

Coryphaenoides Gunnerus, 1765**MACROUR** Cory

Genus with Reference : *Coryphaenoides* Gunnerus, 1765, K.NorskeVidensk.-Selsk.Skrif. Trondh., 3(4):50 (type species *Coryphaenoides rupestris* Gunnerus, 1765, by monotypy).

Synonyms : *Moseleya* Goode & Bean, 1896:417 (type species *Coryphaenoides longifilis* Günther, 1877, by original designation); *Bogoslovius* Jordan & Evermann, 1898:2570 (type species *Bogoslovius clarki* Jordan & Evermann, 1898, by original designation); *Dolloa* Jordan, 1900:897 (substitute for *Moseleya* Goode & Bean, 1896, preoccupied); *Ateleobranchium* Gilbert & Burke, 1912:94 (type species *Ateleobranchium pterotum* by original designation); *Hemimacurus* Fraser-Brunner, 1935:322 (type species *Macurus acrolepis* Bean, 1883, by original designation); *Cariburus* Parr, 1946:57 (type species *Macurus zaniophorus* Vaillant, 1888, by original designation).

Diagnostic Features : Macrourines with 6 branchiostegal rays. Anus immediately before anal fin origin. Barbel present; dentition variable among species, from broad bands to 1 or 2 rows, but teeth never few and fang-like; snout moderately pointed to bluntly rounded, never greatly prolonged; outer gill slit usually greatly restricted; rakers on outer series of first arch often few and rudimentary. First dorsal fin with a serrated spinous ray (teeth sometimes rudimentary or mostly lost); pelvic fin rays 7 to 14. Precaudal vertebrae 11 to 16. Retia mirabilia and gas glands 4 to 7; retia usually slender and elongated. Pyloric caeca usually fewer than 20, stub-like to elongate.

Habitat Distribution and Biology : Worldwide in tropical to polar seas. Benthopelagic in about 300 to 6 100 m depth, but most species found between 700 and 2 000 m depth.

Size : To more than 120 cm, but most species less than 60 cm.

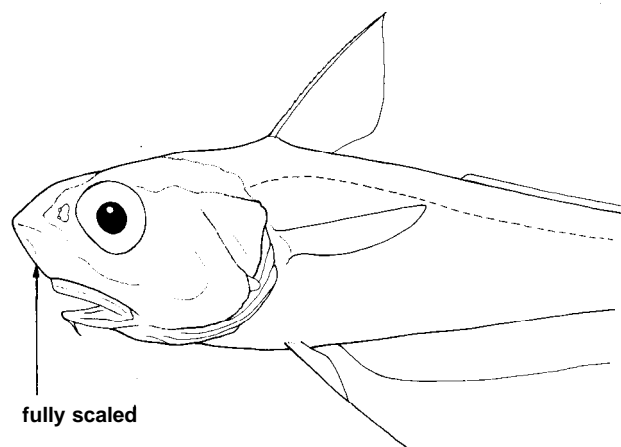
Interest to Fisheries : This genus includes some of the largest and commercially most important species of macrourids. The roundnose grenadier, *Coryphaenoides ruspestris*, of the North Atlantic is by far the most valuable macrourid for the fishing industry. As much as 80 000 t/year of the fish were harvested in the early 1970's, mostly off New Foundland, Labrador and Iceland. In more recent years, the catch has been under 50 000 t and catch quotas have been instituted to prevent overexploitation. The wide-ranging Pacific grenadier, *Coryphaenoides acrolepis* forms a small local fishery in the North Pacific off northern California and is being investigated for its potential in other areas. Other species are taken as incidental catch, and as such, are sometimes used for industrial purposes. Most species are found too deep and in too small a quantity to be of interest to fisheries.

Literature : Okamura (1970a); Marshall (1973); Iwamoto & Stein (1974).

Remarks : Relationships within this large diverse genus have not been adequately worked out, and the subgeneric categories should be considered as tentative. *Nematonurus*, *Chalinura* and *Lionurus* are treated as subgenera because of the author's inability to characterize each in a satisfactory manner. The species listed under the three subgenera probably constitute natural groups, but whether or not they deserve full generic ranking is debatable. Others may choose to treat them as distinct genera. The subgenus *Coryphaenoides* as defined here is undoubtedly paraphyletic, and more detailed analyses of characters are necessary to understand relationships among the more than 44 species in that group.

Key to species :

- 1a. Upper jaw extends to posterior 1/3 of orbits or beyond
- 2a. Inner gill rakers on first arch 17 to 20 (total)
- 3a. Underside of head fully scaled; head large, broadly rounded; interorbital space 33 to 40% of head length; inner gill rakers on first arch 19 or 20 (total); outer gill slit 11 to 15% of head length**C. rupestris** (Fig. 412)



C. rupestris
(after Parr, 1946)

Fig. 412

3b. Underside of head mostly naked; head compressed, angular; interorbital space 21 to 25% of head length; inner gill rakers on first arch 17 to 19 (total); outer gill slit 21 to 27% of head length **C. subserrulatus** (Fig. 413)

2b. Inner gill rakers on first arch 9 to 16 (total)

4a. Outer pelvic fin rays greatly prolonged, greater than head length; scale rows below origin of second dorsal fin 12 to 15; barbel rudimentary, 2 to 4% of head length; first dorsal fin with 2 spines and 12 to 14 rays; inner gill rakers on first arch 14 to 16 (total); premaxillary teeth in 2 distinct rows, mandibular teeth in 1 row **C. longifilis** (Fig. 414)

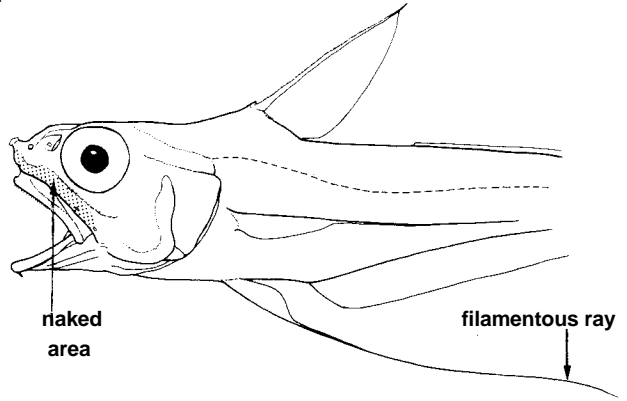
4b. Outer pelvic fin ray less than 1.5 times head length; scale rows below origin of second dorsal fin 4.5 to 10; barbel rudimentary to well developed, 0 to 37% of head length; first dorsal fin with 2 spines and 7 to 13 (rarely 14) rays; inner gill rakers on first arch 8 to 16 (total); premaxillary teeth in 1 row to a broad band, mandibular teeth in 1 row to a narrow band

5a. Mandibular teeth in 1 distinct row*

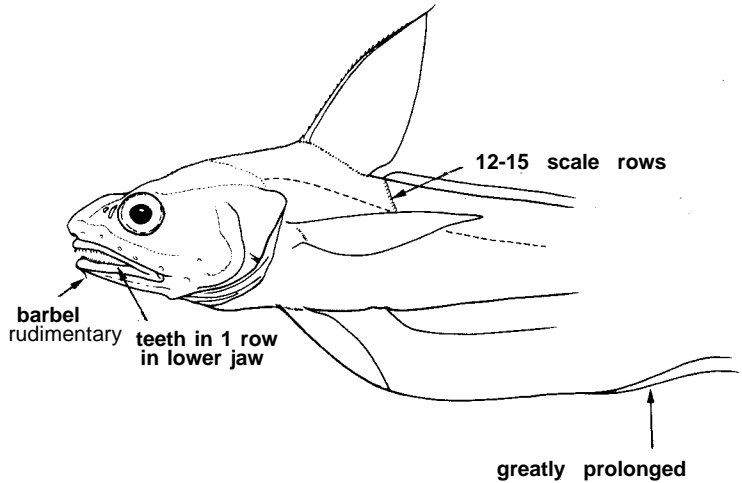
6a. Orbit diameter 30 to 38% of head length ... **C. serrulatus** (Fig. 415)

6b. Orbit diameter less than 30% of head length

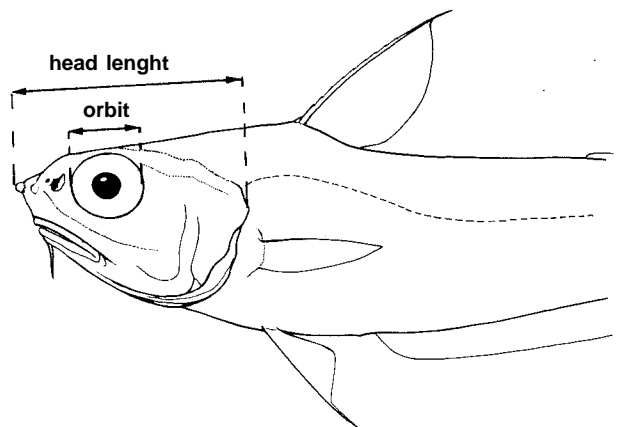
7a. Underside of snout almost entirely scaled



C. subserrulatus
(after Iwamoto, in Smilth & Heemstra, 1986) **Fig. 413**



C. longifilis **Fig. 414**
(after Jordan & Gilbert, 1899)



C. serrulatus **Fig. 415**
(after Günther, 1887)

* **C. bulbiceps, C. paradoxus, C. rudis, C. thelostomus, C. carapinus** have mandibular teeth in either 1 or 2 irregular rows

8a. One distinct row of small premaxillary teeth *C. bulbiceps* (Fig. 416)

8b. Two or more rows to a broad band of premaxillary teeth

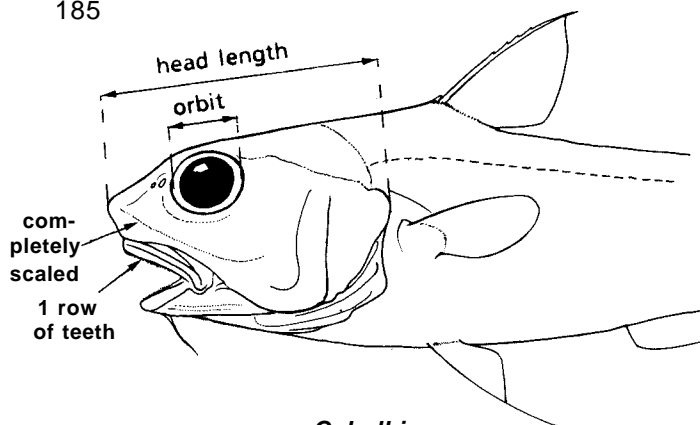
9a. Pelvic fins with 8 rays; barbel long, 30 to 33% of head length; orbits small, their diameter 15 to 16% of head length *C. thelostomus* (Fig. 417)

9b. Pelvic fins with 9 to 12 rays; barbel 8 to 23% of head length; orbits 15 to 28% of head length

10a. Inner gill rakers on first arch 12 to 14 (rarely 11); outer gill slit 18 to 22% of head length

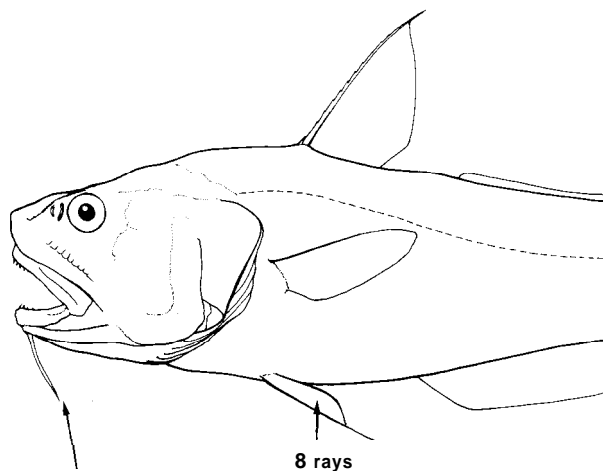
11a. Premaxillary teeth in a broad band; orbits 20 to 21% of head length; barbel 18 to 25% of head length *C. striatus* (Fig. 418)

11b. Premaxillary teeth in 2 rows; orbit diameter 22 to 28% of head length; barbel 8 to 14% of head length *C. lecointei* (Fig. 419)



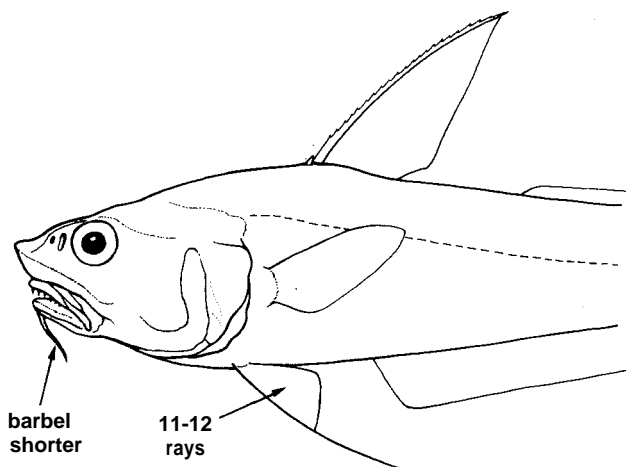
C. bulbiceps
(after Garman, 1899)

Fig. 416



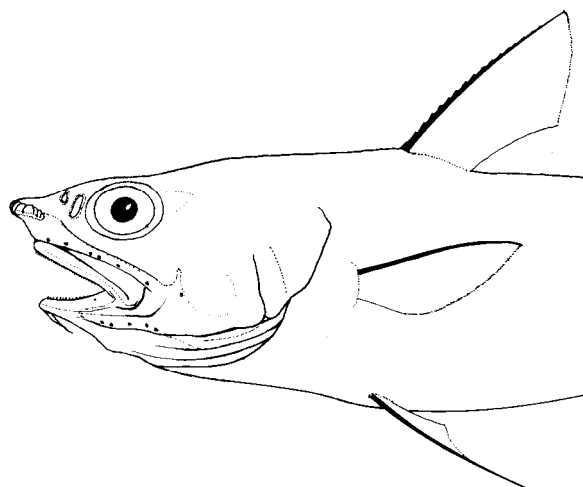
C. thelostomus
(after Maul, 1951)

Fig. 417



C. striatus
(after Smith, 1949)

Fig. 418



C. lecointei
(after Dollo, 1904)

Fig. 419

15a. Pelvic fins with 12 to 14 rays; inner gill rakers of first arch 15 or 16 (total) **C. mediterraneus** (Fig. 425)

15b. Pelvic fins with 8 to 11 rays; inner gill rakers of first arch 9 to 16 (total)

16a. Barbel long, 25 to 26% of head length; interorbital space broad, 28 to 34% of head length **C. murrayi** (Fig. 426)

16b. Barbel short to moderate, 5 to 23% of head length; interorbital space narrow to broad, 22 to 35% of head length

17a. Snout blunt, scarcely protruding beyond mouth; premaxillary teeth in a broad band

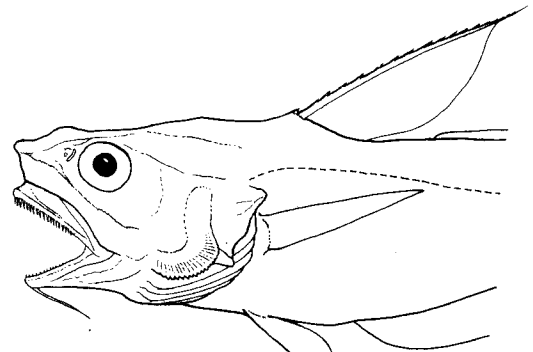
18a. Barbel 16 to 23% of head length **C. leptolepis*** (Fig. 427)

C. liocephalus* (Fig. 428)

18b. Barbel 5 to 18% of head length

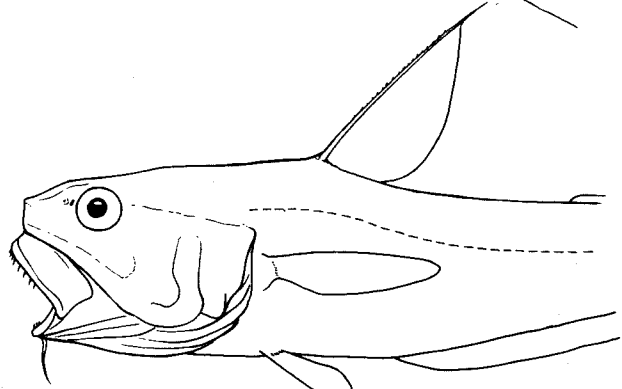
19a. Pelvic fins with 8 or 9 rays; interorbital space 32 to 35% of head length; barbel 9 to 12% of head length ... **C. brevibarbis** (Fig. 429)

19b. Pelvic fin with 8 to 11 rays; interorbital space about 22 to 33% of head length; barbel 5 to 18% of head length



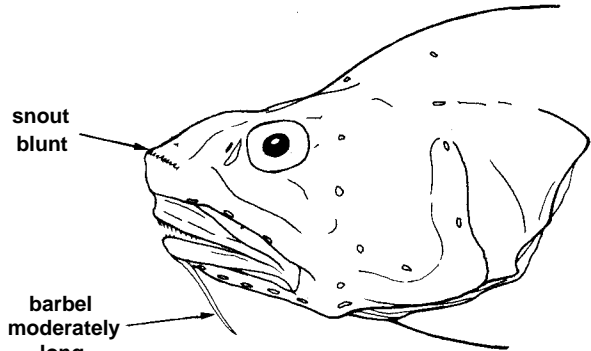
C. mediterraneus
(after Marshall, 1973)

Fig. 425



C. murrayi

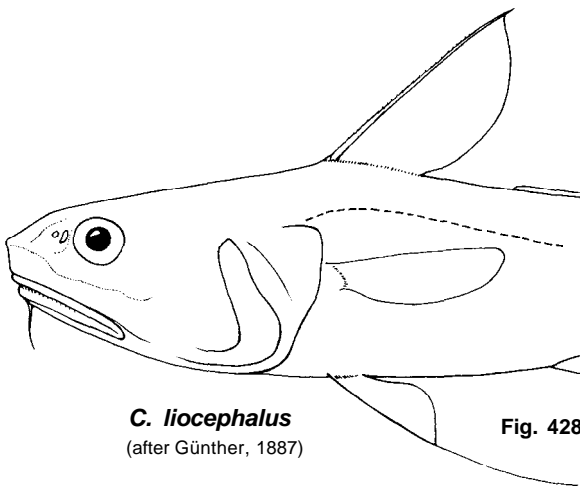
Fig. 426



C. leptolepis

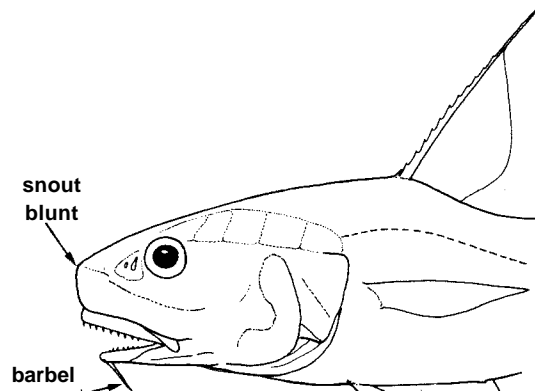
(after Iwamoto & Stem, 1974)

Fig. 427



C. liocephalus
(after Günther, 1887)

Fig. 428



C. brevibarbis

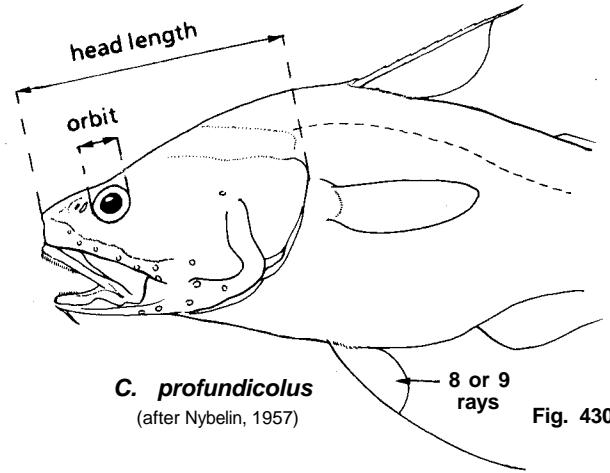
(after Marshall, 1973)

8 or 9 rays

Fig. 429

* The author is unable to differentiate these two species

20a. Pelvic fins with 8 or 9 rays; first dorsal fin with 2 spines and 7 or 8 rays; barbel 5 to 9% of head length; orbit diameter 12 to 18% of head length ... **C. profundicolus** (Fig. 430)

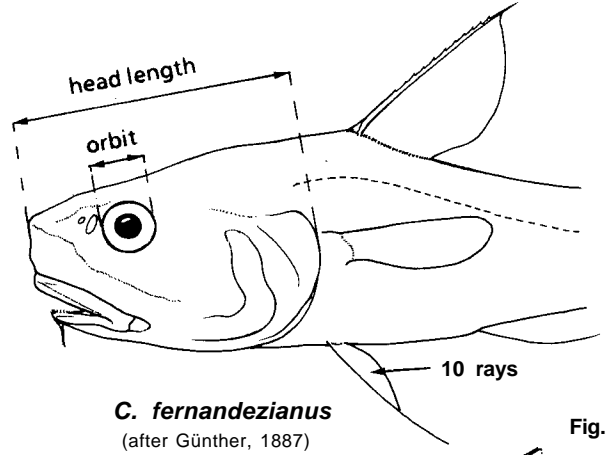


C. profundicolus (after Nybelin, 1957) Fig. 430

20b. Pelvic fins with 9 to 11 rays; first dorsal fin with 2 spines and 7 to 10 rays; barbel about 10 to 17% of head length; orbit diameter about 17 to 20% of head length

21a. First dorsal fin with 2 spines and 7 rays; interorbital space about 30% of head length... **C. fernandezianus** (Fig. 431)

21b First dorsal fin with 2 spines and 8 to 10 rays; interorbital space about 22 to 25% of head length **C. leptolepis*** (Fig. 427)
C. liocephalus* (Fig. 428)

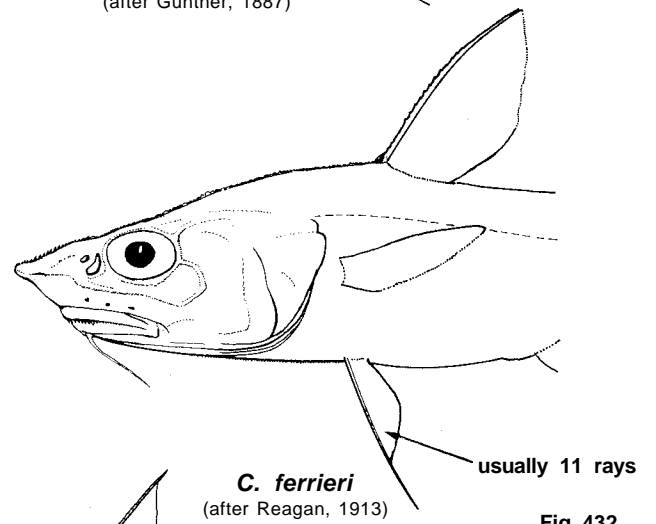


C. fernandezianus (after Günther, 1887) Fig. 431

17b. Snout pointed; premaxillary teeth in a narrow band

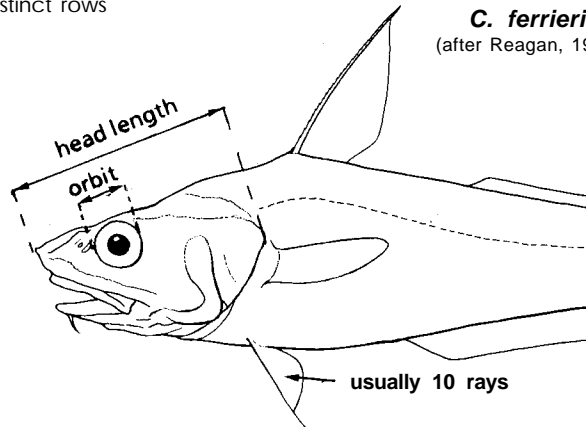
22a. Pelvic fin rays usually 11; inner gill rakers on first arch 9 to 12 (total); upper jaw 34 to 36% of head length; snout 30 to 33% of head length; outer gill slit 15 to 19% of head length **C. ferrieri** (Fig. 432)

22b. Pelvic fin rays usually 10; inner gill rakers on first arch 11 or 12; upper jaw 39 to 40% of head length; snout 26 to 30% of head length **C. yaquinae** (Fig. 433)



C. ferrieri (after Reagan, 1913) Fig. 432

12b. Premaxillary teeth in 1 or 2 distinct rows



C. yaquinae Fig. 433

* The author is unable to differentiate these two species

23a. Premaxillary teeth in 1 or 2 rows; jaw teeth short, conical, slightly flanged near tips, giving a bluntly arrowhead-like tip; outer gill slit 12 to 18% of head length ***C. armatus*** (Fig. 434)

23b. Premaxillary teeth in 2, sometimes irregular rows; jaw teeth slender, sharp, and without an arrowhead-like tip; outer gill slit 18 to 25% of head length

24a. Orbit diameter 19 to 21% of head length; snout 26 to 30% of head length ***C. yaquinae*** (Fig.433)

24b. Orbit diameter about 25% of head length; snout about 25% of head length ***C. affinis*** (Fig. 435)

5b. Mandibular teeth in 2 rows to a broad band

25a. Underside of snout variously naked

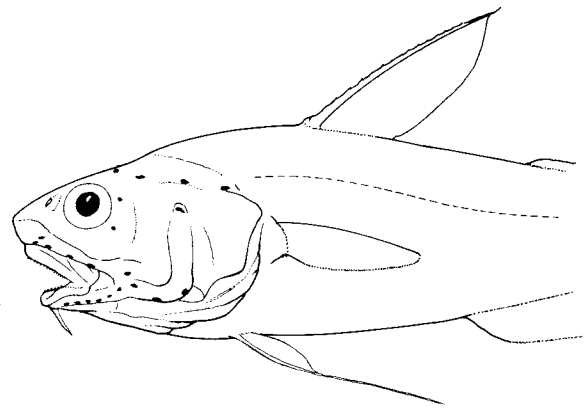
26a. No barbel visible; pelvic fin rays 8; first dorsal fin rays with 2 spines and 8 rays ***C. sibogae****

26b. Barbel rudimentary to long; pelvic fin rays 7 to 11; first dorsal fin with 8 to 12 rays (rarely 14 rays)

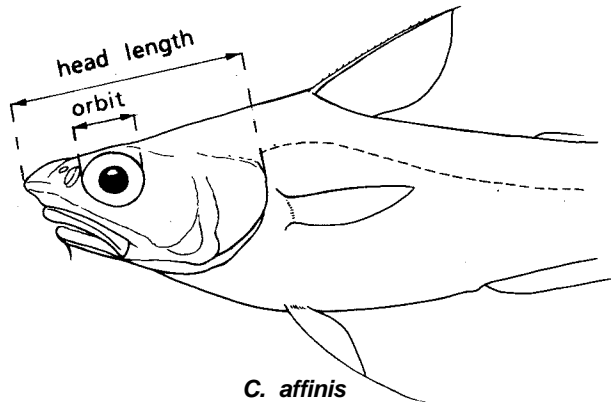
27a. Pelvic fin rays 7 or 8 (rarely 9); barbel 11 to 19% of head length; numerous stout, deeply embedded scales form a firm sub-orbital shelf and leading horizontal snout edges

28a. Pelvic fin rays 7; scales with small, fine spinules in parallel rows; pyloric caeca 14 or 15 ***C. hextii*** (Fig. 436)

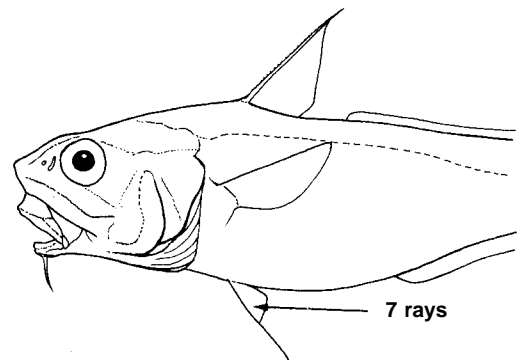
28a. Pelvic fin rays 8 (rarely 9); scales with rather strong spinules in 3 to 5 divergent rows; pyloric caeca 11 to 14 ***C. acrolepis*** (Fig. 437)



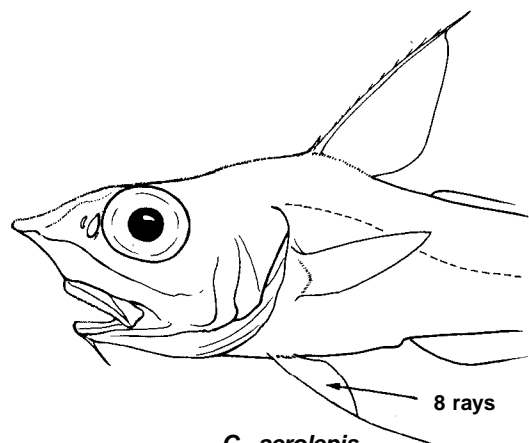
C. armatus Fig. 434



C. affinis (after Günther, 1887) Fig. 435



C. hextii (after Alcock, 1899) Fig. 436



C. acrolepis (after Jordan & Gilbert, 1899) Fig. 437

* Species described from a small, immature, mutilated specimen and never illustrated

27b. Pelvic fin rays 9 to 11 (rarely 8 in *C. cinereus*); barbel 3 to 15% of head length; suborbital and leading edges of snout variously naked to moderately coarsely armed with scute-like scales

29a. Orbit diameter 23% of head length or less; snout rather strongly pointed, length 30 to 38% of head length

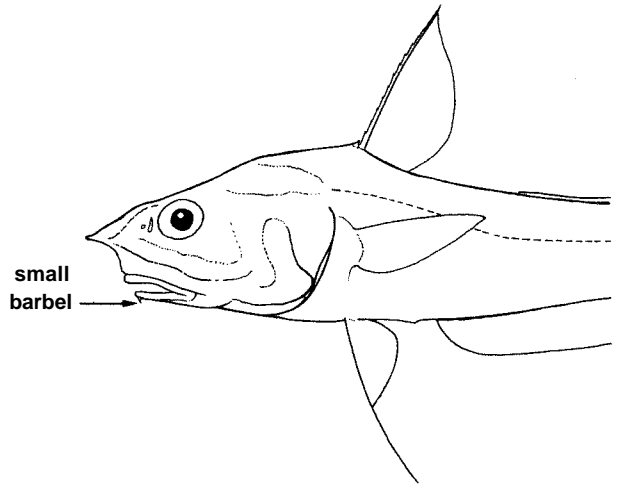
30a. Barbel rudimentary to about 3% of head length; first dorsal fin with 2 spines and 11 rays; orbit diameter 23% of head length, upper jaw 32% of head length *C. orthogrammus* (Fig. 438)

30b. Barbel rudimentary to moderately long, 4 to 15% of head length; first dorsal fin with 2 spines and 8 to 11 rays; orbit diameter 16 to 22% of head length; upper jaw 33 to 39% of head length

31a. Scales on suborbital form a coarse spiny shelf; scales fairly adherent, 6.5 to 8 below midbase of first dorsal fin; isthmus to anal fin distance 113 to 122% of head length; interorbital space 22 to 26% of head length *C. ferrieri* (Fig.432)

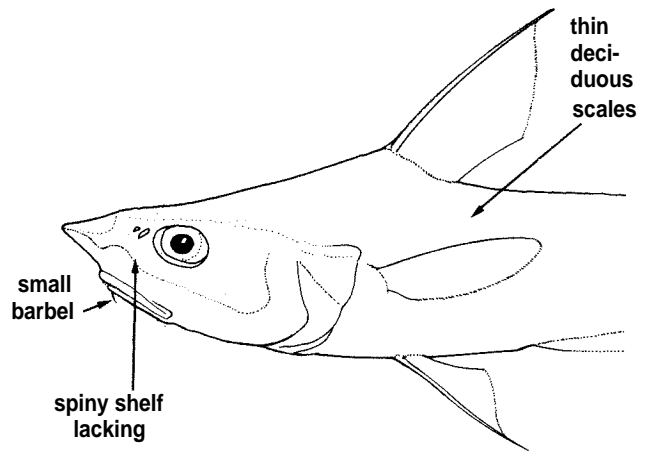
31b. Scales weak, deciduous, not forming a coarse spiny suborbital shelf; about 4 to 5.5 scales below midbase of first dorsal fin; distance from isthmus to anal fin 76 to 106% of head length; interorbital space 31 to 40% of head length

32a. Outer gill rakers on first arch rudimentary, 3 to 6 total, those on inner side 8 to 10 total; serrations obsolete on long spine of first dorsal fin; barbel 4 to 9% of head length; interorbital space 31 to 33% of head length *C. filicaudus* (Fig. 439)



C. orthogrammus
(after Radcliffe, 1912)

Fig. 438



C. filicaudus
(after Günther, 1887)

Fig. 439

32b. Outer gill rakers on first arch somewhat spatulate and tab-like, 6 to 11 total, those on inner side of arch 10 to 12 total; serrations on long spine of first dorsal fin well developed; barbel 8 to 14% of head length; interorbital space 34 to 40% of head length ***C. carapinus*** (Fig. 424)

29b. Orbit diameter moderate to large, 23 to 34% of head length; snout moderately pointed, length 25 to 32% of head length

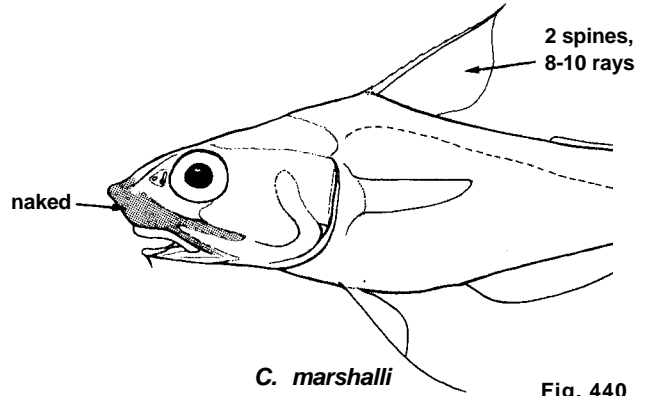
33a. First dorsal fin with 2 spines and 8 to 10 rays; inner gill rakers on first arch 9 to 11; upper jaw 30 to 35% of head length; almost entire dorsal and ventral surfaces of snout naked, except scutes at terminal and lateral angles; suborbital region broadly naked anteroventrally ***C. marshalli*** (Fig. 440)

33b. First dorsal fin with 2 spines and 8 to 12 (rarely 14) rays; inner gill rakers on first arch 11 to 14 total; upper jaws 35 to 41% of head length; snout ventrally mostly naked, dorsally naked only along leading edges; suborbital mostly scaled

34a. Body scales in adults with tridentate spinules; first dorsal fin with 2 spines and 8 to 10 (rarely 11) rays; length of outer gill slit 11 to 17% of head length ***C. delsolari*** (Fig. 441)

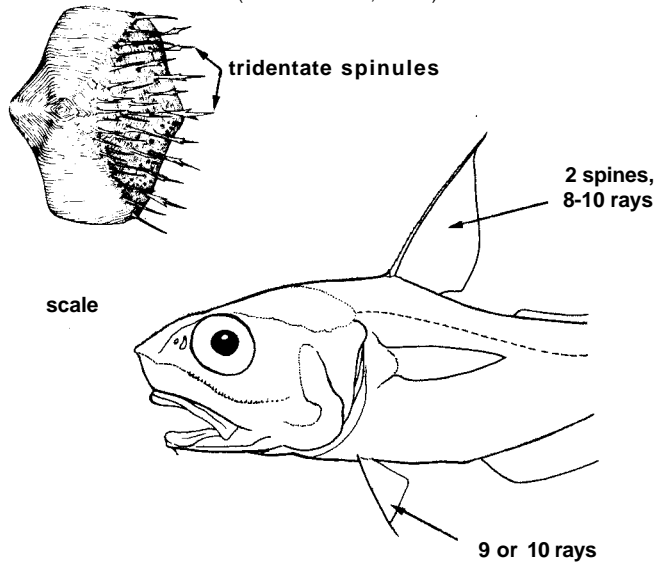
34b. Spinules on scales all conical, needle-like, without tridentate tips; first dorsal fin with 2 spines and 10 to 12 rays; length of outer gill slit 18 to 20% of head length

35a. Barbel 8 to 9% of head length; orbit diameter about 26 to 28% of head length ***C. filamentosus*** (Fig. 442)



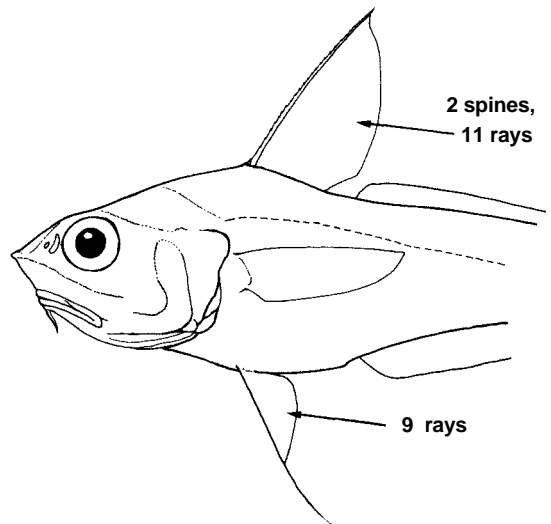
C. marshalli
(after Iwamoto, 1970)

Fig. 440



C. delsolari
(after Chirichigno & Iwamoto, 1977)

Fig. 441



C. filamentosus
(after Okamura, 1970)

Fig. 442

35b. Barbel 2 to 8% of head length; orbit diameter 27 to 34% of head length **C. cinereus** (Fig. 443)

25b. Underside of snout essentially completely scaled

36a. First dorsal fin with 2 spines and 8 rays; pelvic fin rays 8; barbel lacking **C. sibogae**

36b. First dorsal fin with 2 spines and 8 to 14 rays; pelvic fin rays 7 to 11; barbel rudimentary to well developed, 3 to 33% of head length

37a. Pelvic fin rays 7 or 8 (rarely 9)

38a. Premaxillary teeth small, in 1 distinct row **C. bulbiceps** (Fig.416)

38b. Premaxillary teeth in 2 rows to a broad band

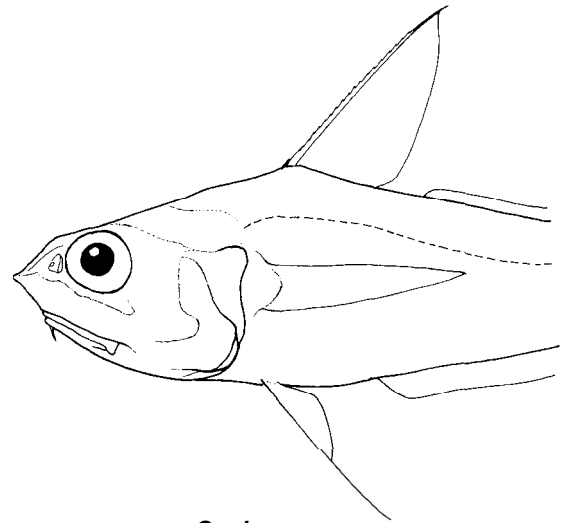
39a. Pelvic fin rays 7 **C. hextii** (Fig.436)

39a. Pelvic fin rays 8 (rarely 9)

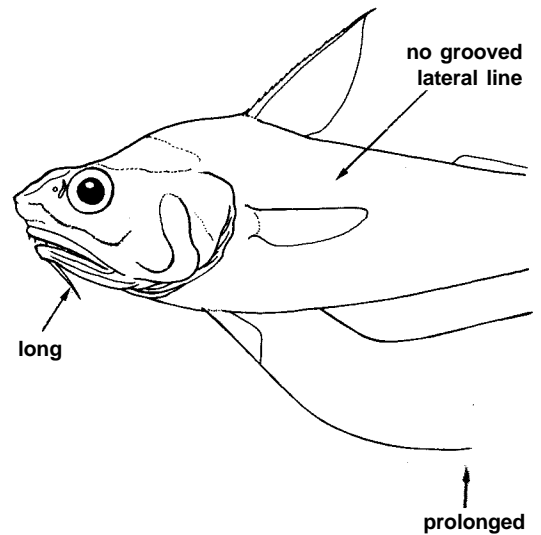
40a. Inner gill rakers on first arch 11 to 13; barbel 11 to 19% of head length; interorbital space 18 to 24% of head length; body scales with short conical spinules in 3 to 5 divergent rows **C. acrolepis** (Fig.437)

40b. Inner gill rakers on first arch 8 or 9; barbel 19 to 33% of head length; interorbital space 24 to 33% of head length; body scales with long, slender spinules in parallel to slightly convergent rows

41a. Barbel 19 to 25% of head length; orbits 23 to 27% of head length; upper jaw 31 to 33% of head length; no lateral-line groove **C. alateralis** (Fig. 444)



C. cinereus
(after Iwamoto & Stein, 1974) **Fig. 443**



C. alateralis
(after Marshall & Iwamoto, in Marshall, 1973) **Fig. 444**

41b. Barbel 30 to 33% of head length; orbit diameter 15 to 16% of head length; upper jaw 36 to 39% of head length; a distinct lateral-line groove present **C. theleostomus** (Fig.417)

37b. Pelvic fin rays 9 to 11*

42a. First dorsal fin with 2 spines and 12 or 13 (rarely 11 or 14) rays; inner gill rakers on first arch 12 to 14 total

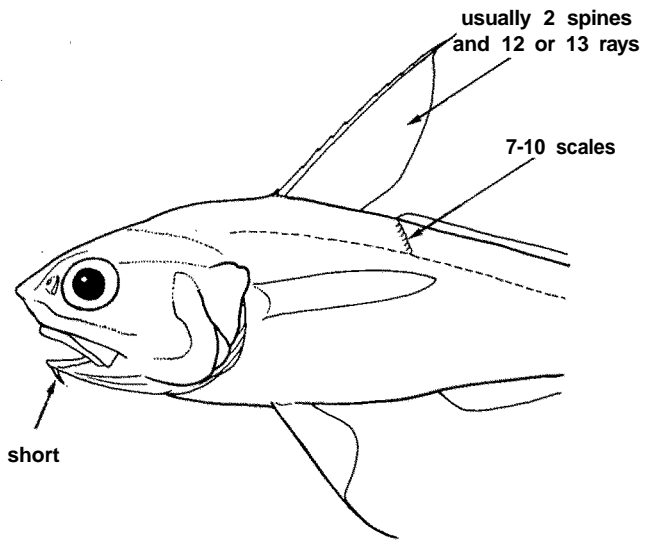
43a. Outer pelvic ray extends to beyond anus; scales below second dorsal fin origin 7 to 10 **C. filifer** (Fig. 445)

43b. Outer pelvic ray falls well short of anus; scales below second dorsal fin origin about 12 **C. altipinnis** (Fig.446)

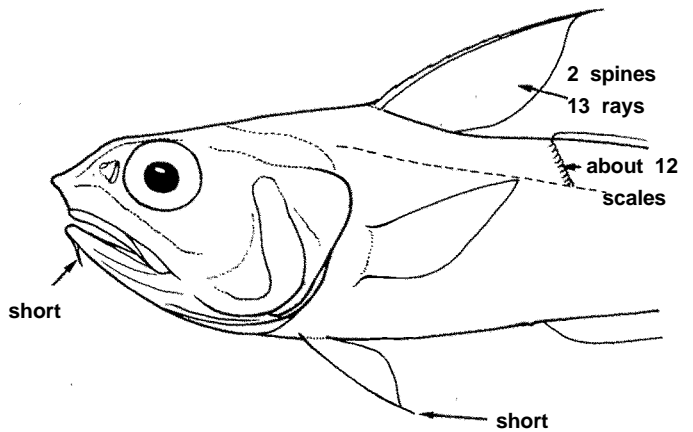
42b. First dorsal fin with 2 spines and 8 to 11 rays; inner gill rakers on first arch less than 12

44a. Scales small, about 14 or 15 below origin of first dorsal fin, about 12 below origin of second dorsal fin **C. camurus** (Fig. 447)

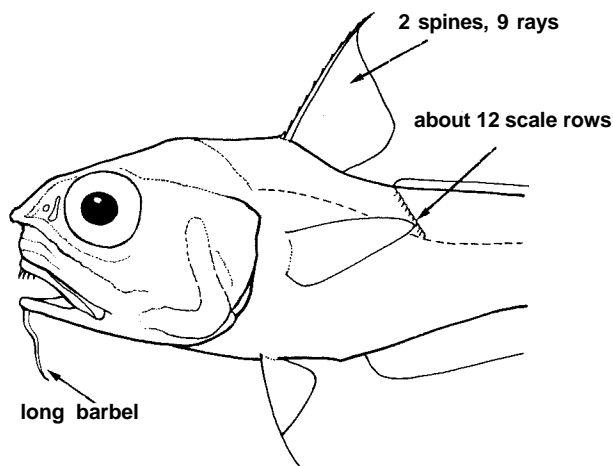
44b. Scales larger, about 8 to 10 below origin of first dorsal fin, 4.5 to 8 below origin of second dorsal fin



C. filifer Fig. 445
(after Iwamoto & Stein, 1974)



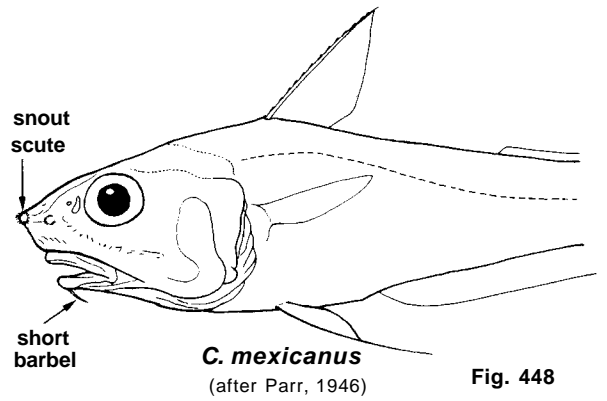
C. altipinnis Fig. 446
(after Günther, 1887)



C. camurus Fig. 447
(after Radcliffe, 1912)

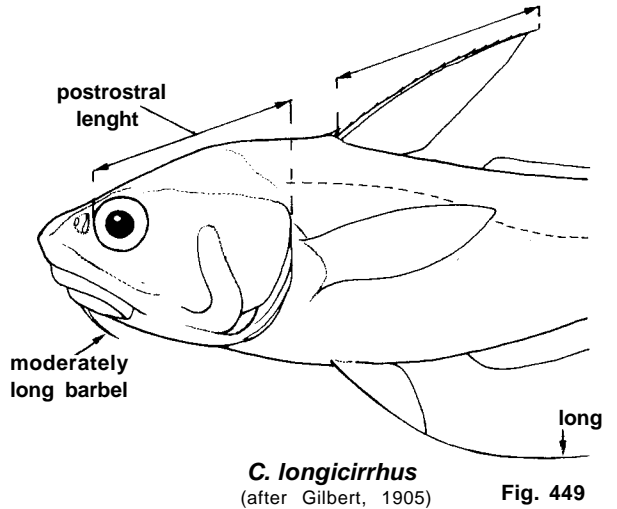
* The following species would key out here if 5b were chosen rather than 5a: **C. macrocephalus**, **C. paradoxus**, **C. rudis**

45a. Barbel small, 5 to 9% of head length; a large, stout terminal scute at snout tip; upper jaw extends posteriorly only to posterior 1/3 of orbit or less; orbit diameter 26 to 34% of head length *C. mexicanus* (Fig. 448)



45b. Barbel moderate to large, 10 to 20% of head length; terminal snout scute not especially large and stout; upper jaw extends to below posterior edge of orbits; orbit diameter 15 to 26% of head length

46a. Length of first dorsal fin greater than postrostral length of head; outer pelvic fin ray about 3/4 length of head or more *C. longicirrus* (Fig. 449)

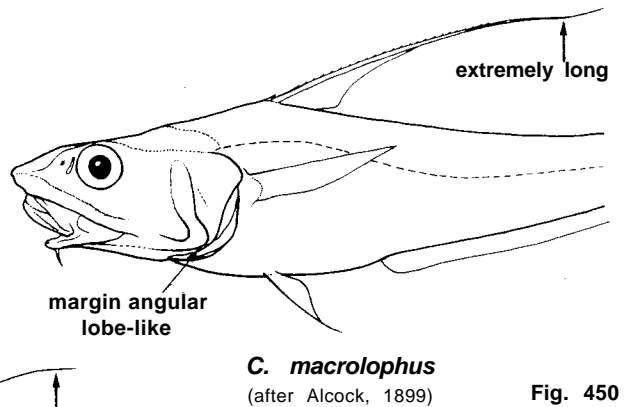


46b. Length of first dorsal fin less than postrostral length of head; outer pelvic fin ray about 2/3 length of head or less *C. macrocephalus* (Fig. 420)
C. paradoxus (Fig. 421)
C. rudis (Fig. 422)

1b. Upper jaw falls short of reaching below posterior 1/3 of orbits

47a. An extremely long dorsal spine, usually 1.5 or more times the head length

48a. Preopercle margin acutely angulated at posteroventral corner *C. macrolophus* (Fig. 450)



48b. Preopercle margin broadly rounded at posteroventral corner

49a. Orbit diameter very small, about 17% of head length *C. microps* (Fig. 451)

49b. Orbit diameter moderate, 20 to 34% of head length

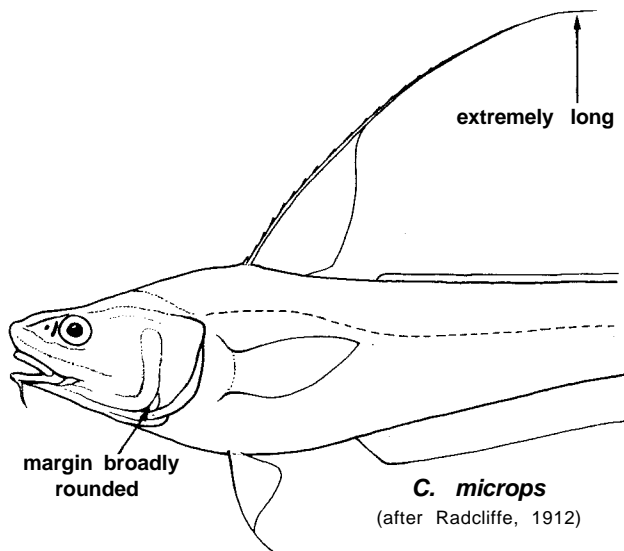


Fig. 451

50a. Interorbital space about 1.5 to 1.6 times into orbit diameter ***C. marginatus***
(Fig. 452)

50b. Interorbital space about 1.0 to 1.2 times into orbit diameter

51a. Inner gill rakers of first arch 8 or 9 (total); distance from isthmus to anal fin origin 98 to 108% of head length; interspace between first and second dorsal fins 1.0 to 1.25 length of first dorsal fin base ***C. tydemani***
(Fig. 453)

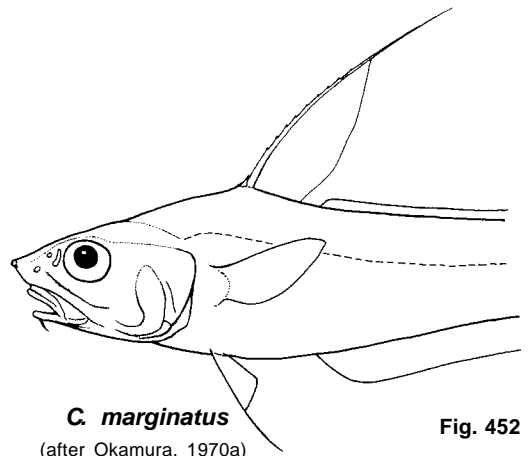
51b. Inner gill rakers of first arch 11 (total); distance from isthmus to anal fin origin 84 to 93% of head length; interspace between first and second dorsal fins 1.3 to 2.3 length of first dorsal fin base ***C. semiscaber***
(Fig. 454)

47b. Length of longest first dorsal fin spine usually 1.2 of head length or less

52a. Most of ventral surfaces of snout and suborbital space naked

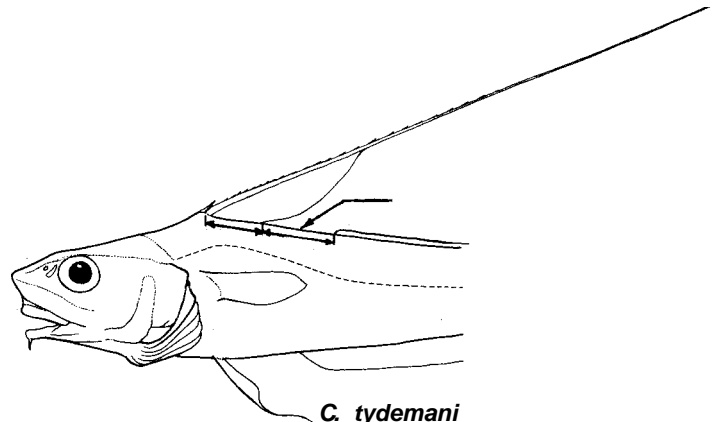
53a. Snout rather blunt and high, scarcely protruding beyond front of mouth, median tubercle on snout tip absent; upper jaws moderately large, 36 to 39% of head length, extending to about midorbit; diameter of orbits 22 to 25% of head length; scales below origin of second dorsal fin 6.5 to 9.5, lateral-line scales over a distance equal to predorsal length, about 45 to 49; pelvic fin rays 9 or 10; inner gill rakers on first arch 9 to 11 total ... ***C. oreinos***
(Fig. 455)

53b. Snout pointed, protruding, a distinct tubercular scale at snout tip; upper jaws moderate to small, 24 to 35% of head length, extending to midorbit or forward of that vertical; diameter of orbits 21 to 36% of head length; scales below origin of second dorsal fin 4.5 to 8.5, lateral-line scales over a distance equal to predorsal length, 31 to 55; pelvic fin rays 7 to 9, occasionally 10; inner gill rakers on first arch 7 to 14



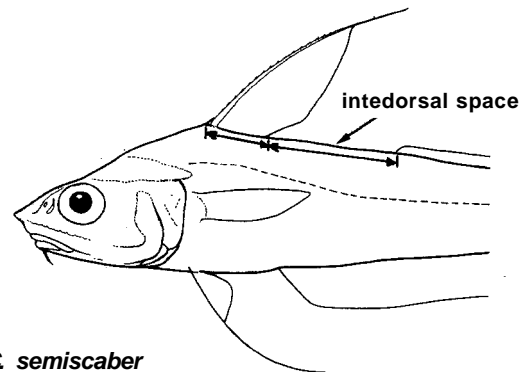
C. marginatus
(after Okamura, 1970a)

Fig. 452



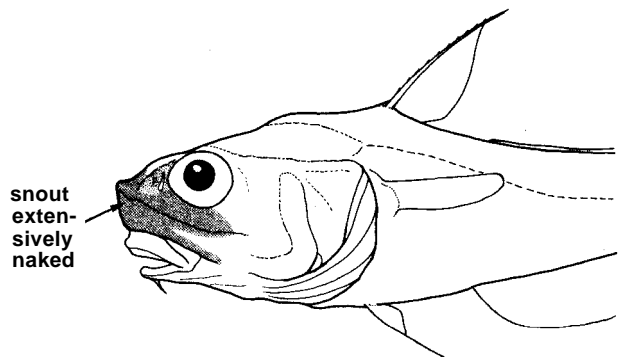
C. tydemani
(after Weber, 1913)

Fig. 453



C. semiscaber
(after Gilbert & Hubbs, 1920)

Fig. 454



C. oreinos
(after Iwamoto & Sazonov, 1988)

Fig. 455

54a. Body scales coarsely spinulated, adherent, those of suborbital shelf strongly adherent, in 2 or more rows forming a distinct scaled edge to ventral rim of orbits

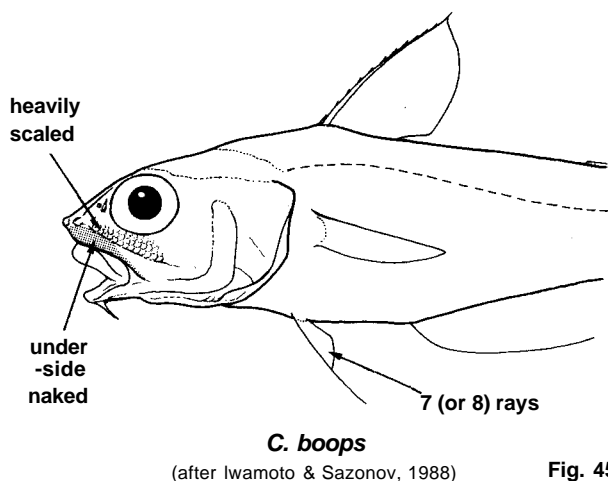
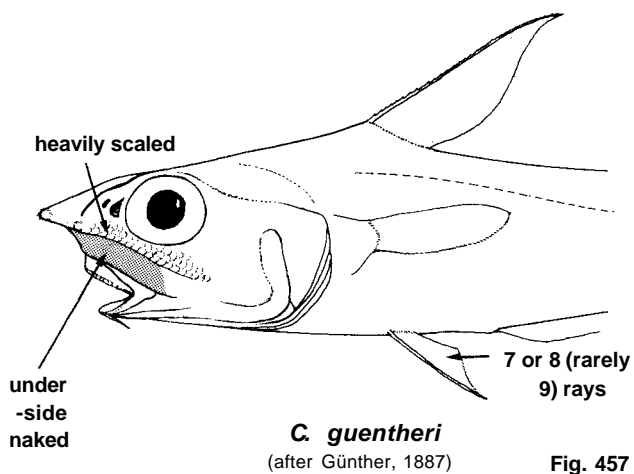
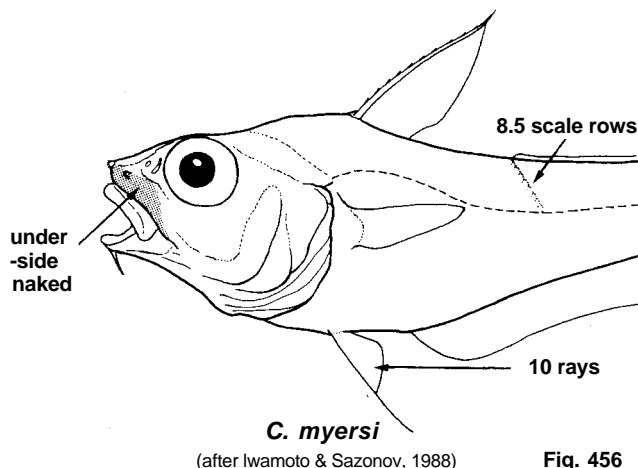
55a. Pelvic fin rays 10; scales below origin of second dorsal fin 8.5; pyloric caeca long, slender, about 7; snout very low, scarcely produced beyond mouth, preoral length only slightly longer than posterior nostril **C. myersi** (Fig. 456)

55b. Pelvic fin rays 7 or 8 (sometimes 9); scales below origin of second dorsal fin 4.5 to 7.5; pyloric caeca short to rudimentary stubs, 6 to 11; snout distinctly protruding beyond mouth; preoral length about twice or longer than posterior nostril

56a. Snout relatively long, strongly pointed, 31 to 34% of head length; interorbital space 21 to 26% of head length; orbits 25 to 30% of head length; pyloric caeca short, about 11 total; scales below origin of second dorsal fin 6.5 to 7.5; inner gill rakers on first arch 9 or 10 total..... **C. guentheri** (Fig. 457)

56b. Snout rather short, bluntly pointed, 24 to 27% of head length; interorbital space 14 to 17% of head length; orbit diameter 29 to 35% of head length; pyloric caeca rudimentary stubs, 6 or 7 total; scales below origin of second dorsal fin 4.5 to 6.5; inner gill rakers on first arch 10 to 12 total **C. boops** (Fig. 458)

54b. Body scales thin and highly deciduous or heavily spinulated and moderately adherent; suborbital shelf mostly naked or with small scales in 1 or 2 rows that do not cover most of shelf and do not form a scaled ventral orbital edge.



57a. Snout blunt, not much protruding beyond mouth, length 22 to 31% of head length; inner gill rakers on first arch 10 to 14 total; pyloric caeca short to long, 6 to 10.

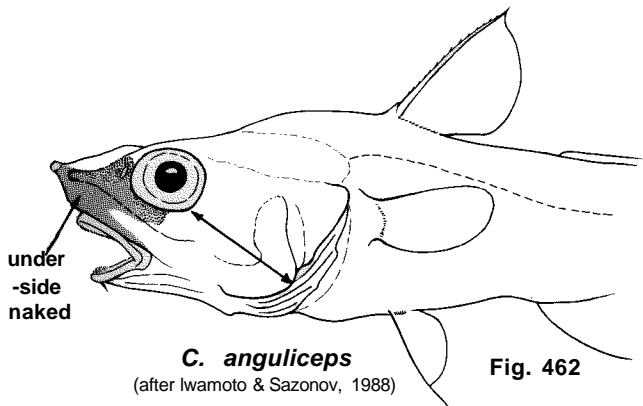
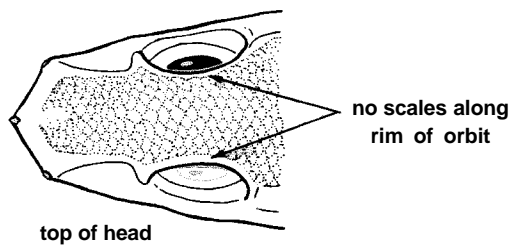
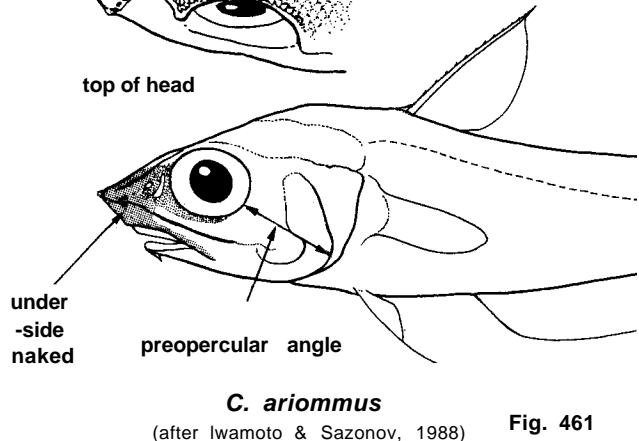
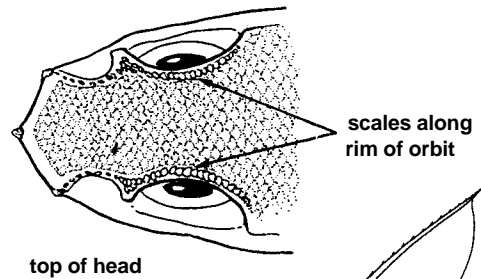
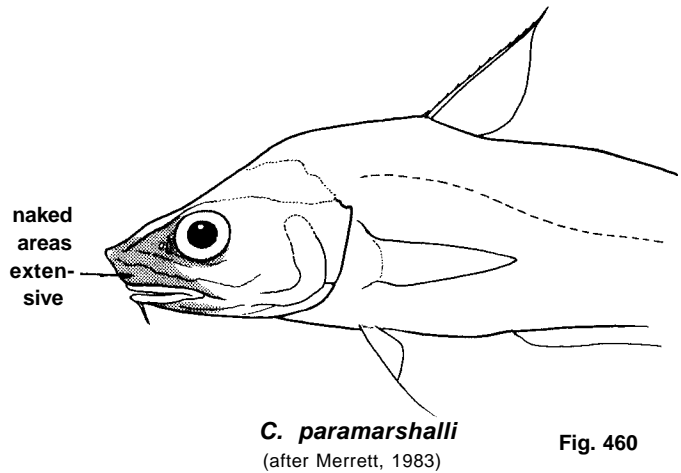
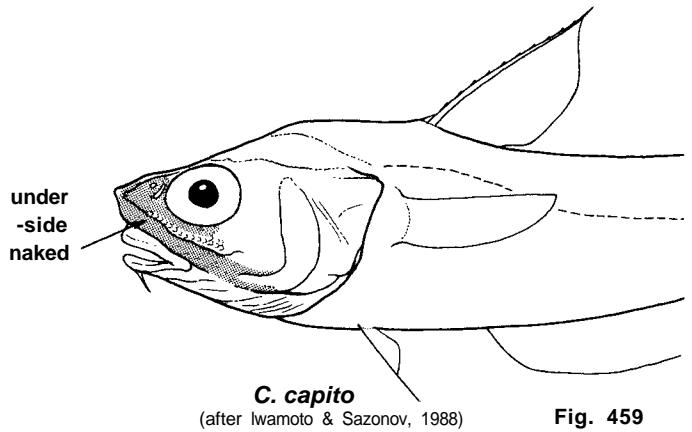
58a. Inner gill rakers on first arch 11 to 14; interorbital space narrow, width 14 to 21% of head length; pyloric caeca short, 6 to 8 **C. capito** (Fig. 459)

58b. Inner gill rakers on first arch 10 to 12; interorbital space 21 to 28% of head length; pyloric caeca long, 9 or 10 **C. paramarshalli** (Fig. 460)

57b. Snout pointed, protruding well beyond mouth, length 28 to 35% of head length; inner gill rakers on first arch 7 to 10; pyloric caeca long, 9 to 14.

59a. Pelvic fin with 9 rays (rarely 7, 8 or 10); scales relatively adherent, coarsely spinulated, 11 to 14 rows across interorbital space; dorsal rim of orbits demarcated by a row of small, coarse, adherent scales; orbit 1.09 to 1.66 times into distance from orbit to angle of preopercle **C. ariommus** (Fig. 461)

59b. Pelvic fin with 8 rays (rarely 7 or 9); scales highly deciduous, sparsely spinulated, 6 to 8 rows across interorbital space, no scales along dorsal rim of orbits; orbit 1.60 to 2.22 times the distance from orbit to angle of preopercle **C. anguliceps** (Fig. 462)



52b. Ventral surfaces of snout and suborbital space almost entirely scaled, except for a narrow to moderately broad naked strip midventrally on snout

60a. Pelvic fin with 8 (rarely 9) rays

61a. Snout bluntly rounded; orbit diameter small, 20% of head length ***C. dubius*** (Fig. 463)

61b. Snout pointed; orbit diameter 23 to 31% of head length

62a. Spinous dorsal ray about equal to head length...***C. asprellus*** (Fig. 464)

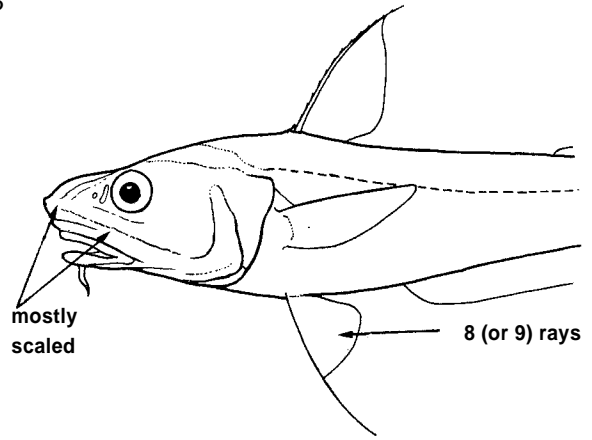
62b. Spinous dorsal ray about equal to postrostral length of head

63a. Outer pelvic fin ray elongated, about equal to head length; barbel stout; pyloric caeca 8 or 9; mouth opening restricted posterolaterally, rictus extends about to below anterior nostril ***C. carminifer*** (Fig. 465)

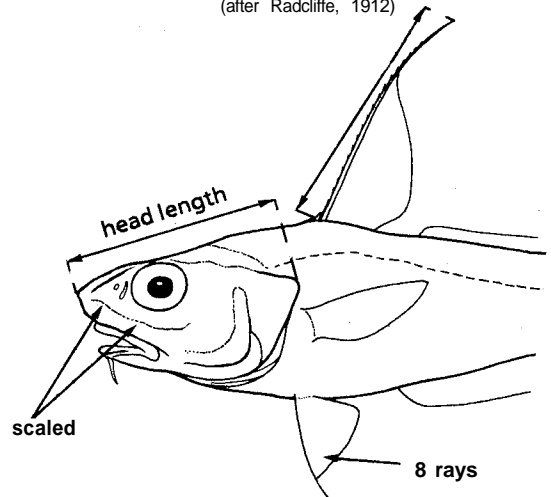
63b. Outer pelvic fin ray much less than head length; barbel slender; pyloric caeca 11 to 14; mouth opening relatively unrestricted, rictus extends to below anterior rim of orbits or beyond ***C. woodmasoni*** (Fig.466)

60b. Pelvic fin with 9 to 11 rays

64a. Pelvic fin with 10 or 11 rays



C. dubius
(after Radcliffe, 1912) **Fig. 463**



C. asprellus
(after Radcliffe, 1912) **Fig. 464**

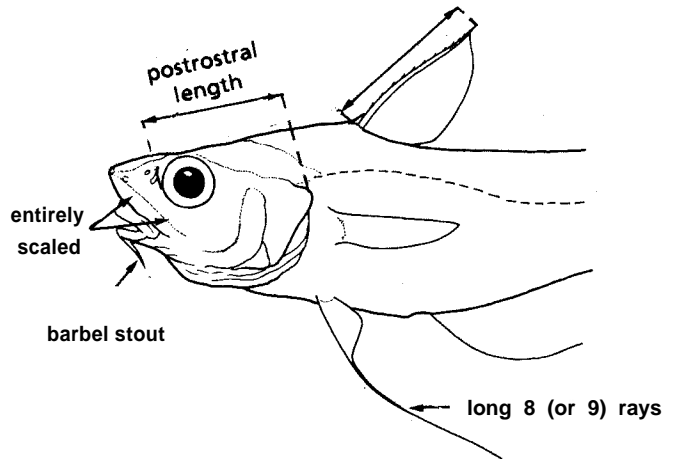
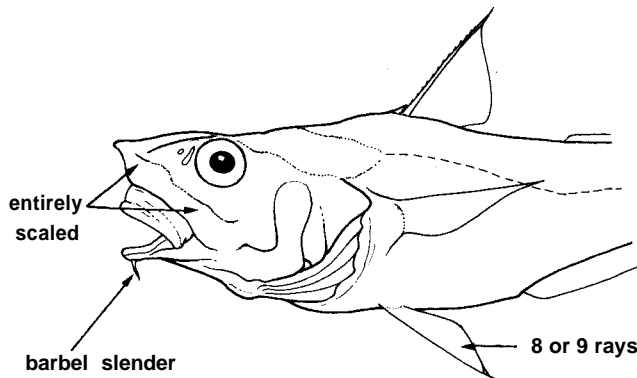


Fig. 465



C. woodmasoni
(after Alcock, 1899) **Fig. 466**

- 65a. Interspace between dorsal fins about equal to length of first dorsal fin base; second dorsal fin origin above origin of anal fin; scale rows below origin of second dorsal fin 5 to 5.5 *C. asper* (Fig. 467)

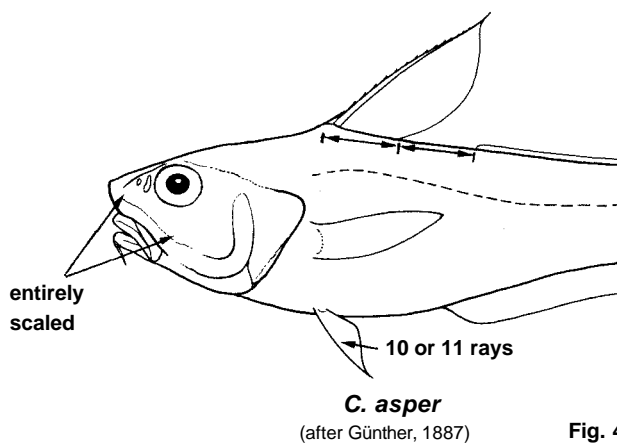
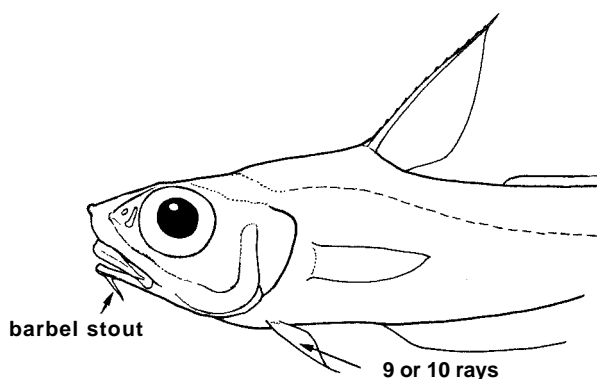


Fig. 467

- 65b. Interspace between dorsal fins much longer than base of first dorsal fin; second dorsal fin origin well behind anal fin origin; scales below origin of second dorsal fin 6 to 10

- 66a. Barbel stout, 11 to 18% of head length; snout blunt, scarcely projecting beyond mouth; inner gill rakers on first arch 11 or 12; interorbital space very narrow, 19 to 21% of head length *C. zaniophorus* (Fig. 468)

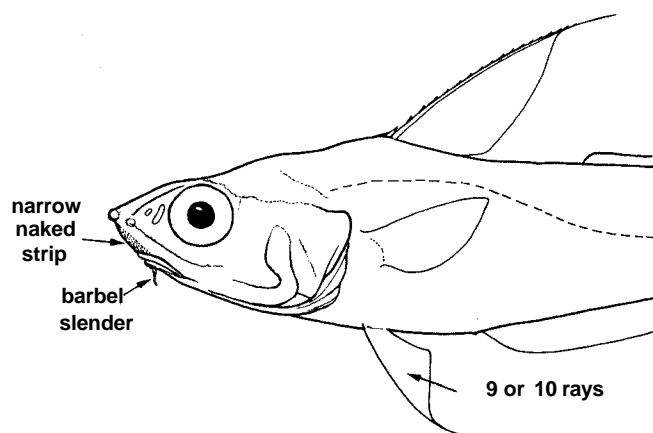


C. zaniophorus
(after Iwamoto, 1970)

Fig. 468

- 66b. Barbel slender, short, 5 to 9% of head length; snout bluntly to acutely pointed, projecting moderately beyond mouth; inner gill rakers on first arch 8 to 11; interorbital space 20 to 27% of head length

- 67a. Ventral surfaces of snout with a median ventral naked strip; inner gill rakers of first arch 9 to 11 (total); dorsal fin spine more than postrostral length of head *C. nasutus* (fig. 469)



C. nasutus
(after Günther, 1887)

Fig. 469

- 67b. Ventral surfaces of snout completely scaled; inner gill rakers on first arch 8 or 9 (total); dorsal fin spine much less than postrostral length of head...*C. mexicanus* (Fig.448)

- 64b. Pelvic fin with 9 rays (sometimes 8 in *C. hoskynii*)

68a. Barbel moderate to long, 11 to 34% of head length

69a. Snout blunt, barely protruding beyond large mouth; upper jaw 40 to 45% of head length ***C. dubius***
(Fig. 463)

69b. Snout more pointed, protruding beyond small to moderate-sized mouth; upper jaw much less than 40% of head length

70a. Orbits rather large, 30 to 34% of head length; origin of pelvic fins forward of pectoral fin origins; length of outer pelvic ray much less than length of head ***C. zaniophorus***
(Fig.468)

70b. Orbits less than 30% of head length; pelvic fin origin below or behind pectoral fin origin; outer pelvic fin ray about equal to or greater than head length

71a. Mouth small, posterior extent of rictus below anterior nostril ***C. carminifer***
(Fig. 465)

71b. Mouth moderate, rictus extends to below anterior margin of orbit or beyond ...***C. aequatoris***
(Fig. 470)

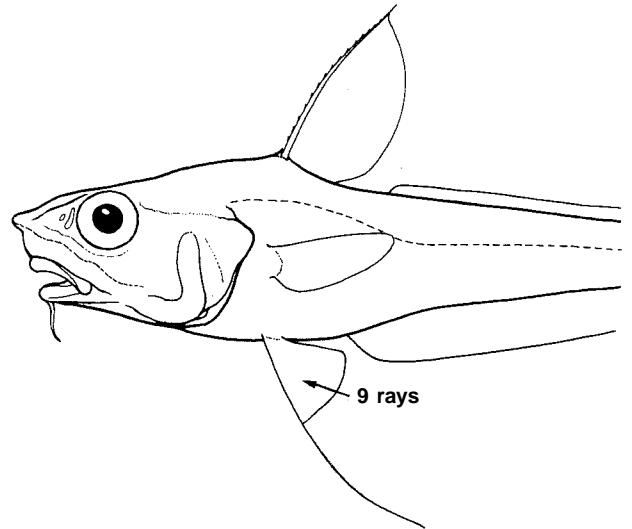
68b. Barbel short to rudimentary, less than 10% of head length

72a. Scale rows below origin of second dorsal fin about 5, body scales with spinules in parallel rows, the central longitudinal series slightly enlarged and projecting beyond scale margin (other spinules not projecting) ***C. hoskynii***
(Fig. 471)

72b. Scale rows below origin of second dorsal fin 6 to 8; body scales densely covered with slender spinules in irregular, somewhat quincunx arrangement, with no enlarged longitudinal series

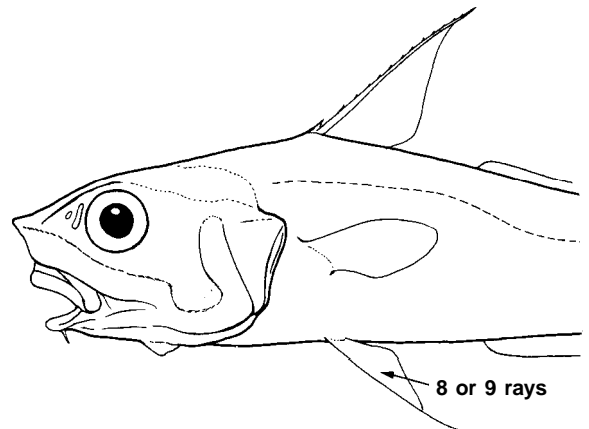
73a. Ventral surfaces of snout with a median ventral naked strip; inner gill rakers of first arch 9 to 11 (total); dorsal fin spine 0.8 to 1.3 times into post rostral length of head..... ***C. nasutus***
(Fig. 469)

73b. Ventral surfaces of snout completely scaled; inner gill rakers on first arch 8 to 9 (total); dorsal fin spine much less than postrostral length of head ***C. mexicanus***
(Fig.448)



C. aequatoris
(after Radcliffe, 1912)

Fig. 470



C. hoskynii
(after Alcock, 1899)

Fig. 471