

CHAPTER 30

Myctophids in the Arabian Sea And its Systematics



Fish Stocks in the Arabian Sea

The northern Arabian Sea is the habitat of large mid-water fish stocks (Gjøsæter, 1984). These stocks reside all along the outer edges of the coastal zone of the Arabian Peninsula, off Pakistan, and the Gulf of Oman. Doubtless there are also sizeable stocks off Somalia and northern India. Off the Arabian Peninsula and in the Gulf of Oman these stocks are dominated by myctophids, mostly by *Benthoosema pterotum*, although *Benthoosema fibulatum*, *Diaphus arabicus* (Kinzer et al. 1993), *Myctophum spinosum*, and *Symbolophorus evermanni* are occasional large contributors. Possibly the *B. pterotum* population is the largest, localized fish stock in the world, amounting to 100 million tons! It has been suggested that this very large stock of the one species derives from the very small stocks of all other fish; for some reason *B. pterotum* and other myctophids are the competitive dominants (GLOBEC, 1993).

Myctophiformes

Lantern fishes the order myctophiforms belongs to the Class Actinopterygii (ray-finned fishes). It contains two families: Myctophidae & Neoscopelidae

Characters of family Myctophidae: Head and body compressed. Eyes large and lateral. Mouth terminal extending beyond vertical through the middle of eye. Upper edge of jaw formed by premaxillary only. Teeth small. Rudimentary spine at base of dorsal, anal and upper-most pectoral and outermost ventral fin ray. Adipose fin present. Anal fin origin under or close behind base of dorsal fin. Scales cycloid or ctenoid. Photophores present, arranged in distinct groups on head and trunk. Small secondary photo pose on head, trunk and fins in some species. Luminous organs of various shapes and the size are present on head or caudal peduncle, and at base of adipose fin in some species.

Characters of family Neoscopelidae: Body elongate; head and body compressed. Mouth terminal; jaws extending to or beyond rear margin of orbit. Maxilla vomer and palatines. Pectoral fins well-developed, reaching to about anus. Origin of ventral fins well behind vertical through pectoral fin base. Origin of dorsal fin above vendor base; anal fin

posterior to dorsal fin. Adipose fin present. Luminous organs on head absent. Photophores on body present or absent.

General characters of the order are, Head and body compressed; eye lateral (dorsolateral in the myctophids Hierops); mouth usually large and terminal; adipose fin present; usually 8 pelvic fin rays; usually 7-11 branchiostegal rays. Lantern fishes live all over the world except the Arctic Ocean. All are deep-and benthopelagic fishes as adults live in the middle depths of the open ocean, usually between 660 and 3,3300 ft (200 and 1000 m). Some may enter the upper part of the deep water region. Several lantern fishes are thought to live near, but not in contact with the bottom at the same point in life. Larval or young lantern fishes live near the surface, mainly between about 150 and 800 feet (50 - 2580 m)

Family – Myctophidae

Myctophidae belongs to the Class - Osteichthyes, Order - Myctophiformes. Worldwide there are more than 30 genera (230-250 species) of myctophid fishes with a size range of 3-30cm, most being under 15cm.

Systematics

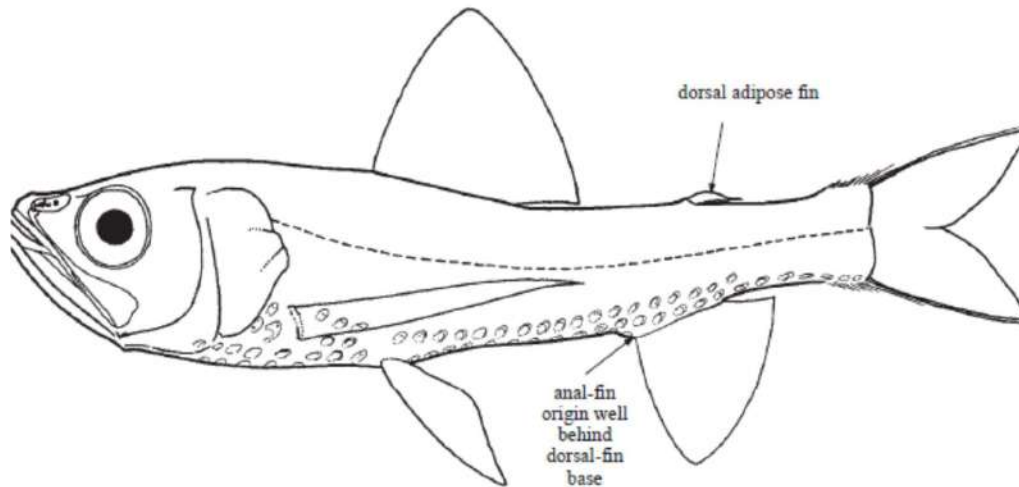
Myctophids have a slender, compressed body covered with deciduous, cycloid or ctenoid scales, a prominent, bluntly rounded head with large elliptical to round eye and terminal mouth with rows of small teeth. Fins are generally small with a single dorsal fin, adipose fin, anal fin (with adipose plates at its base), paired fins (pectoral and pelvic; pectorals absent in some) and a forked caudal fin. Majority of the myctophids possess a gas bladder (that reflects sound and also helps in buoyancy), which become filled with lipids or degenerates during maturation (helps in egg production) in some species. An important characteristic of myctophids is the presence of non bacterial luminescent organs called photophores present along their ventral body surface and head. The presence of photophores forms an important diagnostic feature in identifying different species of various genera and also to distinguish between the male and female of the same genus. Though all the myctophids species have photophores, one species, *Taaningichthys paurolychnus*, completely lacks these organs. Interestingly all other members of this genus have these organs. The photophores emit blue, green or yellow light by chemical reaction. Each photophore is covered by a modified scale which acts as a lens to focus light. In *Diaphus sp.* There are two pairs of well developed light organs situated immediately in front of the eyes (and hence the name ‘headlight fish’). The photophores are sexually dimorphic in nature especially the luminous glands present in the dorsal and ventral surface of caudal peduncle – supra caudal (dorsal) in male and infra caudal (ventral) in female; although male and female of some species (*Lampanyctus sp.* etc) possess both glands. The colour of the myctophids vary from bluegreen to silver in shallow dwelling species, while deep water species are dark brown to black.

Neoscopelids

Diagnostic characters: Small fishes, usually 15 to 30 cm as adults. Body elongate with no photophores (*Scopelengys*) or with 3 rows of large photophores when viewed from below (*Neoscopelus*). Eyes variable, small to large. Mouth large, extending to or beyond vertical from posterior margin of eye; tongue with photophores around margin in *Neoscopelus*. Gill rakers 9 to 16. Dorsal fin single, its origin above or slightly in front of pelvic fin, well in front of anal

fins; 11 to 13 soft rays. **Dorsal adipose fin** over end of anal fin. **Anal-fin origin well behind dorsal-fin base**, anal fin with 10 to 14 soft rays. Pectoral fins long, reaching to about anus, anal fin with 15 to 19 rays. Pelvic fins large, usually reaching to anus. Scales large, cycloid, and deciduous.

Colour: reddish silvery in *Neoscopelus*; blackish in *Scopelengys*.

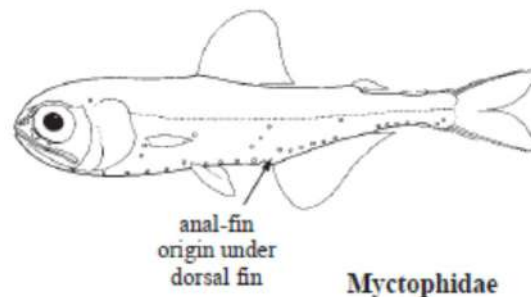


Habitat, biology, and fisheries: Large adults of *Neoscopelus* usually benthopelagic below 1 000 m, but subadults mostly in midwater between 500 and 1 000 m in tropical and subtropical areas. *Scopelengys* mesotobathypelagic. No known fisheries.

Remarks: Three genera and 5 species with *Solivomer* not known from the Atlantic. All Atlantic species probably circumglobal.

Similar families in occurring in area

Myctophidae: photophores arranged in groups not in straight horizontal rows (except *Taaningichthys paurolychnus* which lacks photophores). Anal-fin origin under posterior dorsal-fin base.



Gonostomatidae, Phosichthyidae, Sternoptychidae: certain genera with similar body form to, and might be confused with, neoscoleids. Almost all with 1 or 2 horizontal rows of photophores on body but lack median ventral row. Lack edentulate maxilla that is expanded posteriorly.

Key to the species of Neoscopelidae in the area

1a. Photophores present; eye large, about 1 in snout; upper jaw extending to about posterior margin of eye (Fig. 1). . (*Neoscopelus*) _ 3

1b. Photophores absent; eye small, about 3 in snout; upper jaw extending at least 1 eye diameter beyond eye (Fig. 2) . *Scopelengys tristis*

2a. Upper lateral series of photophores extends well past midpoint of anal-fin base (Fig. 1); gill rakers usually 14 (rarely 15 or 16) *Neoscopelus microchir*

2b. Upper lateral series of photophores extends only to about anus (Fig. 3); gill rakers usually 11 (rarely 12 to 14). *Neoscopelus macrolepidotus*

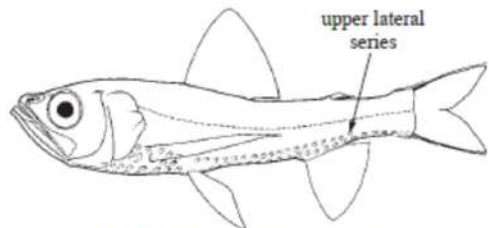
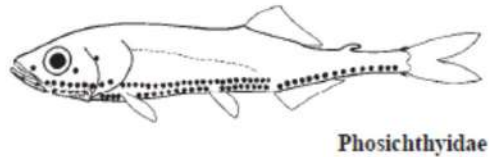


Fig. 1 *Neoscopelus microchir*

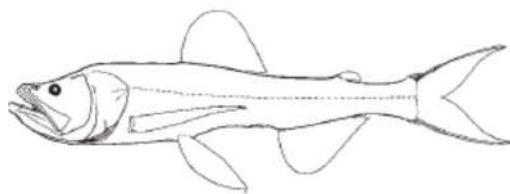


Fig. 2 *Scopelengys tristis*

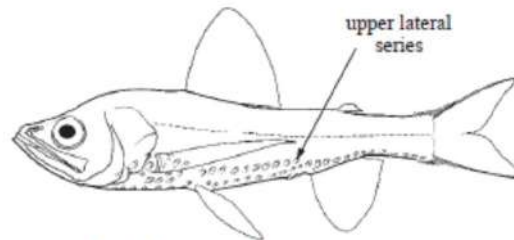


Fig. 3 *Neoscopelus macrolepidotus*

List of species occurring in the area

Neoscopelus macrolepidotus Johnson, 1863. To 23 cm. Tropical-subtropical.

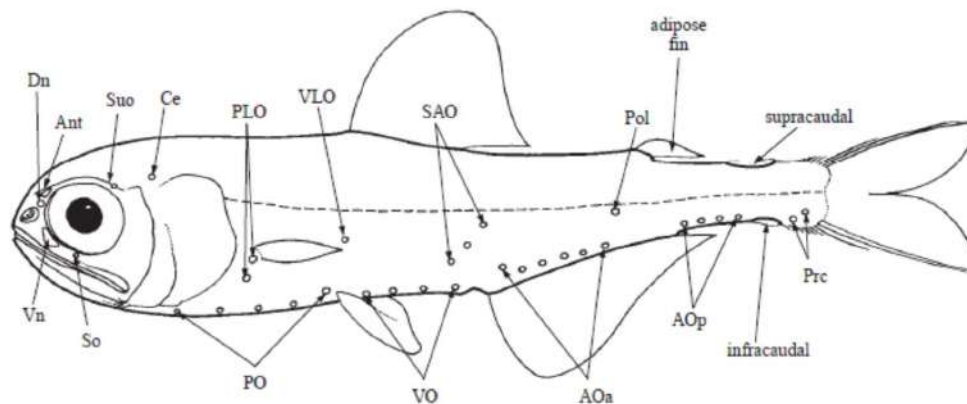
Neoscopelus microchir Matsubara, 1943. To 30 cm. Tropical-subtropical.

Scopelengys tristis Alcock, 1890. To 20 cm. Tropical-subtropical.

MYCTOPHIDAE

Lanternfishes

Diagnostic characters: Small fishes, from 2 to 30 cm as adults. Body typically elongate although 2 area species, *Electrona risso* and *Myctophum selenops*, quite deep-bodied. Head large with jaws reaching posterior margin of eye and beyond. Eye large. Small teeth in bands on the premaxillaries and dentaries, sometimes flattened but seldom enlarged. Gill rakers well developed but absent in *Centrobranchus*. Dorsal-fin base at midbody, fin sometimes relatively high; posterior dorsal-fin base nearly above or behind anal-fin origin; 10 to 26 soft rays. Dorsal adipose fin present. Anal fin under or just behind base of dorsal fin; 12 to 27 soft rays. Principal caudal-fin rays 10 + 9 = 19. Pectoral fins rudimentary to very long; 10 to 18 soft rays. Pelvic fins under or just before anterior base of dorsal fin; pelvic-fin soft rays usually 8 but 6 in *Notolychnus* and sometimes 7 in *Gonichthys*. Scales deciduous. Photophores present in groups on head and body in all but 1 area species, *Taaningichthys paurolychnus*. Additional luminous tissue may be found on head, scales, fins, and as glands on the upper and/or lower caudal peduncle. Colour: mainly brown to black in deeper water species, silvery in shallower water species; often with metallic blue or green scales.



Dn	-	dorso-nasal	Vn	-	ventronasal
Ant	-	antorbital	So	-	suborbital
Suo	-	supraorbital	PO	-	thoracic
Ce	-	cervical	VO	-	ventral
PLO	-	suprapectoral	AOa	-	anterior anal
VLO	-	supraventral	AOp	-	posterior anal
SAO	-	supra-anal	Prc	-	precaudal

general distribution and terminology of the luminous organs
(photophores)

Habitat, biology, and fisheries: Typically, myctophids are pelagic fishes of the open ocean. Most species are found in the upper 1 000 m of the water column (mesopelagic). A few species live deeper than 1 000 m (bathypelagic). Some species are associated with continental and island slopes (pseudoceanic). Daily vertical migrations from about 400 to 1 000 m during the day into the upper 200 m at night are common; some species reach the surface. The light produced by the various light-producing organs is the result of relatively simple oxidation of luciferin in the presence of the enzyme luciferase. Myctophids are abundant in some areas, making up a large portion of the total biomass. Many myctophid species are found in Area 31 because it includes elements of tropical, sub-tropical, and even temperate faunas. Myctophids are very important food for larger fishes, sea birds, and marine mammals. The only myctophid fisheries have been in the South Atlantic, Gulf of Oman, and Persian Gulf.

Remarks: Thirty-three genera and at least 240 species worldwide; 20 genera and 77 species in the area. It is possible that certain species with wide distributions are, in fact, species complexes. The life histories of many lanternfish species are poorly known, especially of those species larger than 10 cm. Distributions given in the list of species apply only to the Atlantic; space does not allow discussion of extra-Atlantic occurrences.

Similar families occurring in area

Separated from most other families in the area by a lack of photophores and a dorsal adipose fin. Further distinguishing characters of these families are the following: Neoscopelidae: posterior dorsal-fin base well in advance of the anal-fin origin. *Neoscolepelus* as large photophores in 3 longitudinal rows on body and along edge of tongue. *Scopelengys* lacks photophores and has a very small eye. Gonostomatidae, Phosichthyidae (Photichthyidae), Sternoptychidae: teeth conical or needle-like on both premaxilla and maxilla, never in bands. Almost all have 1 or 2 horizontal rows of photophores on body. None with a set of 3 photophores (SAO) at midbody, elaborate head photophores (Ant, Dn, Vn), or the supra- or infracaudal glands of myctophids.

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

Note: Identification and taxonomy of Myctophidae are based heavily on the arrangement of the various photophore groups as shown above. Care must be taken in identifying the location and number of photophores. Photophores are often lost or damaged in nets so identification may be impossible.

- 1a. Two Prc photophores (Fig. 1a) _ 2
- 1b. Three or more Prc (1 may be at or above lateral midline at base of caudal peduncle) or none in *Taaningichthys paurolychnus* (Fig. 1b) _ 12
- 2a. Four photophores (VLO, SAO3, Pol, Prc2) well above the midlateral line (Fig. 2); specimens usually skinned and photophores often lost; small species, never over 2.5 cm *Notolychnus valdiviae*
- 2b. No photophores above lateral line. _ 3
- 3a. AO in a single uninterrupted series (Fig. 3, 4); Pol absent _ 4
- 3b. AO divided into 2 groups, AOa and AOp (Fig. 5); Pol present (Fig. 5) _ 5

4a. PVO1-2 inclined, in line with PO1 (Fig. 3); interorbital wide; eye normal, pointing laterally.
..... *Electrona risso*

4b. PVO1-2 in an almost horizontal line (Fig. 4), a line through them markedly above PO1;
interorbital very narrow; eyes pointed upward, almost telescopic.....
. *Protomyctophum arcticum* (not in Area 31)

5a. Mouth terminal, snout not projecting (Fig. 5); jaws short, extending less than 1/2 eye
diameter behind orbit....._ 6

5b. Mouth subterminal, snout projecting (Fig. 10); jaws moderate, extending 1/2 eye diameter
behind orbit....._ 10

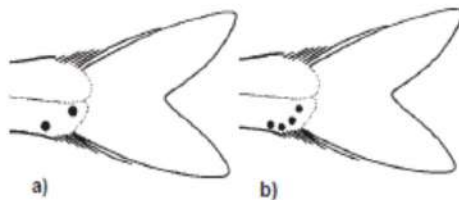
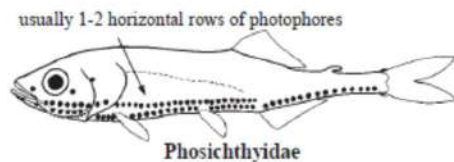
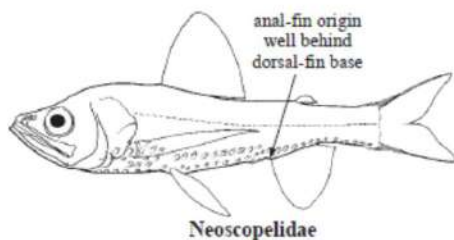


Fig. 1 Prc photophores

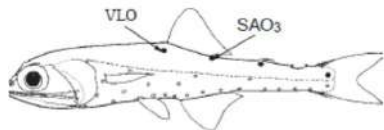


Fig. 2 *Notolychnus*

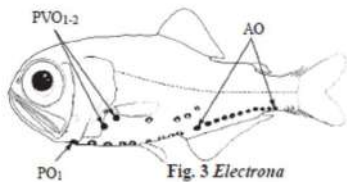


Fig. 3 *Electrona*

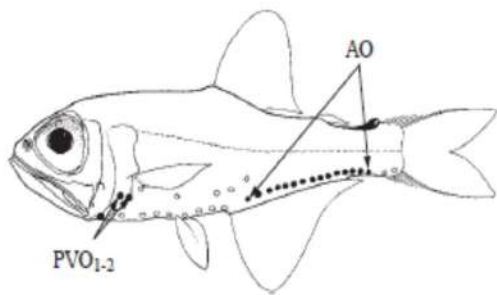


Fig. 4 *Protomyctophum arcticum*

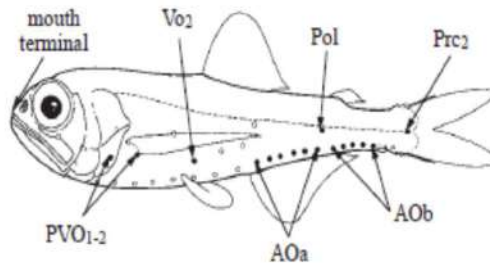


Fig. 5 *Benthosema*

- 6a. PVO1-2 in a horizontal line (Fig. 5); VO2 elevated _ 7
- 6b. PVO1-2 in an inclined line (Fig. 7), with PVO2 usually more than 1 photophore diameter above PVO1; all VO level (Fig. 7)..... _ 8
- 7a. Prc2 high, from 1 to 2 photophore diameters below, or on, midlateral line (Fig. 5); teeth simple, never hooked *Benthosema*
- 7b. Prc2 low, level with Prc1 (Fig. 6); outer dentary teeth flattened and hooked forward *Diogenichthys atlanticus*
- 8a. Two Pol (Fig. 7) *Hygophum*
- 8b. One Pol (Fig. 8) _ 9
- 9a. SAO forming an almost right angle with SAO1 over or in advance of VO3 (Fig. 8) ... *Symbolophorus*
- 9b. SAO in an almost straight or slightly angled line with SAO1 well behind VO3 (Fig. 9) ... *Myctophum*
- 10a. Gill rakers absent (Fig. 10) *Centrobranchus nigroocellatus*

10b. Gill rakers present *11*

11a. AOp 7 or fewer, at most 1 over anal base (Fig. 11); anal-fin origin about under middle of dorsal-fin base. *Loweina*

11b. AOp 10 or more, with 5 to 7 over anal-fin base (Fig. 12); anal-fin origin under end of dorsal-fin base . . . *Gonichthys cocco*

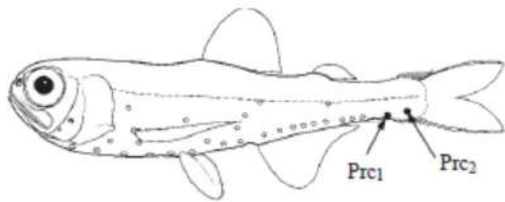


Fig. 6 *Diogenichthys atlanticus*

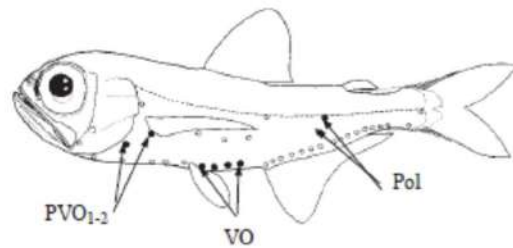


Fig. 7 *Hygophum*

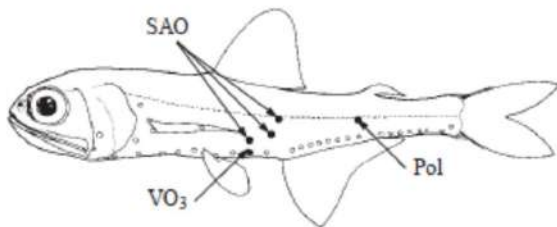


Fig. 8 *Symbolophorus*

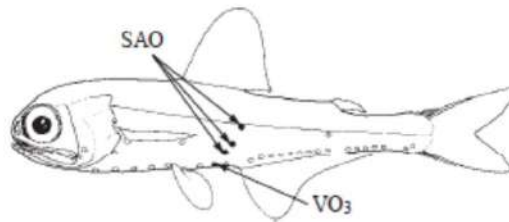


Fig. 9 *Myctophum*

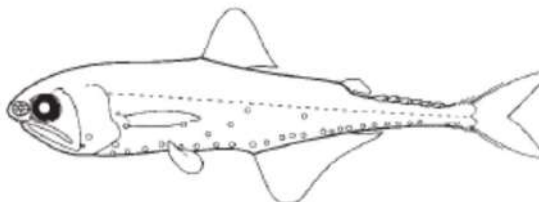


Fig. 10 *Centrobranchus nigroocellatus*

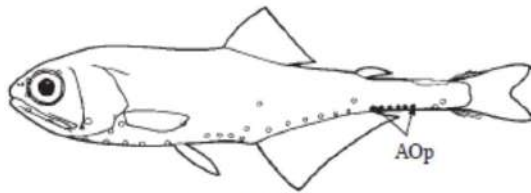


Fig. 11 *Loweina*

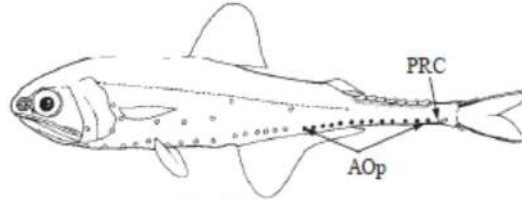


Fig. 12 *Gonichthys*

12a. Dn absent; VO and Pol never arranged as in 12b _ 13

12b. Dn present; either 2 horizontal Pol (Fig. 13) near lateral line or VO1-3 on a straight ascending line with VO4-5 level (Fig. 14). _ 19

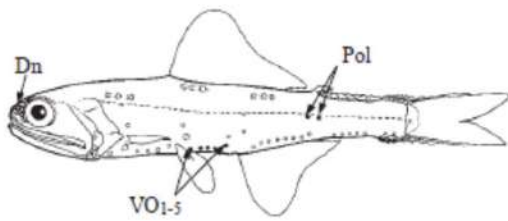


Fig. 13 *Notoscopelus*

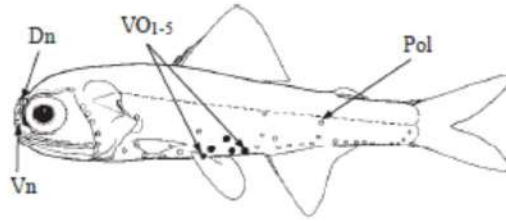


Fig. 14 *Diaphus*

13a. Supra- and infracaudal glands single organs bordered by heavy jet-black pigment (Fig. 15a). _ 14

13b. Supra- and infracaudal glands overlapping scale-like plates, never bordered by jet-black pigment (Fig. 15b) _ 15

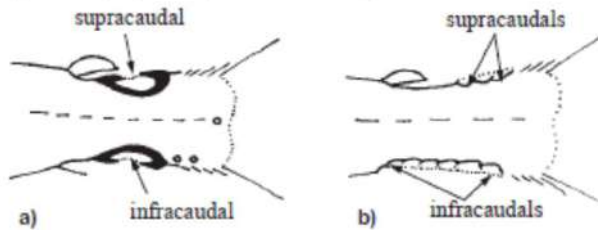


Fig. 15 caudal peduncle

14a. A large white crescent on posterior half of eye; dorsal-fin origin behind base of pelvic fin; only 1 SAO (at midbody) or none in *T. paurolychnus* (Fig. 16) *Taaningichthys*

14b. No large white crescent on posterior half of eye; dorsal-fin origin over or slightly in front of pelvic fin; 3 SAO (Fig. 17) *Lampadena*

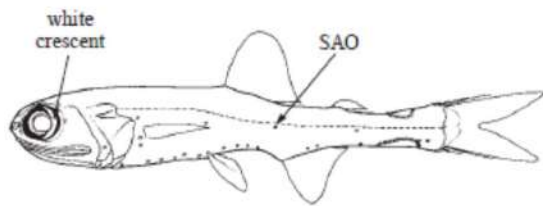


Fig. 16 *Taaningichthys*

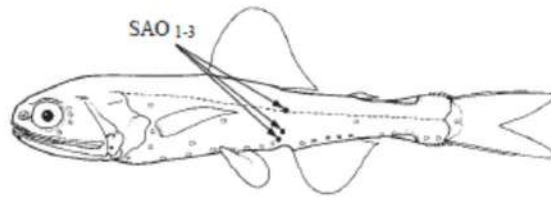


Fig. 17 *Lampadena*

15a. Luminous tissue restricted to caudal luminous glands and occasionally at base of adipose fin (Fig. 18) _ 16

15b. Luminous tissue over base of anal or dorsal fins and on other portions of body (Figs. 19, 20, 21) _ 17

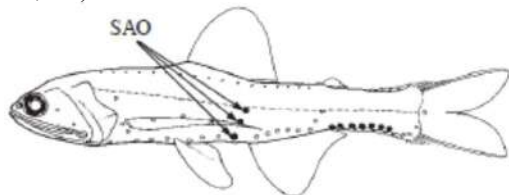


Fig. 18 *Lampanyctus*

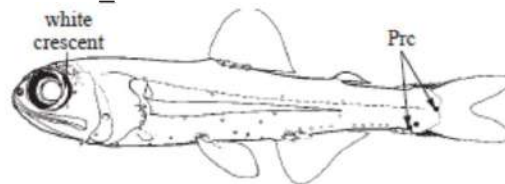


Fig. 19 *Bolinichthys*

16a. Pectoral fin long, at least reaching SAO photophores, often to anterior anal fin. (Fig. 18) *Lampanyctus*

16b. Pectoral fin rudimentary or short, seldom reaching PO4 (note that *L. macdonaldi* is the only Atlantic *Lampanyctus* with a short pectoral fin but it has 21 or more gill rakers vs. fewer than 21 in all *Nannobranchium*) *Nannobranchium*

17a. Three (2+1) Prc; a whitish crescent on posterior half of eye; luminous tissue above eyes in some species (Fig. 19) *Bolinichthys*

17b. Four (3+1) Prc; eye without whitish crescent; no luminous tissue above eyes (Figs. 20, 21) _ 18

18a. PO4 elevated; VO2 elevated (Fig. 20); no medial luminous tissue either at bases of pelvic fins or between pelvic fins and anal-fin origin; pectoral fin long, reaching adipose origin. *Lepidophanes*

18b. PO4 not elevated; VO only slightly arched (Fig. 21); medial luminous tissue present at bases of pelvic fins or between pelvic fins and anal-fin origin; pectoral fins moderate, not reaching adipose fin *Ceratoscopelus*

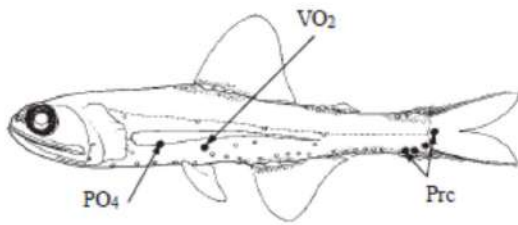


Fig. 20 *Lepidophanes*

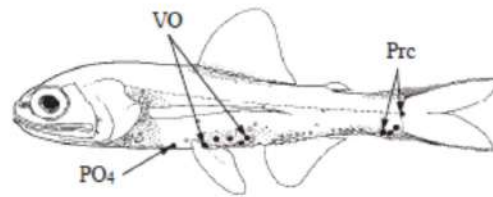


Fig. 21 *Ceratoscopelus*

19a. VO1-5 level; both supra- and infracaudal glands present in both sexes; 2 horizontal Pol near lateral line (Fig. 22) *Notoscopelus*

19b. VO1-3 on a straight, inclined, ascending line with VO4-5 level (Figs 23, 24); no caudal glands (*Diaphus*) or only 1 caudal gland (*Lobianchia*); 1 Pol **20**

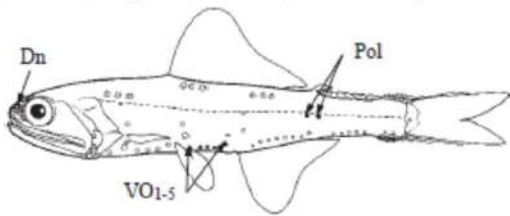


Fig. 22 *Notoscopelus*

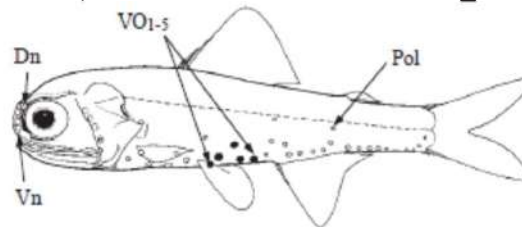


Fig. 23 *Diaphus*

20a. Caudal glands absent; more than 1 pair of luminous glands on head (Ant, Dn, Vn, or So); usually a luminous scale at PLO (Fig. 23) . . . *Diaphus*

20b. Supracaudal (males) and infracaudal (females) well developed; 1 pair (Dn) of luminous organs on head; luminous scale at PLO absent (Fig. 24) *Lobianchia*

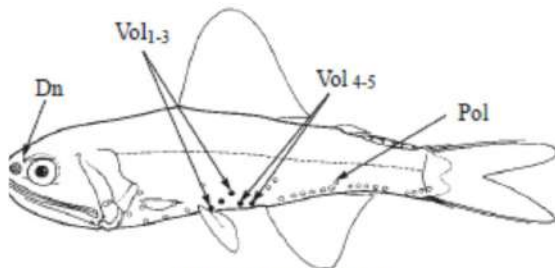


Fig. 24 *Lobianchia*

List of species occurring in the area

- Benthoosema glaciale* (Reinhardt, 1837). To 7 cm. Subarctic S to N31.
- Benthoosema suborbitale* (Gilbert, 1913). To 3.8 cm. Widespread, tropical to temperate.
- Bolinichthys distofax* Johnson, 1975. To 8.5 cm. Rare, tropical and S subtropical.
- Bolinichthys indicus* (Nafpaktitis and Nafpaktitis, 1969). To 4.5 cm. Bipolar subtropical.
- Bolinichthys photothorax* (Parr, 1928). To 6.5 cm. Tropical-subtropical, rarely N to Slope Water (SW21).
- Bolinichthys supralateralis* (Parr, 1928). To 11 cm. Widespread, tropical to temperate.
- Centrobranchus nigroocellatus* (Günther, 1873). To 5 cm. Widespread, tropical to temperate.

Ceratoscopelus maderensis (Lowe, 1839). To 7 cm. N temperate S to N 31.
Ceratoscopelus warmingii (Lütken, 1892). To 7.5 cm. Widespread, tropical to temperate.
Diaphus adenomus Gilbert, 1905. To 18 cm. Rare, pseudoceanic, W31 (and SE27).
Diaphus anderseni Tåning, 1932. To 3 cm. S subtropical, rare to SE31.
Diaphus bertelseni Nafpaktitis, 1966. To 8 cm. Rare, tropical-subtropical.
Diaphus brachycephalus Tåning, 1928. To 6 cm. Tropical-subtropical.
Diaphus dumerilii (Bleeker, 1856). To 8.6 cm. Tropical, common N to Slope Water (SW21).
Diaphus effulgens (Goode and Bean, 1896). To 15 cm. Bipolar subtropical.
Diaphus fragilis Tåning, 1928. To 9 cm. Tropical, rare N to Slope Water (SW31).
Diaphus garmani Gilbert, 1906. To 6 cm. Tropical, possibly pseudoceanic as adult.
Diaphus lucidus (Goode and Bean, 1896). To 12 cm. Tropical, rare N to Slope Water (SW21).
Diaphus luetkeni (Brauer, 1904). To 6 cm. Tropical, rare N to Slope Water (SW21).
Diaphus metopoclampus (Cocco, 1829). 7.5 cm. Bipolar temperate-subtropical.
Diaphus minax Nafpaktitis, 1968. To 6.6 cm. Extremely rare, pseudoceanic, only W31.
Diaphus mollis Tåning, 1928. To 6 cm. Widespread.
Diaphus perspicillatus (Ogilby, 1898). To 7 cm. Tropical, N to Slope Water (SW21).
Diaphus problematicus Parr, 1928. To 9 cm. Tropical.
Diaphus rafinesquii (Cocco, 1838). To 9 cm. Temperate, rare S to Gulf of Mexico.
Diaphus roei Nafpaktitis, 1974. To 11 cm. Rare, pseudoceanic, only 31.
Diaphus splendidus (Brauer, 1904). To 5.5 cm. Tropical-subtropical.
Diaphus subtilis Nafpaktitis, 1968. To 8.5 cm. Uncommon, tropical-subtropical.
Diaphus taaningi Norman, 1930. To 7 cm. Pseudoceanic, W31, Slope Water and off Africa.
Diaphus termophilus Tåning, 1928. To 7.5 cm. Tropical.
Diogenichthys atlanticus (Tåning, 1928). To 3 cm. Widespread, tropical to temperate.
Electrona risso (Cocco, 1829). To 8 cm. E Atlantic but rare stray to SE31.
Gonichthys cocco (Cocco, 1829). To 6 cm. Widespread, tropical to temperate.
Hygophum benoiti (Cocco, 1838). To 5.5 cm. N temperate-subtropical.
Hygophum hygomii (Lütken, 1892). To at least 6 cm. Bipolar temperate-subtropical.
Hygophum macrochir (Günther, 1864). To 6 cm. Tropical and S subtropical.
Hygophum reinhardtii (Lütken, 1892). To at least 5 cm. Probably tropical-subtropical.
Hygophum taaningi Bekker, 1965. To 5 cm. N tropical-subtropical.
Lampadena anomala Parr, 1928. To 15 cm. Rare, bathypelagic, tropical-subtropical.
Lampadena chavesi Collett 1905. To 7.5 cm. Bipolar subtropical.
Lampadena luminosa (Garman, 1899). To 18 cm. Tropical-subtropical.
Lampadena speculigera Goode and Bean, 1896. To 13 cm. Bipolar temperate to N31.
Lampadena urophaos atlantica Maul, 1969. To 23 cm. N subtropical.
Lampanyctus alatus Goode and Bean, 1896. To 6 cm. Widespread, mostly tropical.
Lampanyctus crocodilus (Risso, 1810). To 30 cm. N temperate to N31 and E 34.
Lampanyctus festivus Tåning, 1928. To 12 cm. Bipolar subtropical.
Lampanyctus intricarius Tåning, 1928. To 17 cm. Bipolar temperate, extremely rare N31.
Lampanyctus macdonaldi (Goode and Bean, 1896). To 14 cm. Bipolar temperate rare to N31.

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Lampanyctus nobilis Tåning, 1928. To 11 cm. Tropical.
Lampanyctus photonotus Parr, 1928. To 7 cm. Widespread, tropical to temperate.
Lampanyctus pusillus (Johnson, 1890). To 4.3 cm. Bipolar, temperate-subtropical.
Lampanyctus tenuiformis (Brauer, 1906). To 12 cm. Tropical.
Lampanyctus vadulus Hully, 1981. To 9.9 cm. E tropical, W to SE31.
Lepidophanes gaussi (Brauer, 1906). To 4.8 cm. Bipolar subtropical.
Lepidophanes guentheri (Goode and Bean, 1896). To 7 cm. Widespread, tropical to temperate.

Lobianchia dofleini (Zugmayer, 1911). To 5 cm. Bipolar temperate-subtropical.
Lobianchia gemellarii (Cocco, 1838). To 11 cm. Tropical-subtropical.
Loweina interrupta (Tåning, 1928). To 3.9 cm. Extremely rare, temperate-subtropical.
Loweina rara (Lütken, 1892). To 4.5 cm. Rare, widespread.
Myctophum affine (Lütken, 1892). To 8 cm. Tropical, N in Slope Water.
Myctophum asperum Richardson, 1845. To 8.5 cm. Tropical, rare to Slope Water.
Myctophum nitidulum Garman, 1899. To 9.9 cm. Widespread, tropical to temperate.
Myctophum obtusirostre Tåning, 1928. To 9 cm. Tropical, rare to Slope Water.
Myctophum punctatum Rafinesque, 1810. To 10 cm. N subpolar-temperate.
Myctophum selenops Tåning, 1928. To 7.5 cm. Widespread, usually tropical-subtropical.
Nannobranchium atrum (Tåning, 1928). To 14 cm. Bipolar, temperate-subtropical.
Nannobranchium cuprarium (Tåning, 1928). To 11 cm. Bipolar, subtropical.
Nannobranchium isaacsi (Wisner, 1974). To 13 cm. E tropical to SE31.
Nannobranchium lineatum (Tåning, 1928). To 24 cm. Tropical-subtropical.
Notolychnus valdiviae (Brauer, 1904). To 2.5 cm. Widespread, tropical to temperate.
Notoscopelus caudispinosus (Johnson, 1863). To 14 cm. Tropical-subtropical.
Notoscopelus resplendens (Richardson, 1845). To 7.7 cm. Widespread, tropical to temperate.
Symbolophorus rufinus (Tåning, 1928). To 8.7 cm. Tropical-subtropical.
Symbolophorus veranyi (Moreau, 1888). To 5.8 cm. N temperate, rare to N31.
Taaningichthys bathyphilus (Tåning, 1928). To 8 cm. Bathypelagic, tropical-subtropical.
Taaningichthys minimus (Tåning, 1928). To 6.5 cm. Tropical-subtropical. *Taaningichthys paurolychnus* Davy 1972. To 9.5 cm. Extremely rare, bathypelagic.

Distribution

The myctophids, together with Gonostomatidae forms one of the most dominant fish species in the mesopelagic realm of the world oceans, from Arctic to Antarctic. Other fish groups include Neoscopelidae (Blackchins), Sternoptychidae (Hatchet fishes), Chiasmodontidae (Swallowers), Nomeidae (Man-of-War fishes), Bathylagidae (Deep-sea smelts) etc. Though mesopelagic fish are found in all oceans, their annual production and species diversity is found to be more in tropical

and sub-tropical waters. Myctophids are distributed throughout the world oceans from Arctic to Antarctic waters. Though many are meso or bathypelagic species, some were found to inhabit the continental slope regions. Larval forms of many deep water species are also found to inhabit inshore waters. Worldwide, myctophid larvae make up at least 50% of all fish larvae taken in open water plankton tows. Species distribution is related to the currents and other physical and chemical characteristics of ocean.

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