2.5 Suborder Bythitoidei

Number of recognized families: 2.

Diagnosis and description: See key to suborders (page 9).

Key to families

1a. Most species with scales; skin firm; precaudal vertebrae 9 to 22; swimbladder present . . . . . **Bythitidae**

1b. Scales absent; skin loose and transparent; precaudal vertebrae 26 to 50; swimbladder absent . . . . . **Aphyonidae**

2.6 Family Bythitidae

Family name: Bythitidae Gill (1861a).

Number of recognized genera: 32.

Diagnosis and description: Developed rakers on anterior arch fewer than 6 in most species but in some as many as 18; scales present in all but a few species; **no median basibranchial tooth patch**; **pelvic fin with a single ray or absent in a few**, except 2 in ***Thalassobathia***; swimbladder present; precaudal vertebrae 9 to 22; anterior neural spine shorter than those following.

Key to subfamilies

1a. Caudal fin broadly joined to dorsal and anal fins . . . . . **Bythitinae**

1b. Caudal fin free from dorsal and anal fins (sometimes partly connected in ***Dermatopsis***, ***Dipulus***, and ***Lucifuga***) . . . . . **Brosmophycinae**

2.6.1 Subfamily Bythitinae

Subfamily name: Bythitinae Gill (1861a).

Number of recognized genera: 13.

Diagnosis and description: Squamation on body and head variable, present and imbricate in most genera but absent in a few; **caudal fin broadly joined to dorsal and anal fins**; **male intromittant organ lacking ossified parts**.

Key to genera

1a. Pelvic fin with 2 short, fleshy rays in each (Fig. 92) . . . . . ***Thalassobathia***

1b. Pelvic fins absent or with a single filamentous ray in each . . . . . → ***2***

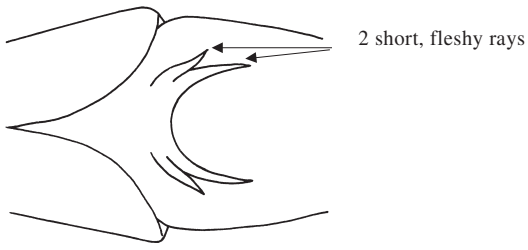

Fig. 92 Pelvic fins of *Thalassobathia* (from Cohen and Nielsen, 1978)

2a. Pectoral fins supported by elongate radials . . . . . → ***3***

2b. Pectoral fins radials not elongate . . . . . → ***5***

3a. Two anteriorly directed, median spines on head, 1 on frontal, the other buried on mesethmoid . . . . . ***Hastatobythites***

3b. No anteriorly directed spines on head . . . . . → ***4***

4a. Scales present on head; preopercle with a curved spine at lower angle; branchiostegal rays 7 . . . . . ***Calamopteryx***

4b. Scales absent from head; no spines at lower angle of preopercle; branchiostegal rays 8 . . . . . ***Saccogaster***

5a. Palatine teeth absent . . . . . → ***6***

5b. Palatine teeth present . . . . . → ***7***

6a. Rear of maxilla rounded, not expanded (Fig. 93a) . . . . . ***Stygnobrotula***

6b. Rear of maxilla vertically expanded (Fig. 93b) . . . . . ***Grammonus***

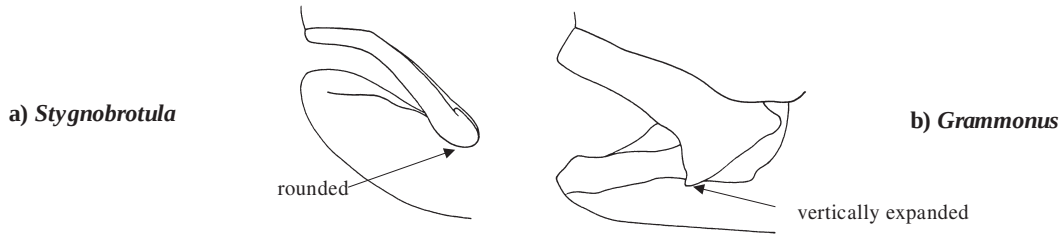

Fig. 93 (from Cohen and Nielsen, 1978)

7a. Prominent skin flap bearing large pore above opercle (Fig. 94) . . . . . → ***8***

7b. No prominent skin flap with pore above opercle . . . . . → ***9***

8a. Pelvic fin absent . . . . . ***Hephthocara***

8b. Pelvic fin present . . . . . ***Diplacanthopoma***

9a. Circumorbital head pores large, a prominent median interorbital pore (Fig. 95) . ***Pseudonus***

9b. Circumorbital pores variously developed, no prominent median interorbital pore. . . . → ***10***

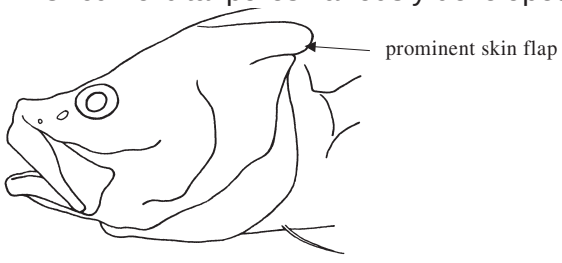

Fig. 94 Head of *Diplacanthopoma* (from Cohen and Nielsen, 1978)

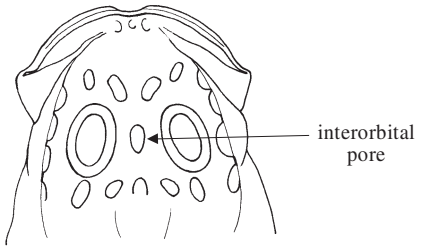

Fig. 95 Dorsal view of head (*Pseudonus*) (from Cohen and Nielsen, 1978)

10a. Pelvic fins absent; preopercle with several sharp, pointed spines at lower angle . . ***Bellottia***

10b. Pelvic fins present; no sharp spines on preopercle . . . . . → ***11***

11a. Scales absent on head . . . . . ***Bythites***

11b. Scales present on head . . . . . → ***12***

12a. Pectoral-fin rays 11 to 14; precaudal vertebrae 11 or 12 . . . . . ***Microbrotula***

12b. Pectoral-fin rays 22 to 32; precaudal vertebrae 13 to 16 . . . . . ***Cataetyx***

List of nominal genera

Abythites Nielsen and Cohen, 1973 (here treated as a junior synonym of ***Cataetyx***)
Barbuliceps Chan, 1966 (junior synonym of ***Saccogaster***)
Bathystorreus Howell Rivero, 1934 (junior synonym of ***Grammonus***)
Bellottia Giglioli, 1883
Bythites Reinhardt, 1835
Calamopteryx Böhlke and Cohen, 1966
Cataetyx Günther, 1887
Diplacanthopoma Günther, 1887
Eutyx Heller and Snodgrass, 1903 (junior synonym of ***Grammonus***)
Grammonoides Smith, 1934 (here treated as a junior synonym of ***Grammonus***)
Grammonus Gill in Goode and Bean, 1896
Hastatobythites Machida, 1997
Hephthocara Alcock, 1892b
Microbrotula Gosline, 1953
Myxocephalus Steindachner and Doderlein, 1887 (junior synonym of ***Diplacanthopoma***)
Oculospinus Koefoed, 1927 (junior synonym of ***Cataetyx***)
Oligopus Risso, 1810 (incorrectly used in Bythitidae as senior synonym of ***Grammonus***)
Propteridium Arambourg, 1967 (Oligocene fossil, apparently valid; not included in key)
Pseudonus Garman, 1899
Saccogaster Alcock, 1889
Stygnobrotula Böhlke, 1952
Thalassobathia Cohen, 1963
Xenobythites Smith and Radcliffe in Radcliffe, 1913 (junior synonym of ***Bellottia***)

Bellottia Giglioli, 1883

Type species: ***Bellottia apoda*** Giglioli, 1883 by monotypy.

Synonyms: ***Xenobythites*** Smith and Radcliffe in Radcliffe, 1913. Type species ***Xenobythites armiger*** Smith and Radcliffe in Radcliffe, 1913.

Number of recognized species: 2.

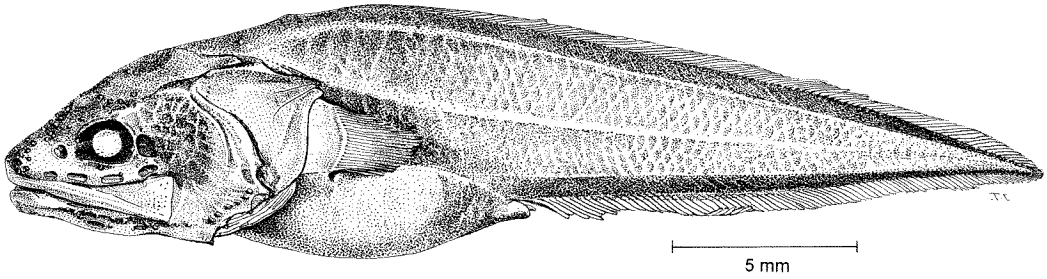

Fig. 96 ***Bellottia apoda*** (from Nielsen and Cohen, 1968)

Diagnosis and description: Body short, depth at anus 26.2 to 31.2% of standard length; **several sharp spines present at lower angle of preopercle**, a single spine near upper angle of opercle; palatine teeth present; developed rakers on first arch 3 to 6; pectoral-fin rays 22 to 25; **pelvic fins absent**; precaudal vertebrae 10 to 12.

Revisions: None.

Geographical distribution: Subtropical eastern and western North Atlantic, Mediterranean, off the Galapagos Archipelago and off the Philippines.

Habitat and biology: Mostly caught with bottom trawls fishing between 30 m and 527 m. Two specimens have been caught in midwater trawls: the first by a closing net fishing at 990 to 1 010 m, the other by an open net fishing from 0 to 1 000 m.

Interest to fisheries: None.

Size: At least 71 mm.

Key to species: Additional research required.

List of nominal species

Bellottia apoda Giglioli, 1883. Mediterranean and subtropical eastern Atlantic. Specimens from subtropical western Atlantic may also be this species. Uncommon.

B. armiger (Smith and Radcliffe in Radcliffe, 1913). The Philippines. Rare.

Remarks: The 2 pelagic specimens mentioned above, 1 from off Portugal, the other from the Galapagos Islands, may represent 1 or more undescribed species.

Bythites Reinhardt, 1835

Type species: ***Bythites fuscus*** Reinhardt, 1837 by monotypy.

Synonyms: None.

Number of recognized species: 4.

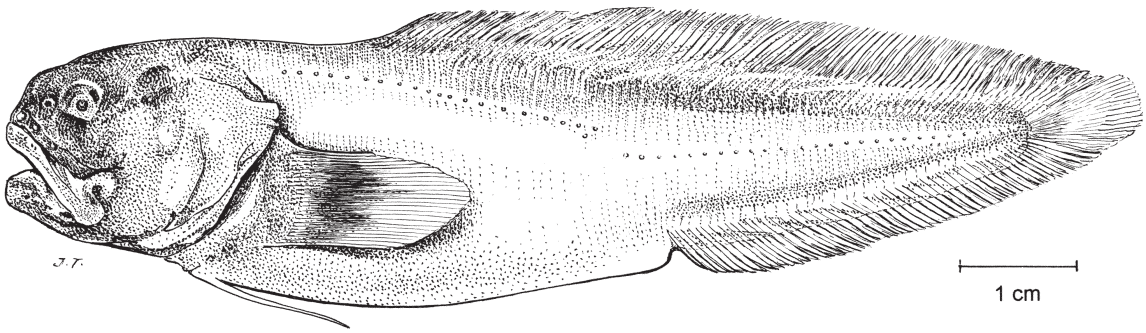

Fig. 97 ***Bythites islandicus*** (from Nielsen and Cohen, 1973)

Diagnosis and description: Body short with blunt snout, caudal fin not attenuate; **body with scales**, **head without scales**, mouth terminal, **upper jaw ends well behind eye**; snout longer than eye diameter; **opercular spine strong**; **palatines with teeth**; developed rakers on anterior gill arch 0 to 3; male with stalked intromittent organ; pectoral-fin rays 22 to 37; **pectoral-fin peduncle not prolonged; pelvic-fin rays 1** in each fin; precaudal vertebrae 14 to 20.

Revisions: Nielsen and Cohen (1973), Cohen et al. (1990).

Geographical distribution: Greenland, Iceland, Straits of Florida and off the Galapagos Archipelago.

Habitat and biology: Benthopelagic at 100 to 2 500 m.

Interest to fisheries: None.

Size: At least 304 mm.

Key to species

1a. Pectoral-fin rays 37; dorsal-fin rays 122; total vertebrae 76 . . . . . ***B. hollisi***

1b. Pectoral-fin rays 22 to 30; dorsal-fin rays 75 to 88; total vertebrae 40 to 53 . . . . . → ***2***

2a. Lower jaw with 5 pairs of large pores . . . . . ***B. gerdae***

2b. Lower jaw with 2 pairs of large pores . . . . . → ***3***

3a. Dorsal-fin rays 88; anal-fin rays 70 . . . . . ***B. fuscus***

3b. Dorsal-fin rays 76 to 79; anal-fin rays 46 to 50 . . . . . ***B. islandicus***

List of species

Bythites fuscus Reinhardt, 1837. West Greenland from “great depths”. Rare.

B. gerdae Nielsen and Cohen, 1973. Straits of Florida at 86 to 832 m. Rare.

B. hollisi Cohen et al, 1990. Galapagos Rift Zone at 2 500 m. Living in thermal vent effluent. Rare.

B. islandicus Nielsen and Cohen, 1973. Off southeastern Iceland at 223 to 285 m. Rare.

Remarks: As all ***Bythites*** spp. are rare both inter- and intraspecific variation is poorly known and the genus may be paraphyletic (Cohen et al. 1990). In the latter paper the genus ***Abythites*** was considered a junior synonym of ***Bythites*** but we here place it in the synonymy of the genus ***Cataetyx*** due to the shape of the snout and the naked head.

Calamopteryx Böhlke and Cohen, 1966

Type species: ***Calamopteryx goslinei*** Böhlke and Cohen, 1966 by original designation.

Synonyms: None.

Number of recognized species: 3.

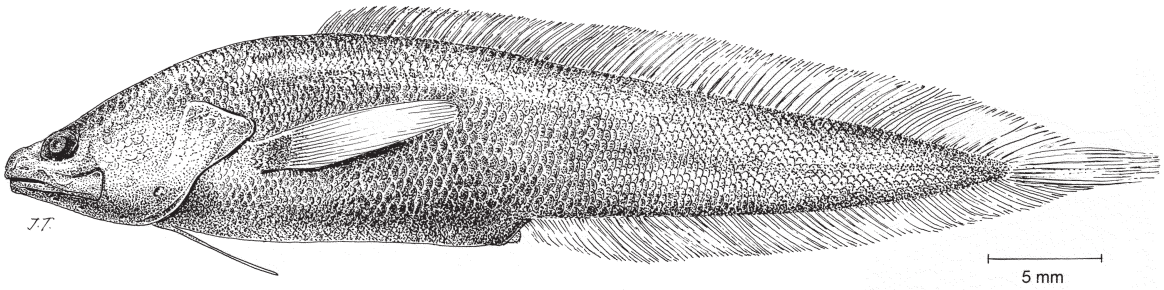

Fig. 98 ***Calamopteryx goslinei*** (from Nielsen et al., 1968)

Diagnosis and description: Preopercle with a curved spine at the lower angle; opercular spine flattened and flap-like; **scales present on body and head**; branchiostegal rays 7; palatine teeth present; developed rakers on first gill arch 2 or 3; **pectoral fins supported by an elongated peduncle that contains elongated pectoral radials**; pectoral-fin rays 13 to 19; precaudal vertebrae 10 or 11.

Revisions: Cohen (1973).

Geographical distribution: Tropical western North Atlantic and Galapagos Archipelago.

Habitat and biology: Intertidal to 210 m.

Interest to fisheries: None.

Size: At least 58 mm.

Key to species

1a. Papillae on head small and sparse; caudal-fin rays 8; preanal length 1.6 to 1.7 in standard length . . . . . ***C. robinsorum***

1b. Papillae on head prominent; caudal-fin rays 10; preanal length 1.8 to 2 in standard length . . . . . → ***2***

2a. Anal-fin rays 46 to 50; eye 7.7 to 10.9 in head length . . . . . ***C. jeb***

2b. Anal-fin rays 51 to 57; eye 6.1 to 7.6 in head length . . . . . ***C. goslinei***

List of species

Calamopteryx goslinei Böhlke and Cohen, 1966. Coral reefs in the tropical western North Atlantic to 55 m. Uncommon.

C. jeb Cohen, 1973. Rocky areas and reefs in the Galapagos Archipelago to 25 m. Uncommon.

C. robinsorum Cohen, 1973. Most specimens trawled in the tropical western North Atlantic at depths of 64 to 210 m. Rare.

Cataetyx Günther, 1887

Type species: ***Sirembo messieri*** Günther, 1887 by monotypy.

Synonyms: ***Oculospinus*** Koefoed, 1927, type species ***Oculospinus brevis*** Koefoed, 1927; ***Abythites*** Nielsen and Cohen, 1973, type species ***Bythites lepidogenys*** Smith and Radcliffe in Radcliffe, 1913.

Number of recognized species: 11.

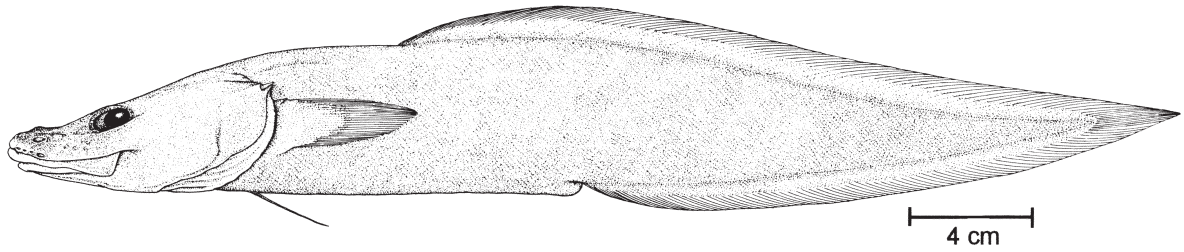

Fig. 99 ***Cataetyx chthamalorhynchus*** (from Cohen, 1981)

Diagnosis and description: Scales present on body and head; eye diameter less than snout length; prominent opercular spine present; **lateral ethmoid bone variously developed in front of or below eye, ranging from a sharp, retrorse, emergent spine to a buried cartilaginous knob; palatine teeth present**; developed rakers on first arch 3; **male intromittent organ on a broad, fleshy pad or stalk**; pelvic fins with 1 short ray in each; pectoral-fin rays 22 to 32; caudal-fin rays 8 to 11; precaudal vertebrae 13 to 18.

Revisions: Meyer-Rochow (1970), but see Cohen (1981) for comments.

Geographical distribution: Circumglobal in temperate to tropical seas.

Habitat and biology: Bottom trawled on continental slopes; however, the young of ***Cataetyx rubrirostris*** are taken from the mesopelagic off the Pacific coast of the U.S. at closing net depths of 300 to 900 m (Gibbs, 1991; Ambrose, 1996).

Interest to fisheries: None.

Size: The largest known species, ***C. laticeps***, reaches at least 765 mm; however, other species, for example ***C. alleni, C. messieri*** and ***C. rubrirostris*** mature at sizes of 250 mm or less.

Key to species

1a. Some or all jaw teeth separate and sharp-pointed (but granular in the small species ***C. lepidogenys***); adults small (to about 250 mm) and usually pale, with a less depressed snout . . . . . → ***2***

1b. Jaw teeth granular (but in ***C. platyrhynchus*** inner teeth on lower jaw somewhat enlarged); adults large (to 765 mm), usually dark brown with a moderately to strongly depressed snout . . . . . → ***7***

2a. Dorsal-fin rays 75 to 89; anal-fin rays 49 to 70; vertebrae 45 to 49 . . . . . → ***3***

2b. Dorsal-fin rays 109 to 121; anal-fin rays 76 to 93; vertebrae 56 to 65 . . . . . → ***4***

3a. Dorsal-fin rays 89; anal-fin rays 70; vertebrae 49 . . . . . ***C. hawaiiensis***

3b. Dorsal-fin rays 75 to 81; anal-fin rays 49 to 56; vertebrae 44 or 45 . . . . . ***C. lepidogenys***

4a. Pectoral-fin rays 30 to 32 . . . . . ***C. alleni***

4b. Pectoral-fin rays 25 to 28 . . . . . → ***5***

5a. Dorsal-fin rays 114 to 121; anal-fin rays 86 to 93 . . . . . ***C. bruuni***

5b. Dorsal-fin rays 100 to 116; anal-fin rays 76 to 86 . . . . . → ***6***

6a. Vertebrae 62 to 64; snout 3.5 to 4.2 in head length; no sharp retrorse suborbital spine . . . . . ***C. messieri***

6b. Vertebrae 59 to 63; snout 5 in head length; sharp retrorse suborbital spine present . . . . . ***C. rubrirostris***

7a. Dorsal-fin rays 139; anal-fin rays 100; vertebrae 77; snout 3 in head length . . . . . ***C. chthamalorhynchus***

7b. Dorsal-fin rays 84 to 107; anal-fin rays 57 to 83; vertebrae 56 to 63; snout 4.2 to 5 in head length . . . . . → ***8***

8a. Dorsal-fin rays 84; anal-fin rays 57 . . . . . ***C. platyrhynchus***

8b. Dorsal-fin rays 93 to 107; anal-fin rays 69 to 83 . . . . . → ***9***

9a. Eyes directed more laterally than dorsally; body depth at anus 5.1 to 5.6 in standard length . . . . . ***C. niki***

9b. Eyes directed more dorsally than laterally; body depth at anus 6.3 to 8.8 in standard length . . . . . ***C. simus, C. laticeps***

List of nominal species

Cataetyx alleni (Byrne, 1906). Temperate eastern North Atlantic and western Mediterranean at depths from 480 to 1 000 m. Feeding in Mediterranean on polychaetes and benthic crustaceans (Carrasson and Matallanas, 1990). Locally abundant.

C. brevis (Koefoed, 1927) (junior synonym of ***C. alleni***).

C. bruuni (Nielsen and Nybelin, 1963). Tropical eastern Atlantic on the lower shelf and upper slope; caught in bottom trawls. Rare.

C. chthamalorhynchus Cohen, 1981. Temperate eastern South Atlantic; caught in a bottom trawl at 1 000 m. Rare.

C. hawaiiensis Gosline, 1954. Collected at surface after 1950 Mauna Loa, Hawaii lava flow into sea. Rare.

C. laticeps Koefoed, 1927 (possibly a junior synonym of ***C. simus***). Temperate and subtropical North Atlantic, Mediterranean and eastern South Atlantic. Benthic or benthopelagic at depths ranging from 500 to 2 400 m. Uncommon.

C. leucos (Osorio, 1917) (possibly a junior synonym of ***C. alleni***).

C. lepidogenys (Smith and Radcliffe in Radcliffe, 1913). The Philippines and Japan. Bottom trawled from the lower shelf and upper slope. Rare.

C. matsubarai (Arai, 1969) (junior synonym of ***C. lepidogenys***).

C. memoriabilis Meyer-Rochow, 1970 (junior synonym of ***C. laticeps***).

C. messieri (Günther, 1887). Off southern South America in both Atlantic and Pacific oceans. Incorrectly recorded from South Africa and New Zealand. Uncommon.

C. niki Cohen, 1981. Off southern coast of South Africa. Also recorded from Australia. Taken in a bottom trawl at 1 000 to 1 100 m. Rare.

C. platyrhynchus Machida, 1984. Okinawa Trough. Trawled at 910 to 990 m. Rare.

C. rubrirostris Gilbert, 1890. Northern Oregon coast to Pacific coast of Baja California and Gulf of California. Juveniles are mesopelagic, larger specimens apparently live on the bottom at depths of 600 to 1 000 m. Locally abundant. Specimens from the Gulf of Panama and Chile may be this species or an undescribed one.

C. simus Garman, 1899 (possibly a senior synonym of ***C. laticeps***). Gulf of Panama to Peru. Benthopelagic or benthic at 1 200 m. Rare.

Remarks: ***Cataetyx*** needs revision. In addition to the taxonomic problems noted above, several species remain to be described. Also, it may be necessary to recognize 2 genera, 1 for the larger dark coloured species, another for the smaller light coloured ones, although the type species of the genus, ***C. messieri*** is somewhat intermediate. ***C. lepidogenys***, which was first described in the genus ***Bythites***, was latter made the type species of the genus ***Abythites***. It is here included in ***Cataetyx*** on a provisional basis.