary, some greatly elongated, fang-like, and extending over front of head to above eye when mouth is closed; posterior half of maxilla with numerous minute teeth. Vomerine teeth absent. Palatine teeth present. **Chin barbel short and simple, becoming reduced or absent during development**. Branchiostegal rays 12 to 21. Gill rakers represented by tooth plates only. **Dorsal fin near head, its origin about half way between that of pectoral and pelvic fins. First dorsal-fin ray prolonged**. Anal fin located posteriorly, near caudal fin. Dorsal fin with 5 to 7 soft rays; anal fin with 10 to 13 soft rays; caudal fin forked; pectoral-fin soft rays 9 to 14; pelvic fin with 6 to 8 soft rays. **Dorsal and ventral adipose fins present. Five longitudinal rows of scales covering body, delineated by a hexagonal pigmentation pattern**. Two ventrolateral rows of photophores on body; OA 39 to 50; IV 25 to 34; VAV 22 to 30; AC 8 to 13; paired row of photophores on isthmus (IP); 1 or more small photophores associated with each hexagonal area on body; suborbital and postorbital photophores present. Premaxillae not protractile; epioccipitals well developed and lateral to supraoccipital; parietals minute. Anterior vertebrae unossified. Three pectoral-fin radials. **Colour:** iridescent silver-grey to silver-blue in some species; body scale rows delineated by a hexagonal pigmentation pattern.



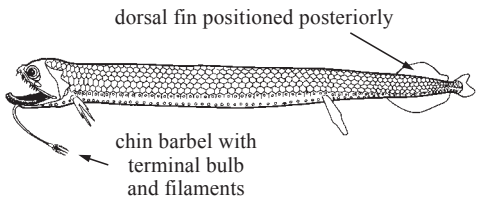
AC - ventral series posterior to anal-fin origin
IP - ventral series anterior to pectoral-fin base
IV - ventral series anterior to pelvic-fin base
OA - lateral series
PV - ventral series between baases of pectoral and pelvic fins
VAV - ventral series between pelcic-fin base and origin of anal fin

Habitat, biology, and fisheries: Meso- to bathypelagic, to 2 800 m maximum, in open ocean; juveniles undergo vertical migration to near surface at night. Diet consists of other fishes and crustaceans.

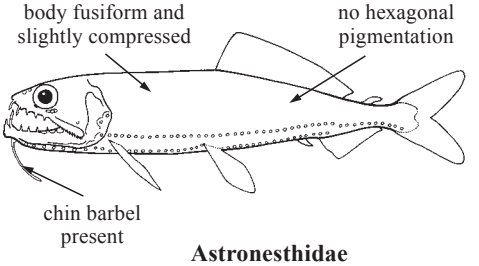
Similar families occurring in the area

Stomiidae: only other stomiiform family with hexagonal pigmentation pattern; body more elongate and slender; chin barbel present, with terminal bulb and filaments; dorsal fin located posteriorly, just ahead of caudal fin; dorsal adipose fin absent.

Astronesthidae: body fusiform and slightly compressed; chin barbel present, terminal bulb present or absent; dorsal-fin near middle of body, origin well ahead of that of anal fin; no hexagonal pigment areas on body; anterior portion of ventral photophore row (PV) curving upward at pelvic-fin base.



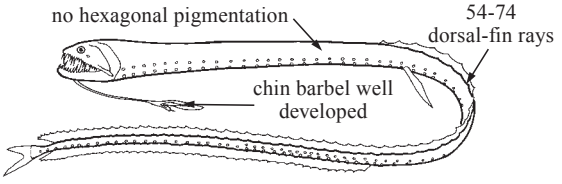
Stomiidae



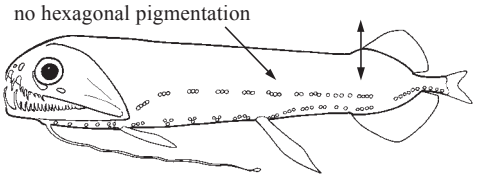
Astronesthidae

Idiacanthidae: body highly elongate, eel-like; hexagonal pigmentation pattern not present on body; chin barbel well-developed in females; dorsal fin with very long base (54 to 74 soft rays), its origin well anterior to midbody; bases of dorsal- and anal-fin rays with a small sharp spur; dorsal and ventral adipose fins absent; pectoral fins present in larvae, absent in adults; pelvic fins absent in males.

Malacosteidae: hexagonal pigmentation pattern not present on body; no membrane in floor of mouth; chin barbel present or absent; presence of a preorbital light organ associated with suborbital organ (absent in *Photostomias*); dorsal fin located posteriorly, just ahead of caudal fin; dorsal adipose fin absent; pectoral fins absent or consisting of only free, filament-like rays.



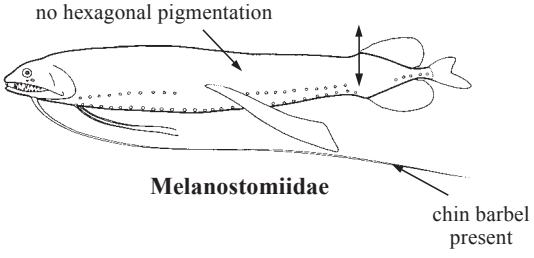
Idiacanthidae



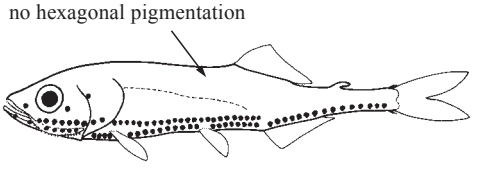
Malacosteidae

Melanostomiidae: hexagonal pigmentation pattern not present on body; maxillae with erect teeth anteriorly and small, oblique denticles posteriorly; chin barbel present, variable in length; pectoral fins present or absent.

Gonostomatidae, Phosichthyidae, and Sternoptychidae: these remaining stomiiform families often with somewhat similar body form and photophore arrangement, but have gill rakers as adults and lack the hexagonal pigmentation pattern, chin barbel, and enlarged, fang-like jaw teeth.

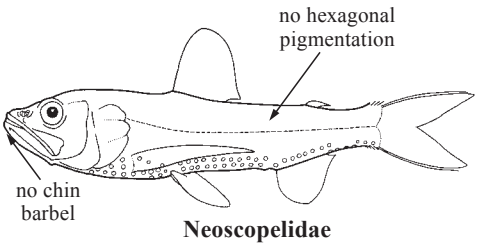


Melanostomiidae



Phosichthyidae

Myctophidae and Neoscopelidae: myctophiform families with photophores but with a less elongate body, lack a chin barbel at all stages, have gill rakers as adults, and the maxilla is completely excluded from the gape by the premaxilla; ventral photophores are usually more widely spaced and not arranged in such regular rows as in the Chauliodontidae.



Neoscopelidae

List of species occurring in the area

Chauliodus danae Regan and Trewavas, 1929. To 15 cm. Tropical to temperate Atlantic.
Chauliodus sloani Bloch and Schneider,1801. To 28 cm. Worldwide, tropical to temperate.

References

Gibbs, R. H., Jr. 1986. Family No. 68: Chauliodontidae. In *Smiths' Sea Fishes*, edited by M. M. Smith, and P. C. Heemstra. Johannesburg, MacMillan, South Africa, p. 203.

Morrow, J. E., Jr. 1964. Family Chauliodontidae. In Fishes of the Western North Atlantic, edited by H. B. Bigelow, D.M. Cohen, M.M. Dick, R.H. Gibbs, Jr., M. Grey, J.E. Morrow, Jr., L.P. Schultz, and V. Walters. *Mem. Sears Found. Mar. Res*., 1(4):274-289.

Regan, C.T. and E. Trewavas. 1929. The fishes of the families Astronesthidae and Chauliodontidae. *Danish Dana Expedition in the North Atlantic and Gulf of Panama*, 1920-22, 5:1-39, 7 pls.

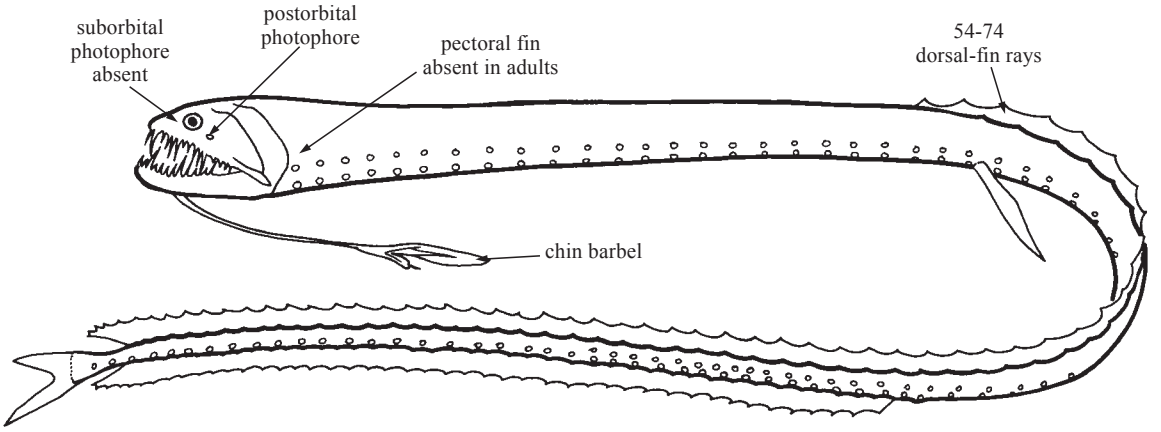
Harold, A.S. and S.H. Weitzman. 1996. Interrelationships of Stomiiform Fishes. In *The Interrelationships of Fishes*, edited by M.L.J. Stiassny, L.R. Parenti, and G.D. Johnson. London, Academic Press, pp. 333-353.

IDIACANTHIDAE

Black dragonfishes (sawtailfishes)

by A.S. Harold, Grice Marine Biological Laboratory, South Carolina, USA

Diagnostic characters: Maximum size about 48 cm standard length for females, 7 cm for males. **Body markedly elongate, eel-like, slightly compressed**. Head small. Snout equal to or less than orbit diameter. Jaw teeth absent in males. Mouth large in adult females, with numerous barbed, hinged, fang-like teeth, variable in size; few teeth present on vomer and palatine. **Chin barbel length about twice head length in females, absent in males. Gill arches without rakers or teeth. Dorsal fin with very long base, its origin well anterior to midbody**. Anal-fin base length about half the length of dorsal fin, its origin below middle dorsal-fin rays. Dorsal and anal fins terminating posteriorly on constricted portion of caudal peduncle. **Base of each dorsal- and anal-fin ray with a small, sharp spur**. Dorsal fin with 54 to 74 rays; anal fin with 29 to 49 rays; caudal fin forked; **pectoral fins present in larvae, absent in adults; pelvic fins with 6 rays in females, absent in males**. Dorsal adipose fin absent. Scales absent. Two main rows of photophores on body ventrolaterally (see family Astronesthidae family figure for definition of abbreviated terms); OA 52 to 61; IV 31 to 36; VAV 15 to 18; AC 13 to 18; paired row of photophores on isthmus (IP); small light organs scattered over head and body in patterns on each body segment; suborbital photophore absent; **postorbital photophore prominent, located posteroventrally, equal in size to eye in males, smaller in females**. Premaxillae not protractile. Gas bladder absent. **Colour:** skin usually black in females, males dark brown; hexagonal pigment areas lacking.

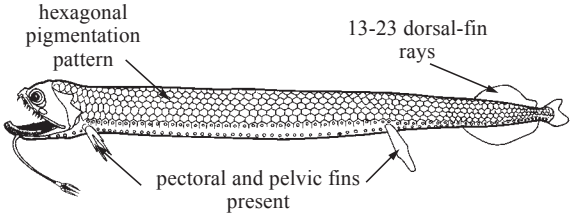


female

Habitat, biology, and fisheries: Meso- to bathypelagic, recorded to 2 000 m. Diet consists mainly of fishes. Markedly sexually dimorphic; males reaching about 15% of female body size, retaining some larval features; anterior anal-fin rays modified as intromittent organ. Eyes on the ends of long stalks in larvae.

Similar families occurring in the area

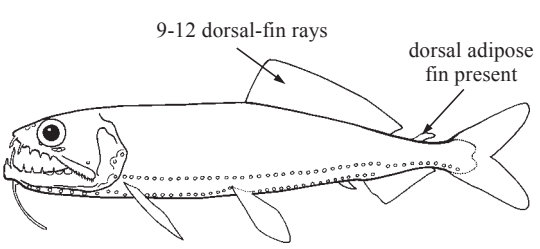
Stomiidae: hexagonal pigment pattern on body; dorsal fin short-based, located posteriorly, just ahead of caudal fin.



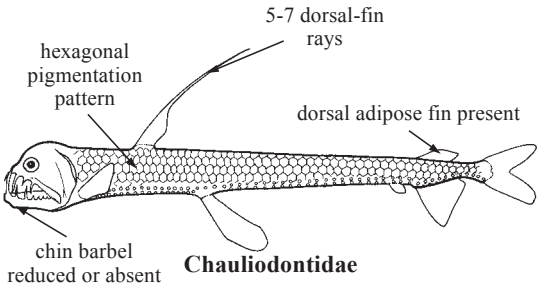
Stomiidae

Astronesthidae: dorsal-fin short-based, near middle of body (9 to 21 rays); dorsal adipose fin present; anterior portion of ventral photophore row (PV) curving upward at pelvic-fin base.

Chauliodontidae: chin barbel reduced or absent in adults; dorsal fin short-based (5 to 7 rays), located between pectoral and pelvic fins; dorsal adipose fin present; scale-like hexagonal pigment pattern on body.



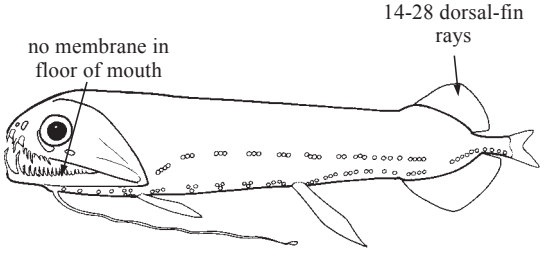
Astronesthidae



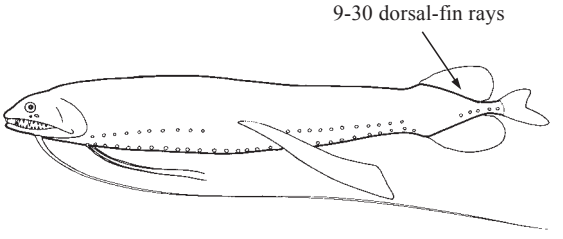
Chauliodontidae

Malacosteidae: no membrane in floor of mouth; dorsal fin short-based (14 to 28 rays), located posteriorly, over anal fin.

Melanostomiidae: dorsal fin short-based, located posteriorly, just ahead of caudal fin and above anal fin.



Malacosteidae



Melanostomiidae

List of species occurring in the area

Idiacanthus fasciola Peters, 1877. Females to 48 cm, males to 7 cm. N Atlantic, E Indian, tropical W Pacific.

References

Gibbs, R. H., Jr. 1964. Family Idiacanthidae. In Fishes of the Western North Atlantic, edited by H. B. Bigelow, D.M. Cohen, M.M. Dick, R.H. Gibbs, Jr., M. Grey, J.E. Morrow, Jr., L.P. Schultz, and V. Walters. *Mem. Sears Found. Mar. Res*. 1(4):512-522.

Regan, C. T. and E. Trewavas. 1930. The fishes of the families Stomiatidae and Malacosteidae. *Danish Dana Expedition in the North Atlantic and Gulf of Panama,* 1920-22, 6:1-143.

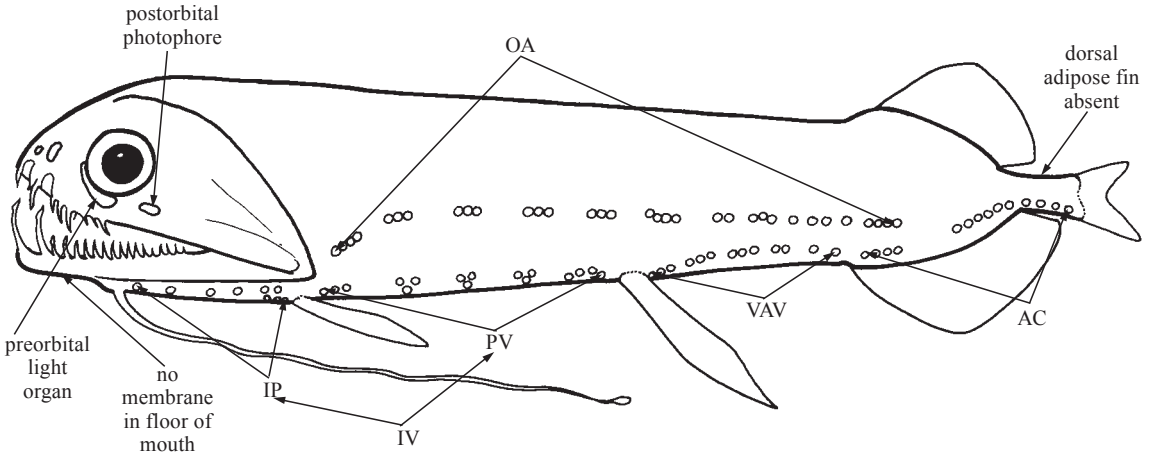
Harold, A.S. and S.H. Weitzman. 1996. Interrelationships of Stomiiform Fishes. In *The Interrelationships of Fishes*, edited by Stiassny, M.L.J., L.R. Parenti and G.D. Johnson. London, Academic Press, pp. 333-353.

MALACOSTEIDAE

Loosejaws

by A.S. Harold, Grice Marine Biological Laboratory, South Carolina, USA

Diagnostic characters: Maximum size about 24 cm standard length. Body elongate, compressed. Head and eye large relative to body. Snout usually quite short (elongate in *Aristostomias*). **Mouth large, jaws longer than skull, about 15 to 30% standard length; membranes forming floor of mouth absent**. Jaw teeth variable in size, some very large and barbed. Vomerine teeth absent. Palatine with or without teeth. **Chin barbel present or absent**. Branchiostegal rays 9 to 15. Gill arches without well-developed rakers. **Dorsal fin located well posteriorly, directly above anal fin**. Dorsal fin with 14 to 28 soft rays; anal fin with 17 to 32 soft rays; caudal fin small, forked; **pectoral fins absent or consisting of 2 to 17 rays**; pelvic fins at about midbody, with 5 to 9 rays. **Dorsal and ventral adipose fins absent**. Scales absent, no hexagonal areas on body. Two ventrolateral rows of photophores on body; OA 7 to 39; IC 12 to 22; paired row of photophores on isthmus (IP); many small light organs covering much of body and head; preorbital light organ present or absent; suborbital photophore present, varying in size from minute to very large, or absent; **postorbital photophore prominent, located posteroventrally to eye**. Premaxillae not protractile. First few vertebrae unossified. Stomach distensible, pigmented. Pyloric caecae present or absent. **Colour:** skin black to dark brown.



AC	-	ventral series posterior to anal-fin origin
IP	-	ventral series anterior to pectroal-fin base
IV	-	ventral series anterior to pelvic-fin base
OA	-	lateral series
PV	-	ventral series between bases of pectoral and pelvic fins
VAV	-	ventral series between pelvic-fin base and anal-fin origin

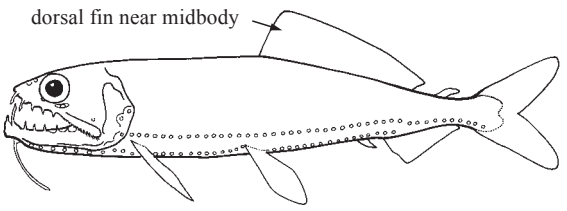
abbreviated terminology of photophores

Habitat, biology, and fisheries: Meso- to bathypelagic adults, at depths to 4 000 m. Diet consists of fishes and crustaceans. Floor of lower jaw lacks membranes, which allows the jaws to swing widely while feeding, hence the common name “loosejaws.”

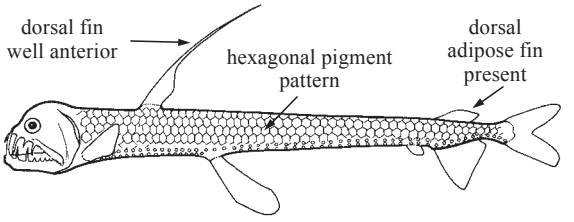
Similar families occurring in the area

Astronesthidae: membrane present in floor of mouth; dorsal fin near middle of body; dorsal adipose fin usually present; anterior portion of ventral photophore row (PV) curving upward at pelvic-fin base.

Chauliodontidae: body elongate, maximum depth at back of head; chin barbel reduced or absent in adults; dorsal fin well anterior, between pectoral and pelvic fins; scale-like, hexagonal pigment pattern on body.



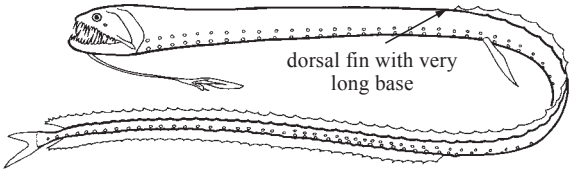
Astronesthidae



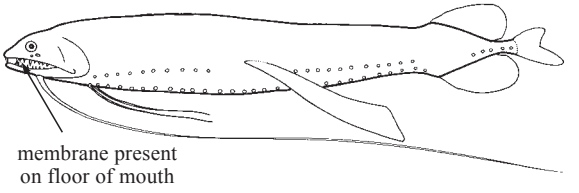
Chauliodontidae

Idiacanthidae: body highly elongate, eel-like; dorsal fin with very long base, its origin well anterior to midbody.

Melanostomiidae: membrane forming floor of mouth present; maxillae with erect teeth anteriorly and small, oblique denticles posteriorly.



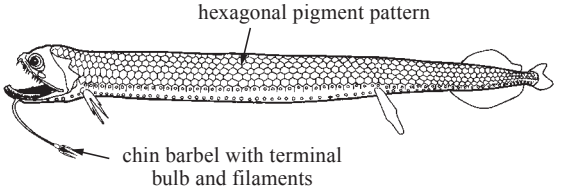
Idiacanthidae



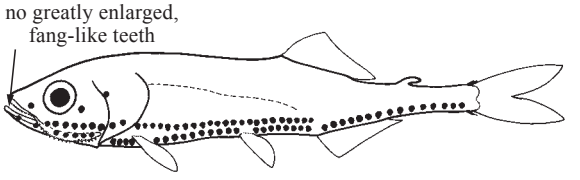
Melanostomiidae

Stomiidae: chin barbel with terminal bulb and filaments; scale-like hexagonal pigment pattern on body.

Gonostomatidae, Phosichthyidae, and Sternoptychidae: have gill rakers as adults, lack a chin barbel and lack greatly enlarged, fang-like jaw teeth.



Stomiidae



Phosichthyidae

Key to the genera of Malacosteidae occurring in the area

(Modifed after Gibbs, 1984 and Goodyear and Gibbs, 1986)

1a. Pectoral fins present; suborbital photophore well-developed and crescentic . . . . . → *2*

1b. Pectoral fins absent; suborbital photophore small and elliptical in males, absent in females (Fig. 1) . ***Photostomias***

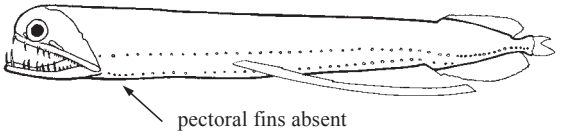


Fig. 1 ***Photostomias***

2a. Chin barbel present (Fig. 2); snout longer than eye; pale luminous patches present on head, especially around eye; 2 pairs of nostrils on each side of snout . . . . . ***Aristostomias***

2b. Chin barbel absent (Fig. 3); snout shorter than eye; no pale luminous patches on head; a single nostril on each side of snout . . . . . ***Malacosteus***

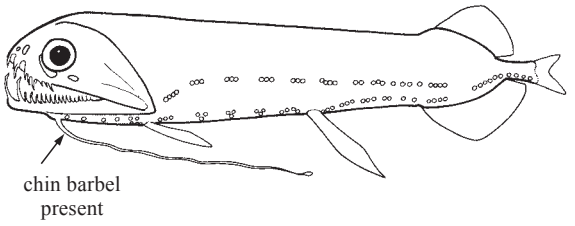


Fig. 2 ***Aristostomias***

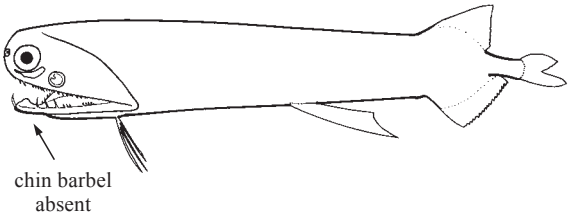


Fig. 3 ***Malacosteus***

List of species occurring in the area

Aristostomias grimaldii Zugmayer, 1913. To 12 cm. Tropical to temperate NW Atlantic.
Aristostomias lunifer Regan and Trewavas, 1930. To 14 cm. Tropical to subtropical NW Atlantic.
Aristostomias tittmanni Welsh, 1923. To 9 cm. Tropical to temperate N Atlantic.
Aristostomias xenostoma Regan and Trewavas, 1930. To 12 cm. Areas W31, SE34, S77.

Malacosteus niger Ayres, 1848. To 22 cm. Circumglobal, tropical to subarctic.

Photostomias guernei Collett, 1889. To 16 cm. Tropical to subarctic.
Photostomias mirabilis (Beebe, 1933). To 4 cm. N Atlantic, off Bermuda.

References

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Goodyear, R.H. and R.H. Gibbs, Jr. 1986. Family No. 71: Malacosteidae. In *Smiths' Sea Fishes*, edited by M.M. Smith and P.C. Heemstra. Johannesburg, Macmillan, South Africa, pp. 235-236.

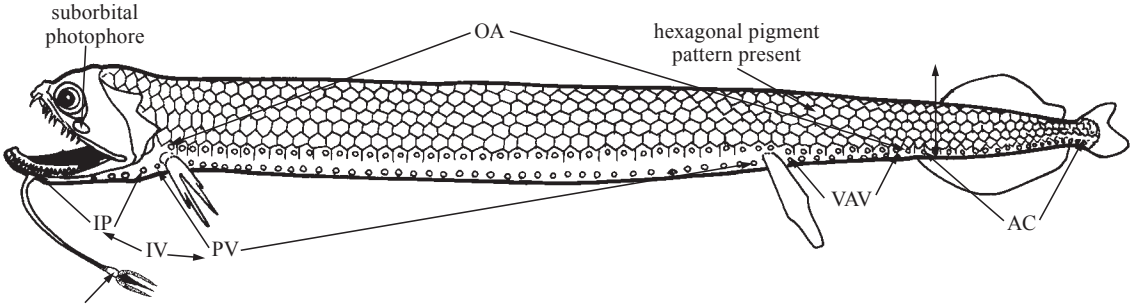
Harold, A.S. and S.H. Weitzman. 1996. Interrelationships of Stomiiform Fishes. In *The Interrelationships of Fishes*, edited by M.L.J. Stiassny, L.R. Parenti and G.D. Johnson. London, Academic Press, pp. 333-353.

STOMIIDAE

Scaly dragonfishes

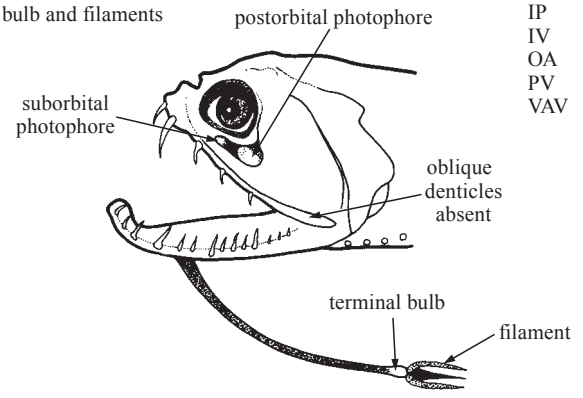
by A.S. Harold, Grice Marine Biological Laboratory, South Carolina, USA

Diagnostic characters: Maximum size about 41 cm. Body long and slender, covered by gelatinous layer enclosed by membrane. Head small. Mouth large relative to head, with teeth ranging in size from small to moderately large and fang-like. Lower jaw curved upward slightly. Chin barbel prominent, terminal bulb with filaments present. Branchiostegals 16 to 18. No true gill rakers in adults. **Dorsal fin located just anterior to caudal fin, directly above anal fin**. Dorsal fin with 13 to 23 rays; anal fin with 15 to 25 rays; caudal fin forked or rounded; pectoral fins with 6 to 9 rays; pelvic fins with 4 or 5 rays. Dorsal adipose fin absent. **Body covered with scale-like hexagonal pigment pattern**. Two ventrolateral rows of photophores on body; OA 36 to 67 or 137 to 153; IV 41 to 64 or 89 to 99; VAV 5 to 16 or 58 to 67; AC 14 to 22; paired row of photophores on isthmus (IP); 1 or more small photophores associated with hexagonal scale-like areas; suborbital photophore small, inconspicuous, located at anteroventral margin of eye; postorbital photophore prominent, located posteroventrally to eye. **Colour:** iridescent silver, bronze, or dark green.



AC	-	ventral series posterior to anal-fin origin
IP	-	ventral series anterior to pectoral-fin base
IV	-	ventral series anterior to pelvic-fin base
OA	-	lateral series
PV	-	ventral series between bases of pectoral and pelvic fins
VAV	-	ventral series between pelvic-fin base and anal-fin base

abbreviated terminology of photophores



lateral view of head

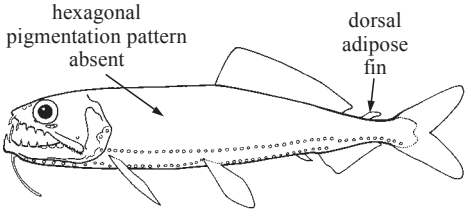
Habitat, biology, and fisheries: Mainly mesopelagic (to 1 000 m) as adults, with some species bathypelagic, to 2 000 m. Migration to near surface at night in some species. Diet consists of other midwater fishes.

Remarks: *Stomias longibarbatus* was previously placed in a separate genus, *Macrostomias*, due mainly to the relatively high photophore counts in this species. Fink and Fink (1986) analyzed the species in the family phylogenetically and found there to be no grounds for the continued placement of *S. longibarbatus* in a separate genus.

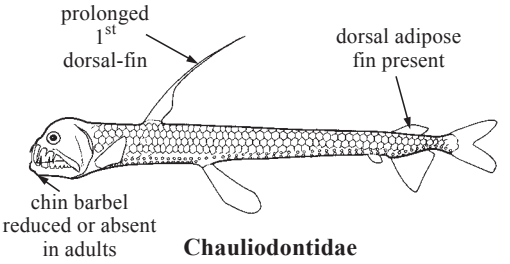
Similar families occurring in the area

Astronesthidae: dorsal fin near middle of body, origin well ahead of that of anal fin; no hexagonal pigment areas on body.

Chauliodontidae: only other stomiiform family with scale-like hexagonal pigment pattern; dorsal fin well anterior, near head with first ray prolonged.



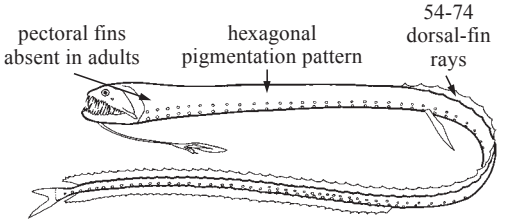
Astronesthidae



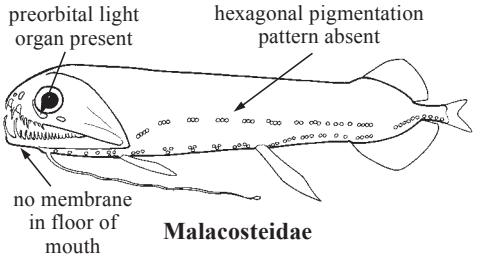
Chauliodontidae

Idiacanthidae: body highly elongate, eel-like; dorsal fin very long (54 to 74 rays), its origin well anterior to midbody; scale-like hexagonal pigment pattern absent.

Malacosteidae: no membrane in floor of mouth; preorbital photophore usually present (absent in *Photostomias*).



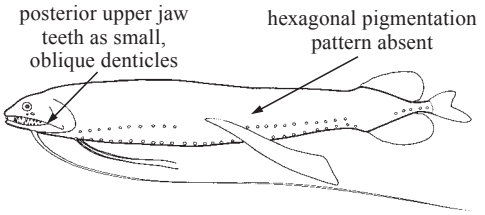
Idiacanthidae



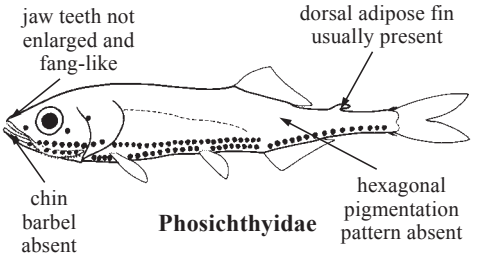
Malacosteidae

Melanostomiidae: maxillae with erect teeth anteriorly and smaller, oblique teeth posteriorly; pectoral fins present or absent; hexagonal pigment pattern absent.

Gonostomatidae, Phosichthyidae, and Sternoptychidae: these remaining stomiiform families often with somewhat similar body form and photophore arrangement, but have dorsal fin at midbody, gill rakers as adults and lack the hexagonal pigmentation pattern, chin barbels, and enlarged, fang-like jaw teeth.

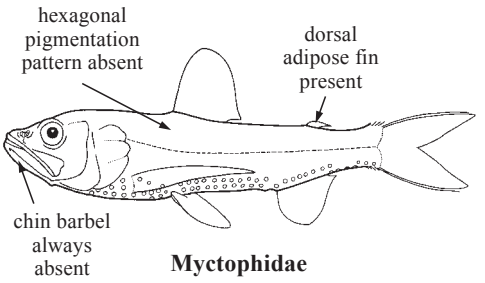


Melanostomiidae



Phosichthyidae

Myctophidae and Neoscopelidae: myctophiform families with photophores but with less elongate bodies, no chin barbels, and maxilla toothless and completely excluded from gape by premaxilla. Ventral photophores usually more widely spaced and not arranged in such regular rows as in Stomiidae.



Myctophidae

List of species occurring in the area

Stomias affinis Günther, 1887. To 20 cm. Circumglobal, trop to warm temperate.
Stomias boa ferox Reinhardt, 1842. To 29 cm. Areas S21, S27, 31, 34.
Stomias brevibarbatus Ege, 1918. To 15 cm. Subtropical to temperate N Atlantic.
Stomias longibarbatus (Brauer, 1902). To 43 cm. Subtropical N Atlantic, equatorial Indian Ocean.

References

Gibbs, R.H., Jr. 1969. Taxonomy, sexual dimorphism, vertical distribution, and evolutionary zoogeography of the bathypelagic fish genus *Stomias* (Stomiatidae). *Smithsonian Contrib. Zool*., 31:1-25.

Gibbs, R. H., Jr. 1986. Family No. 67: Stomiidae. In *Smiths' Sea Fishes*, edited by M.M. Smith and P.C. Heemstra. South Africa, Johannesburg, MacMillan, pp 229-230.

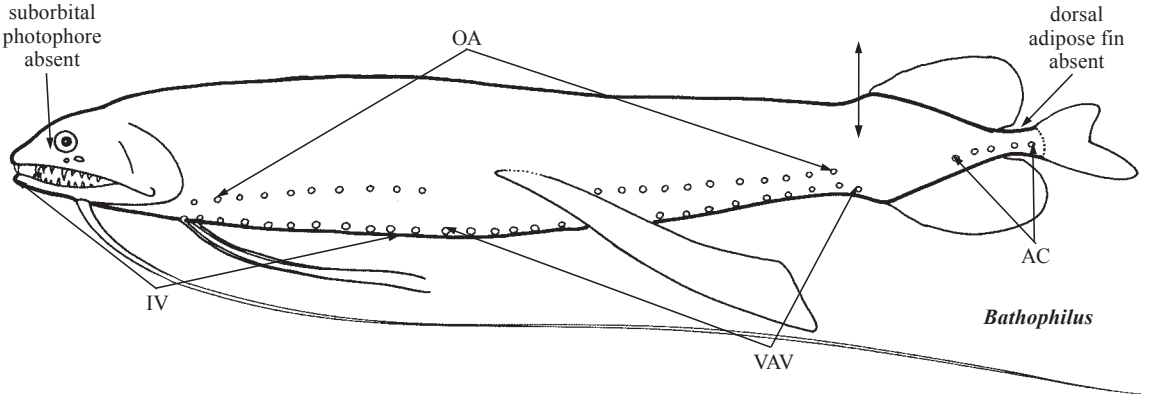
Morrow, J. E., Jr. 1964. Family Stomiatidae. In Fishes of the Western North Atlantic edited by H.B. Bigelow, D.M. Cohen, M.M. Dick, R.H. Gibbs, Jr., M. Grey, J.E. Morrow, Jr., L.P. Schultz, and V. Walters. *Mem. Sears Found. Mar. Res*., 1(4):290-310.

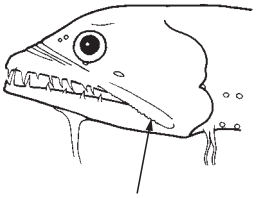
MELANOSTOMIIDAE

Scaleless dragonfishes (scaleless black dragonfishes)

by A.S. Harold, Grice Marine Biological Laboratory, South Carolina, USA

Diagnostic characters: Maximum size about 50 cm standard length. Body elongate, slender, slightly compressed (except *Bathophilus* in which the body is short and highly compressed). Head relatively small. Jaws large, about equal to length of head; membrane forming floor of mouth present. **Small, oblique denticles posteriorly on maxilla**. Vomerine and palatine teeth present or absent. **Chin barbel present; ranging widely in length, with or without branches or terminal elaborations**. Branchiostegal rays 8 to 22. No true gill rakers, arches with series of tooth plates only. **Dorsal fin located well posteriorly, directly above anal fin**. Dorsal fin with 9 to 30 soft rays; anal fin with 9 to 46 soft rays; caudal fin small and forked; pectoral fins present or absent, 0 to 47 soft rays; pelvic fins present, usually with 7 soft rays, range 4 to 26. **Dorsal adipose fin absent (except in *Chirostomias*)**. Scales absent, no hexagonal areas on body. Two ventrolateral rows of prominent photophores on body, (reduced in some *Bathophilus*); OA 18 to 72; IV 16 to 62; VAV 11 to 24; AC 5 to 25; paired row of photophores on isthmus (IP); many small photophores covering much of body and head, often occurring in vertical rows associated with segments of body musculature; preorbital photophore absent, except *Pachystomias*; **suborbital photophore absent; postorbital photophore usually present, located posteroventrally to eye, sometimes reduced or absent in females**. Anterior vertebrae at least slightly modified, allowing greater movement of head; highly reduced in some genera. Stomach long, moderately distensible, usually pigmented; typically 2 pyloric caecae present. **Colour:** skin usually black, sometimes iridescent silver, bronze, or green.





small oblique denticles on posterior portion of maxilla

AC - ventral series posterior to anal-fin origin
IV - ventral series anterior to pelvic-fin base
OA - lateral series
VAV - ventral series between pelvic-fin base and anal-fin origin

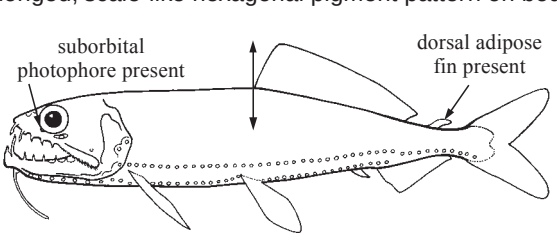
abbreviated terminology of photophores

Habitat, biology, and fisheries: Mainly mesopelagic, occurring in the upper 1 000 m as adults, some species undergoing vertical migration to near surface at night. Some species apparently benthopelagic as adults. Diet consists of other mesopelagic fishes and some crustaceans.

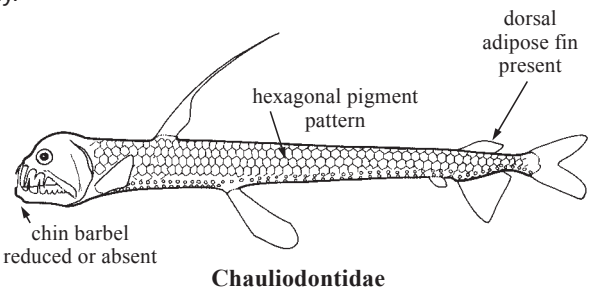
Similar families occurring in the area

Astronesthidae: dorsal fin near middle of body, origin well ahead of that of anal fin; anterior portion of ventral photophore row (PV) curving upward at pelvic-fin base.

Chauliodontidae: chin barbel reduced or absent in adults; dorsal fin well anterior, near head, anterior ray prolonged; scale-like hexagonal pigment pattern on body.



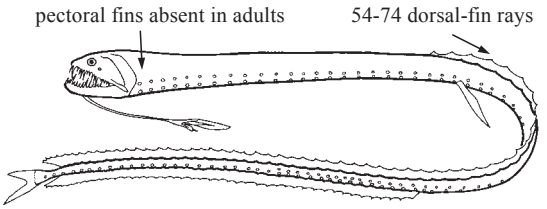
Astronesthidae



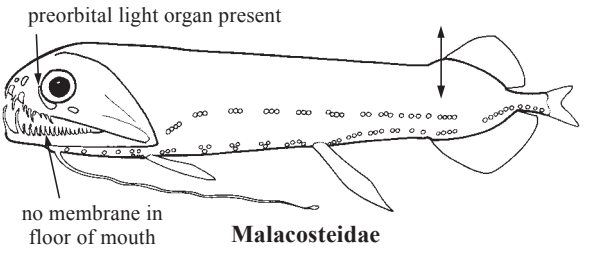
Chauliodontidae

Idiacanthidae: body elongate, eel-like; dorsal fin with very long base (54 to 74 rays).

Malacosteidae: no membrane in floor of mouth; chin barbel present or absent; preorbital photophore present (absent in *Photostomias*, present in the melanostomiid *Pachystomias*); pectoral fins absent or consisting of only free, filament-like rays.



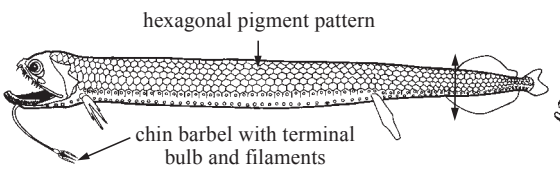
Idiacanthidae



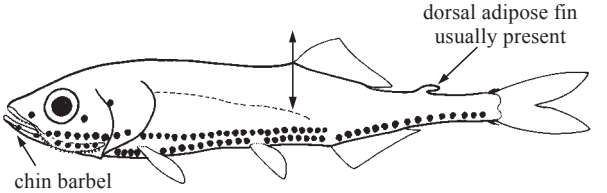
Malacosteidae

Stomiidae: chin barbel with terminal bulb and filaments; scale-like hexagonal pigment pattern on body; pectoral fins present.

Gonostomatidae, Phosichthyidae, and Sternoptychidae: gill rakers in adults, chin barbels and greatly enlarged, fang-like jaw teeth absent.

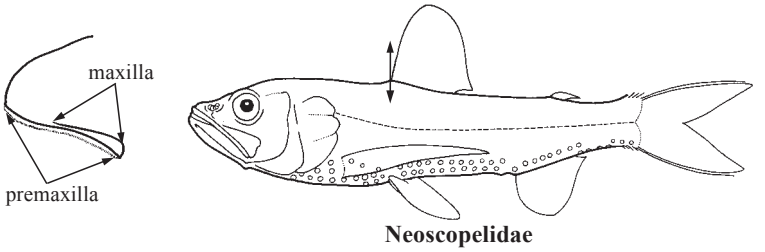


Stomiidae



Phosichthyidae

Myctophidae and Neoscopelidae: lack chin barbels, have gill rakers as adults, and the maxilla is completely excluded from the gape by the premaxilla.



Neoscopelidae

Key to the genera of Melanostomiidae occurring in the area (modified after Gibbs, 1984)

1a. Anal-fin base much longer than dorsal-fin base, its origin much before dorsal-fin origin . . . . . → *2*

1b. Anal- and dorsal-fin bases about same length, anal-fin origin approximately under dorsal-fin origin . . . . . → *3*

2a. First pectoral-fin rays separate, much longer than others; snout blunt, not protrusible (Fig. 1) . . . . ***Flagellostomias***

2b. One or several pectoral-fin rays, none markedly longer than others (Fig. 2); snout slender and tapering, protrusible (Fig. 3) . . . . . ***Eustomias***

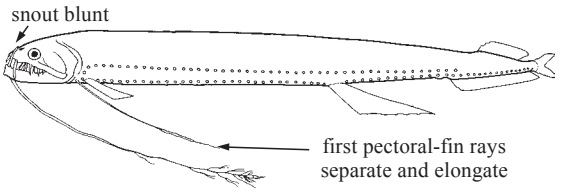


Fig. 1 ***Flagellostomias***

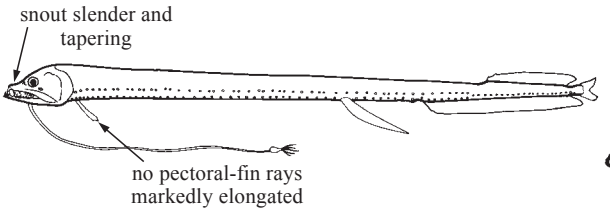


Fig. 2 ***Eustomias***

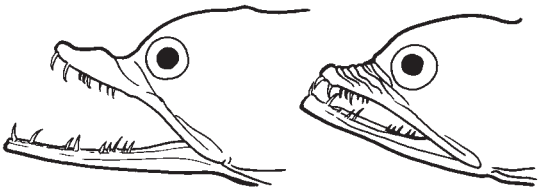


Fig. 3 ***Eustomias*** **jaw protrusion**

3a. Pelvic-fin bases high on body (see family figure), near lateral midline on flank . . . . . ***Bathophilus***

3b. Pelvic-fin bases low on body (Fig. 4), close together near ventral midline . . . . . → *4*

4a. Long cresent-shaped suborbital photophore below eye (Fig. 4), and smaller organs in front (preorbital) and behind (postorbital) eye . . . . . ***Pachystomias***

4b. No suborbital or preorbital photophores; large postorbital organ present (Fig. 5) . . . . . → *5*

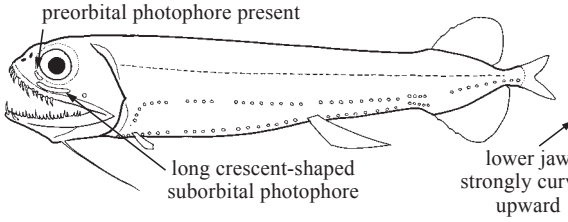


Fig. 4 ***Pachystomias***

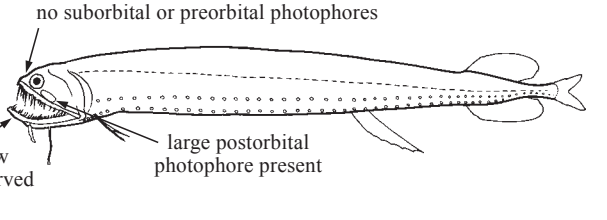


Fig. 5 ***Photonectes***

5a. Lower jaw strongly curved upward, long and projecting beyond snout (Fig. 5); pectoral fin with 0 to 2 soft rays . . . . . ***Photonectes***

5b. Lower jaw about equal to upper, not projecting or strongly curved upward; pectoral fin with 4 to 11 soft rays . . . . . → *6*

6a. Body long and slender, its depth 10 times or more in body length (Fig. 6); 39 or more photophores in PV series . . . . . ***Leptostomias***

6b. Body moderately elongate, its depth less than 10 times in body length; no more than 30 photophores in PV series . . . . . → *7*

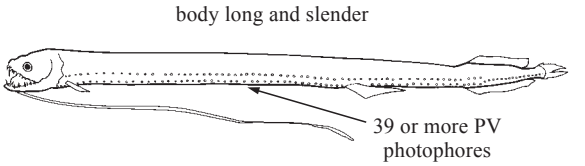


Fig. 6 ***Leptostomias***

7a. One long pectoral-fin ray, separated from the remaining 3 to 11 rays (Fig. 7) . . . . . → ***8***

7b. Pectoral fin without an isolated, elongated ray; rays approximately equal, none separated from rest . . . . . → ***9***

8a. Pectoral-fin rays 1 + 10 or 11, end of isolated ray split into filaments (Fig. 7) . . . . . ***Thysanactis***

8b. Pectoral-fin rays 1 + 3, end of isolated ray simple, not divided into filaments (Fig. 8) . . . ***Echiostoma***

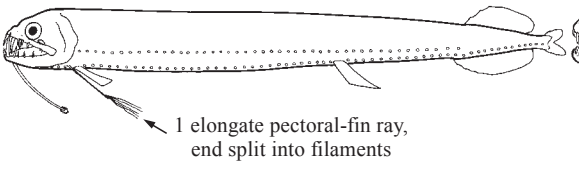


Fig. 7 ***Thysanactis***

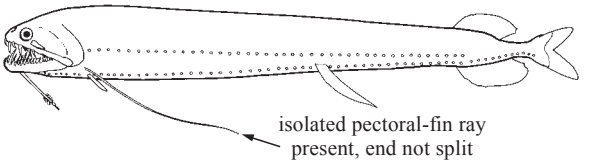


Fig. 8 ***Echiostoma***

9a. Luminous loop on flank above and behind pectoral fin (Fig. 9); 15 to 17 PV photophores . . . . . ***Grammatostomias***

9b. No luminous loop on flank; 22 to 30 PV photophores . . . . . → ***10***

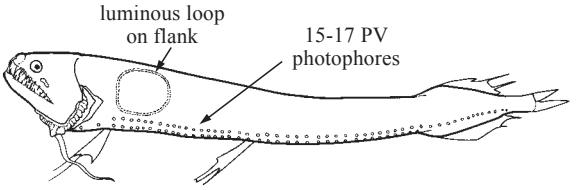


Fig. 9 ***Grammatostomias***

10a. Pectoral-fin ray tips branched; dorsal adipose fin present; postorbital light organ small, less than 1/3 eye diameter; terminal bulb of barbel swollen and complex, with numerous filaments (Fig. 10) . . . . . ***Chirostomias***

10b. Pectoral-fin ray tips unbranched; no dorsal adipose fin (Fig. 11); postorbital light organ large, 1/2 eye diameter or larger; barbel tip usually flattened, without filaments or with a single filamentous appendage . . . . . ***Melanostomias***

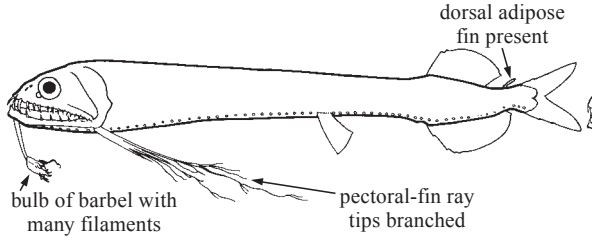


Fig. 10 ***Chirostomias***

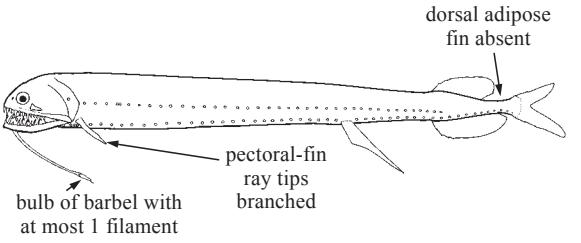


Fig. 11 ***Melanostomias***

List of species occurring in the area

Bathophilus altipinnis Beebe, 1933. To 6 cm. NW Atlantic off Bermuda.
Bathophilus brevis Regan and Trewavas, 1930. To 5 cm. Tropical to temperate N Atlantic.
Bathophilus digitatus (Welsh, 1923). To 3 cm. Off Bermuda.
Bathophilus longipinnis (Pappenheim, 1914). To 11 cm. Areas 31, W34, SE47.
Bathophilus metallicus (Welsh, 1923). To 14 cm. Subtropical to temperate N Atlantic.
Bathophilus nigerrimus Giglioli, 1882. To 11 cm. Tropical to temperate N Atlantic, Mediterranean.
Bathophilus pawneei Parr, 1927. To 12 cm. Tropical to subtropical NW Atlantic.
Bathophilus proximus Regan and Trewavas, 1930. To 6 cm. Off Bermuda.
Bathophilus schizochirus Regan and Trewavas, 1930. To 7 cm. Subtropical NW Atlantic.

Chirostomias pliopterus Regan and Trewavas, 1930. To 23 cm. Subtropical to temperate N Atlantic.

Echiostoma barbatum Lowe, 1843. To 32 cm. Tropical to temperate Atlantic.

Eustomias achirus Parin and Pokhilskaya, 1974. To 9 cm. Subtropical to temperate N Atlantic, SW Pacific.
Eustomias arborifer Parr, 1927. To 25 cm. Tropical to subtropical Atlantic.
Eustomias bibulbosus Parr, 1927. To 20 cm. Tropical to temperate N Atlantc.
Eustomias bigelowi Welsh, 1923. To 20 cm. Tropical to subtropical Atlantic.
Eustomias binghami Parr, 1927. To 10 cm. Tropical to subtropical NW Atlantic.
Eustomias borealis Clarke, 2000. To 17 cm. Areas NW31 and SW21.
Eustomias braueri Zugmayer, 1911. To 12 cm. Tropical to temperate N Atlantic.
Eustomias brevibarbatus Parr, 1927. To 15 cm. Tropical to subtropical N Atlantic.
Eustomias contiguus Gomon and Gibbs, 1985. To 18 cm. Subtropical N Atlantic.
Eustomias decoratus Gibbs, 1971. To 26 cm. Temperate NW Atlantic.
Eustomias dendriticus Regan and Trewavas, 1930. To 15 cm. Areas NE31 and NE34.
Eustomias digitatus Gomon and Gibbs, 1985. To 12 cm. Tropical NW Atlantic, off Leeward Islands.
Eustomias dispar Gomon and Gibbs, 1985. To 12 cm. Tropical NW Atlantic.
Eustomias dubius Parr, 1927. To 13 cm. Tropical to subtropical NW Atlantic.
Eustomias enbarbatus Welsh, 1923. To 12 cm. Areas W31 and SE34.
Eustomias filifer (Gilchrist, 1906). To 23 cm. Tropical to subtropical Atlantic.
Eustomias fissibarbis (Pappenheim, 1914). To 15 cm. Areas 31, 34, N41, N47, W77, N87, S51.
Eustomias globulifer Regan and Trewavas, 1930. To 7 cm. Central FAO Fishing Area 31.
Eustomias hulleyi Gomon and Gibbs, 1985. To 12 cm. Subtropical NW Atlantic.
Eustomias hypopsilus Gomon and Gibbs, 1985. To 16 cm. Tropical to subtropical NW Atlantic.
Eustomias intermedius Clarke, 1998. To 13 cm. Area SE31.
Eustomias kreffti Gibbs, Clarke and Gomon, 1983. To 13 cm. Tropical Atlantic.
Eustomias leptobolus Regan and Trewavas, 1930. To 10 cm. Area W31.
Eustomias lipochirus Regan and Trewavas, 1930. To 9 cm. Tropical to subtropical N Atlantic.
Eustomias longibarba Parr, 1927. To 13 cm. Tropical to subtropical N Atlantic, E tropical Pacific.
Eustomias macronema Regan and Trewaves, 1930. To 16 cm. Areas W31, N41, Pacific, E Indian.
Eustomias macrophthalmus Parr, 1927. To 10 cm. Tropical to subtropical NW Atlantic.
Eustomias macrurus Regan and Trewavas, 1930. To 11 cm. Area NW31.
Eustomias melanostigma Regan and Trewavas, 1930. To 10 cm. Tropical to subtropical N Atlantic.
Eustomias micraster Parr, 1927. To 15 cm. Tropical to subtropical NW Atlantic.
Eustomias micropterygius Parr, 1927. To 6 cm. Subtropical NW Atlantic, off Bahamas.
Eustomias monoclonus Regan and Trewavas, 1930. To 15 cm. Areas W and SE31, SW34, NW51, NW57, NW 71.
Eustomias obscurus Vaillant in Filhol, 1884. To 21 cm. Tropical to temperate N Atlantic, equatorial S Atlantic.
Eustomias parri Regan and Trewavas, 1930. To 14 cm. Subtropical to temperate N Atlantic.
Eustomias paucifilis Parr, 1927. To 17 cm. Area NW31.
Eustomias polyaster Parr, 1927. To 13 cm. Tropical to subtropical N Atlantic.
Eustomias precarius Gomon and Gibbs, 1985. To 13 cm. Tropical NW Atlantic, off Puerto Rico.
Eustomias pyrifer Regan and Trewavas, 1930. To 13 cm. Tropical NW Atlantic, off Virgin Islands.
Eustomias quadrifilis Gomon and Gibbs, 1985. To 11 cm. Temperate NW Atlantic.
Eustomias radicifilis Borodin, 1930. To 16 cm. Area NW31.
Eustomias satterleei Beebe, 1933. To 18 cm. Subtropical to temperate Atlantic, central, W and S Pacific, S Indian.
Eustomias schiffi Beebe, 1932. To 13 cm. Temperate NW Atlantic.

Eustomias schmidti Regan and Trewavas, 1930. To 19 cm. Subtropical to temperate Atlantic and Pacific.
Eustomias silvescens Regan and Trewavas, 1930. To 11 cm. E Caribbean.
Eustomias simplex Regan and Trewavas, 1930. To 9 cm. Area NW31.
Eustomias tenisoni Regan and Trewavas, 1930. To 9 cm. NW Atlantic, off Bermuda.
Eustomias triramis Regan and Trewavas, 1930. To 11 cm. Central and W FAO Fishing Area 31.
Eustomias variabilis Regan and Trewavas, 1930. To 15 cm. Tropical NW Atlantic.
Eustomias xenobolus Regan and Trewavas, 1930. To 17 cm. Area SE31.

Flagellostomias boureei (Zugmayer, 1913). To 32 cm. Tropical to subtropical in Areas 31, 34, 47.

Grammatostomias circularis Morrow, 1959. To 14 cm. Area W31, off Puerto Rico.
Grammatostomias dentatus Goode and Bean, 1896. To 14 cm. Subtropical to temperate NW Atlantic.
Grammatostomias flagellibarba Holt and Byrne, 1910. To 27 cm. Tropical to temperate N Atlantic.

Leptostomias analis Regan and Trewavas, 1930. To 17 cm. Area SE31.
Leptostomias bermudensis Beebe, 1932. To 27 cm. NW Atlantic, off Bermuda.
Leptostomias bilobatus (Koefoed, 1956). To 8 cm. Subtropical to temperate NW Atlantic.
Leptostomias gladiator (Zugmayer, 1911). To 27 cm. Tropical to temperate N Atlantic.
Leptostomias haplocaulus Regan and Trewavas, 1930. To 10 cm. NW Atlantic, off Bermuda.
Leptostomias leptobolus Regan and Trewavas, 1930. To 10 cm. Tropical NW Atlantic.
Leptostomias longibarba Regan and Trewavas, 1930. To 25 cm. Tropical to subtropical NW Atlantic.

Melanostomias biseriatus Regan and Trewavas, 1930. To 22 cm. Tropical to subtropical N Atlantic, N Pacific.
Melanostomias macrophotus Regan and Trewavas, 1930. To 8 cm. Tropical NW Atlantic.
Melanostomias margaritifer Regan and Trewavas, 1930. To 8 cm. Greater Antilles.
Melanostomias melanopogon Regan and Trewavas, 1930. To 15 cm. FAO Fishing Area 31.
Melanostomias melanops Brauer, 1902. To 24 cm. Area W31 off Lesser Antilles and Area 57.
Melanostomias spilorhynchus Regan and Trewavas, 1930. To 24 cm. Subtropical to temperate N Atlantic.
Melanostomias tentaculatus (Regan and Trewavas, 1930). To 20 cm. N and S Atlantic.
Melanostomias valdiviae Brauer, 1902. To 20 cm. Circumglobal, tropical to subtropical.

Pachystomias microdon (Günther, 1878). To 22 cm. N Atlantic, W Pacific.

Photonectes achirus Regan and Trewavas, 1930. To 6 cm. Area W31.
Photonectes braueri (Zugmayer, 1913). To 12 cm. Subtropical N Atlantic.
Photonectes caerulescens Regan and Trewavas, 1930. To 12 cm. Area NW31.
Photonectes dinema Regan and Trewavas, 1930. To 5 cm. Subtropical to temperate N Atlantic.
Photonectes gracilis Goode and Bean, 1896. To 17 cm. Tropical to subtropical in Area 31.
Photonectes leucospilus Regan and Trewavas, 1930. To 5 cm. Subtropical N Atlantic.
Photonectes margarita (Goode and Bean, 1896). To 32 cm. Areas W31 and S21.
Photonectes mirabilis Parr, 1927. To 6 cm. Area W31.
Photonectes parvimanus Regan and Trewavas, 1930. To 6 cm. Subtropical to temperate NW Atlantic.
Photonectes phyllopogon Regan and Trewavas, 1930. To 2 cm. Area W31, Caribbean only.

Thysanactis dentex Regan and Trewavas, 1930. To 14 cm. Area W31.

References

Clarke, T.A. 2000. Review of nine species of North Atlantic *Eustomias*, subgenus Dinematochirus (Pisces: Stomiidae), with the descriptions of two new species. *Copeia*, 2000:96-111.

Gibbs, R.H., Jr. 1984. Melanostomiidae. In *Fishes of the North-eastern Atlantic and the Mediterranean*, edited by P.J.P. Whitehead, M.-L. Bauchot, J.-C. Hureau, J. Nielsen, and E. Tortonese. *UNESCO*, Vol 1:510 p.

Gibbs, R.H., Jr., T.A. Clarke, and J.R. Gomon. 1983. Taxonomy and distribution of the stomioid fish genus *Eustomias* (Melanostomiidae). I. Subgenus Nominostomias. *Smithson. Contrib. Zool.*, 380:139 p.

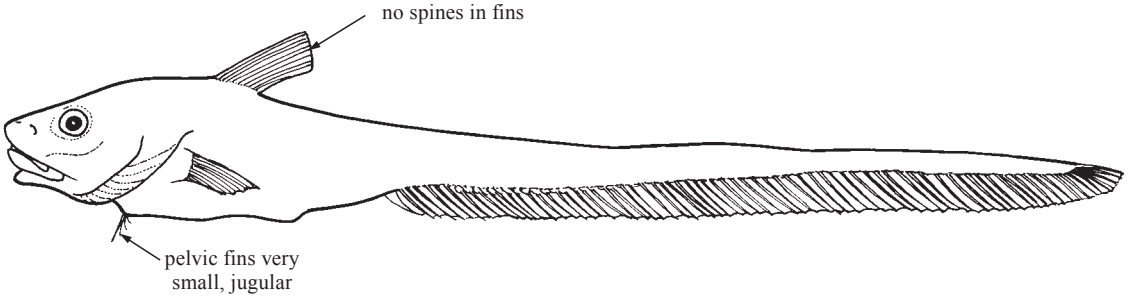
Harold, A.S. and S.H. Weitzman. 1996. Interrelationships of Stomiiform Fishes. In *The Interrelationships of Fishes*, edited by M.L.J. Stiassny, L.R. Parenti and G.D. Johnson. London, Academic Press, pp. 333-353.

Order ATELEOPODIFORMES
ATELEOPODIDAE

Jellynoses (tadpole fishes)

by J.A. Moore, Florida Atlantic University, USA

Diagnostic characters: Elongate fishes (to 2 m) with soft, flabby body; short trunk; tail elongate, compressed, and tapering. Head moderate-sized. Eyes small to moderate. **Snout pointed to rounded, very soft and gelatinous**. Mouth subterminal and protrusible. Teeth villiform, absent, or present in broad band on maxilla and premaxilla, absent on vomer and palatine. **No fin spines; short-based single dorsal fin just behind head, with 8 to 12 soft rays; anal fin elongate and united with caudal fin, with combined total of 80 to 120 soft rays**; pectoral fins with 12 to 14 soft rays; **pelvic fins jugular, adults with 2 to 4 soft rays visible, most rays minute and surrounded by fleshy skin, only 1 ray long and conspicuous**. Body naked, isolated scales present imbedded in lateral line, lateral line obscure exteriorly. Considerable ontogenetic changes in morphometrics and pelvic structure, young have 6 pelvic-fin soft rays with the first longer than the rest. **Colour:** body generally light brown to purplish brown; dorsal, anal, caudal, and pectoral fins dark brown to black, pelvic fins white.

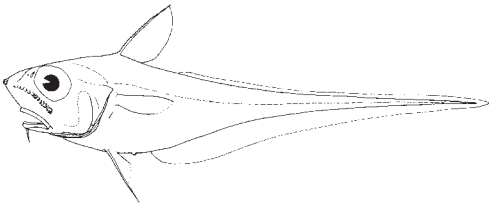


Habitat, biology, and fisheries: Uncommon benthic or benthopelagic fishes usually taken in trawls between 200 and 800 m. Diet consists of benthic invertebrates, especially ophiuroid echinoderms and decapod crustaceans. Of no commercial importance.

Remarks: Currently about 12 species in 4 genera. Specimens placed in the genus *Ijimaia* may represent large adults of *Ateleopus*. This family is in great need of revision. Most recent review of family is by Smith (1986), but the only descriptions of western Atlantic species are in Howell Rivero (1935) and Shimizu (1983).

Similar families occurring in the area

Macrouridae: chin barbel usually present; often spinous rays in first dorsal fin; long low second dorsal fin; scales cover most parts of body and head.



Macrouridae

List of species occurring in the area

Ateleopus sp. To 231 mm TL. French Guiana and Gulf of Mexico.

Ijimaia antillarum Howell Rivero, 1935. To 1 636 mm TL. Areas 31 and SW21.

References

Howell Rivero, L. 1935. The family Ateleopidae and its West Indian form. *Mem. Soc. Cubana Hist. Nat.*, 9(2):91-106.

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Smith, M.M. 1986. Family Ateleopididae. In *Smiths' sea fishes*, edited by M.M. Smith and P.C. Heemstra. Johannesburg, Macmillan, pp. 404-406.

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