

2. SYSTEMATIC CATALOGUE

2.1 Key to Subfamilies, Genera and Species (except for *Merluccius*)

- 1a. Posterior part of the body ending in a peduncle with independent caudal fin. Two dorsal fins; second dorsal and anal similar in length and height. Ventral fins with 7 rays, their origin slightly before the base of pectoral fins. Single, unique pyloric caecum, well visible. No pseudobranchs **subfamily: Merlucciinae (genus: *Merluccius*)**
- 1b. Posterior part of the body ending in a point, without a peduncle or independent caudal fin. One or 2 dorsal fins, if two are present, the second dorsal fin is longer and higher than the anal fin. Ventral fins with 8 to 10 rays, their origin at a vertical through the base of the pectoral fins or behind. Numerous long and thin pyloric caeca. With or without pseudobranchs. . **subfamily: Macruroninae → 2**
- 2a. No pseudobranchs. Two dorsal fins. Ventral fins with 8 rays ***Macruronus* → 3**
- 2b. Pseudobranchs present. One or 2 dorsal fins. Ventral fins with 9 or 10 rays **→ 4**
- 3a. Two rows of teeth on the upper jaw, and canine-like teeth on the anterior part of the premaxillaries ***Macruronus novaezelandiae***
- 3b. A single row of teeth on the upper jaw and no canine-like teeth on the premaxillaries ***Macruronus capensis***
- 4a. One dorsal fin. Ventral fin with 9 rays, inserted in an abdominal position ***Lyconodes argenteus***
- 4b. Two dorsal fins. Ventral fins with 9 or 10 rays, inserted in variable positions in relation to the pectoral fins. ***Lyconus* → 5**
- 5a. First dorsal with 9 or 10 rays. Pectoral fins with 13 or 14 rays ***Lyconus brachycolus***
- 5b. First dorsal with 12 or 13 rays. Pectoral fins with 15 to 17 rays ***Lyconus pinnatus***

2.2 Subfamily: Macruroninae Günther, 1873

Body elongated and compressed, tapering gradually from the occiput to the caudal extremity, which can even become filiform; no peduncle or caudal fin differentiated, as the caudal is joined to the anal and second dorsal, when 2 dorsal fins are present, or to the single dorsal. Head compressed, mouth terminal, oblique, lower jaw slightly or non prognathous. Nasal membrane completely covered in scales. One or 2 rows of teeth on the premaxillaries and a single row on the lower jaw; vomerine teeth in 1 or 2 rows; no teeth on palatines. One or 2 dorsal fins. When there are two, the first one has a short base while the second is very long. Anal fin single, long, but rather shorter than the second dorsal or single dorsal. Pectoral inserted in a high position. Ventral fins with 8 to 10 rays, inserted along the same vertical as the pectoral fins (thoracic) or behind them, but they are smaller. Various long, thin pyloric caeca. With or without pseudobranchs.

Comprises 3 genera (*Lyconodes*, *Lyconus*, *Macruronus*) and 5 species (*Lyconodes argenteus*, *Lyconus brachycolus*, *Lyconus pinnatus*, *Macruronus capensis*, *Macruronus novaezelandiae*). It is proposed that this last species be divided into 2 subspecies: *M. n. novaezelandiae* and *M. n. magellanicus*.

Lyconodes Gilchrist, 1922

Fish. Mar. Biol. Surv. Un. S. Afr., (Spec. Rep.3): 59, pl. 10 Fig. 1 (type species: *Lyconodes argenteus* by monotypy).

Etymology: Similar to a wolf. The term comes from the Greek “lukonódes” (Aristoteles, *Historia Animalium*, 579b 15); it refers to the animal's colour and not its form.

Diagnostic Features: This problematic genus is monotypic and its description was based on a single specimen, which has since been lost; therefore, data were taken from the bibliography and simply transcribed and used for the accompanying illustration.

Lyconodes argenteus* Gilchrist, 1922*Fig. 7**

Lyconodes argenteus Gilchrist, 1922. *Fish. Mar. Biol. Surv. Un. S. Afr.*, (Spec Rep. 3): 59, pl. 10, Fig. 1 (type locality: west of Cape of Good Hope).

Synonyms: None.

FAO Names: None.

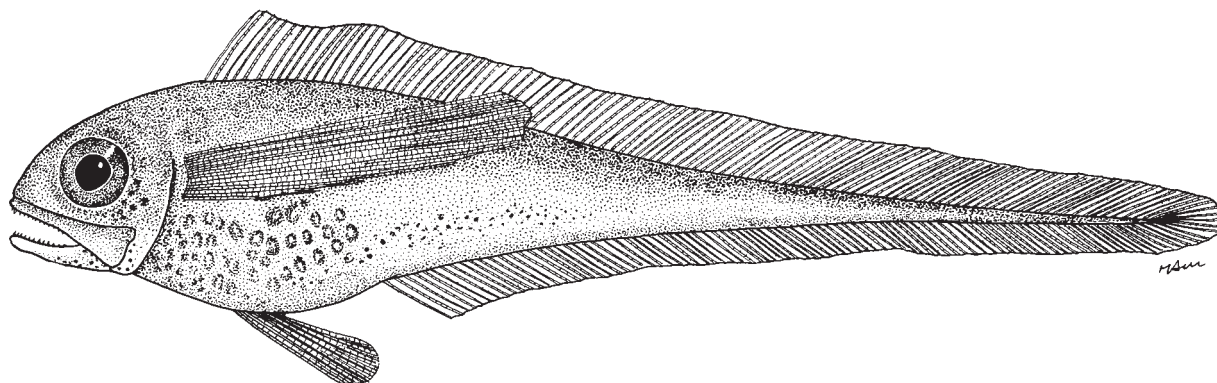


Fig. 7 *Lyconodes argenteus*

Diagnostic Features: Body elongated and compressed, rather enlarged in the anterior third with caudal end tapering to a fine point. The single dorsal and anal fins confluent with the caudal fin. Branchial membranes joined; number of branchiostegal rays unknown. Mouth large, the posterior part of jaw, which is wide, extending beyond the posterior edge of the eye; premaxillaries with a dozen teeth of different sizes and no anterior canines; lower jaw with small teeth and 4 canines on the posterior part. Presence of teeth on the vomer unknown. About 110 rays on the dorsal fin, origin situated slightly behind the base of the pectoral fins. The anal fin, with about 94 rays, is much shorter than the dorsal fin and has no anterior lobe. The pectoral fins, with 15 rays, are much longer than the ventral fins, extending far beyond the origin of the anal fin. The ventral fins, with 9 rays, are clearly inserted behind the base of the pectoral fins. Pseudobranchs present. Scales absent or deciduous. Dorsal side of body dark-coloured, belly lighter and silvery.

Additional Information: The different analyses carried out on the genera *Lyconodes* and *Lyconus* show an affinity index of 92.2%, inferring that they could be the same genus. *Lyconodes* Gilchrist, 1922 would then be a later synonym of *Lyconus* Günther, 1887. Among other characters, they both possess pseudobranchs. Lack of information has forced us to follow the present dichotomy, placing *Lyconodes* in the subfamily Macruroninae, family Merlucciidae. As it was impossible to examine a specimen of this species (the data are from the holotype, which has been lost), we have no choice but to use the original description, which mentions only 1 dorsal fin. However, we have doubts as to whether this is so. *Lyconus* possesses 2 nearly adjacent dorsal fins and a very small interdorsal space. According to Evseenko and Suntsov (1995), this space is imperceptible in some samples of *Lyconus brachycolus* measuring between 42 and 44 mm, and more easily visible in others measuring 79 mm in total length. Taking into account that *Lyconodes* was described using a single specimen measuring 45 mm, we suspect that Gilchrist (1922) inadvertently overlooked the presence of 2 dorsal fins. If this were the case, all Macruroninae would have 2 dorsal fins with the second confluent with the anal and the caudal.

Geographical Distribution: Type locality only: (west of Cape of Good Hope).

Habitat and Biology: Unknown. Species with a pelagic juvenile phase.

Size: The only known specimen measured 45 mm.

Interest to Fisheries: None.

Local Names: None.

Literature: Gilchrist (1922); Barnard (1925); Marshall (1966); Smith (1977) Cohen in Smith and Heemstra (1986); Howes (1991); Evseenko and Suntsov (1995).

***Lyconus* Günther, 1887**

Challenger Rep. Zool., 22; 158 (type species: *Lyconus pinnatus* Günther, 1887, by monotypy).

Macruronus (non Günther 1873) Maul, 1951, *Bolm Mus. Munic. Funchal*, 5(12): 45-49, Fig. 11 (type locality: southeastern coast of Madeira).

Etymology: Alludes to the aspect of the head, which resembles a wolf by its dentition.

Diagnostic Features: Head and body compressed, caudal region filiform and tapering. Lateral line present, running midlaterally on the body, except slightly higher in the anterior part of the body. Second dorsal fin and anal fin confluent with the caudal. Scales cycloid and deciduous. Pseudobranchs present. Two dorsal fins very close together, with an interdorsal space difficult to discern. First ray of the first dorsal fin thin and shorter than the second but perfectly visible, and it has the structure of a spine. Anal fin without a developed anterior lobe. A single row of teeth on the premaxillaries, lower jaw, and vomer. No teeth on the palatine. Front part of branchiostegal membrane attached and joined to the isthmus. First branchial arch with 3-5 + 9-13 gillrakers.

Lyconus brachycolus* Holt and Byrne, 1906*Fig. 8**

Lyconus brachycolus Holt and Byrne, 1906. *Ann. Mag. Nat. Hist.*, 7(18): 423-426 (type locality: southwest of Ireland, 50° 21'N, 11° 39'W, depth 1 140 m).

Synonyms: *Macruronus caninus* Maul, 1951, *Bolm. Mus. Munic. Funchal.*, 5(12): 45-49, Fig. 11 (southeastern coast of Madeira). *Macruronus brachycolus*: Coad, 1995, Encyclopedia of Canadian fishes.

FAO Names: None

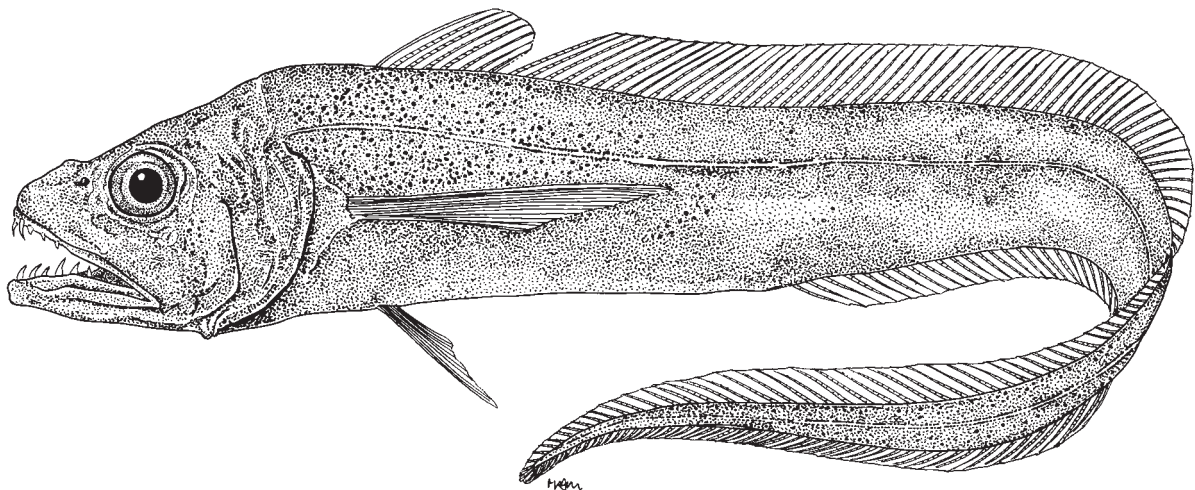


Fig. 8 *Lyconus brachycolus*

Diagnostic Features: Head length included 5.5 to 6.4 times in standard length. Dorsal profile of head varies according to size: juveniles show an interorbital depression, which rises sharply to the occiput; whereas in adults the ascent is gradual from the snout to the insertion of the first dorsal fin. The mouth is large, terminal and oblique, the maxillary extends to the vertical line through the posterior margin of the eye. Teeth variable, but both the premaxillary and lower jaw are armed with a single row of teeth; 1 small tooth on the premaxillary at some distance from the symphysis, followed by 1 or 2 long teeth, one of which is fixed, again followed by a decreasing series of more than 10 articulated teeth. The lower jaw has 7 teeth, longer than those on the upper jaw, on the first half one of them is fixed, the others are articulated and increase in size from the symphysis to the first third, and then decrease in size. The number of vomer teeth varies, but normally 2 or 3 are present on each side in a single row. Eyes large, their diameter included between 3.2 and 4.8 times in head length. 3-5 + 9-12 gillrakers on the first branchial arch; gillrakers of juveniles are long, flattened, wide at the base, pointed, and with denticles on the internal side, whereas those found on adults are short and denticles are only situated on the apex. The first dorsal fin has 9 or 10 rays, its origin is located behind a vertical line through the base of the pectoral fins; the second dorsal fin has 105 to 111 rays. Pectoral fins have 13 or 14 rays. Origin of ventral fins situated behind pectoral fins; they are shorter than the latter and possess 8 or 9 rays. The anal fin, with 95 or 96 rays, is slightly smaller than the second dorsal fin. Abdominal vertebrae 17 or 18; caudal vertebrae 83. **Colour:** bright silver, turning brownish grey after preservation; a black median line between anus and abdomen.

Additional Information: Howes (1991), points out that *Lyconus* needs to be revised and places it in synonymy with *Macruronus*. Here, on the contrary, *Lyconus* is seen as a valid genus, as among other characters, it possesses pseudobranchs (absent in *Macruronus*); a single row of vomerine teeth (2 rows in *Macruronus*); a single row of teeth on the premaxillaries (2 in *M. novaezelandiae novaezelandiae* and in *M. novaezelandiae magellanicus* and 1 in *M. capensis*, although there are doubts on this as we could not examine any specimens); no lobe on anterior part of the anal fin (present in *Macruronus*); dorsal fins are practically contiguous (not so close in *Macruronus*). Nolf and Steurbaut (1989) point out the fact that the otoliths in *Lyconus* have a very generalized aspect and admit to the possibility of the genus being neotenic. This could explain the proximity of the 2 dorsal fins, which are almost contiguous. Evseenko and Suntsov (1995) highlight the pelagic character of the vital cycle, with juveniles living very far from the limits of the continental shelf. *Macruronus* lives practically on the continental shelf, and juveniles remain in shallow waters after a pelagic larval phase. The 210 rays Holt and Byrne (1906) attributed to *L. brachycolus* is probably erroneous.

Geographical Distribution: Rarely captured, only isolated references exist in the northwestern Atlantic (Canada), northeastern Atlantic (to the east of Ireland, southeast of Madeira and the coast of Sahara), and in the southeastern Atlantic.

Habitat and Biology: Juveniles are captured at a depth range from 150 to 700 m in deep ocean and far from the continental shelf and sea-mounts where the adults live.

Size: Maximum known length is of 52.5 cm.

Interest to Fisheries: None.

Local Names: None

Literature: Holt and Byrne (1906); Maul (1951); Marshall (1966); Svetovidov (1969); Svetovidov in Whitehead *et al.* (1973); Cohen (1984); Cohen in Smith and Heemstra (1986); Matallanas and Lloris (1987); Nolf and Steurbaut (1989); Eschmeyer (1990); Maurin in Quéro *et al.* (1990); Howes (1991); Coad, (1995); Evseenko and Suntsov (1995).

***Lyconus pinnatus* (Günther, 1887)**

Fig. 9

Lyconus pinnatus Günther, 1887. *Challenger Rep. Zool.*, 22: 158; (type species: *Lyconus pinnatus* Günther, 1887, by monotypy).

Synonyms: None.

FAO Names: None.

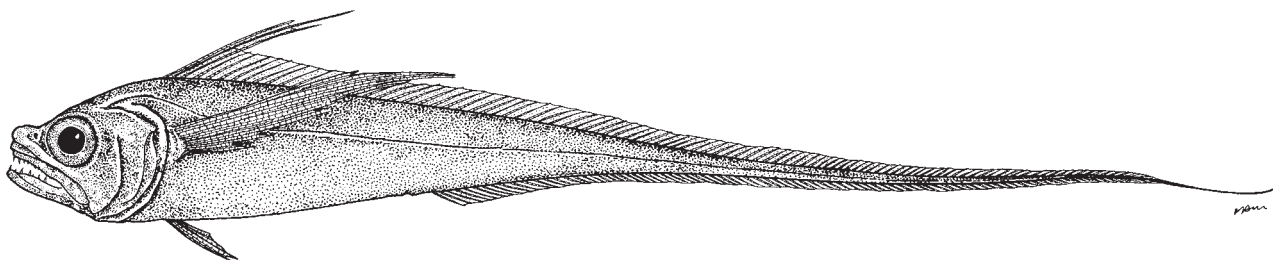


Fig. 9 *Lyconus pinnatus*

Diagnostic Features: Head length included 7.1 to 8 times in standard length; in known individuals, dorsal profile of the head with an interorbital depression, then rising sharply to the occiput. Mouth large, terminal and oblique, maxillary reaches beyond the vertical line to the posterior part of the eye. The premaxillaries and lower jaw have a single row of teeth, and are scarce: the lower jaw of the holotype has 2 anterior canines and 3 smaller teeth behind them. Usually 1 to 3 teeth on the right and left side of the vomer. First branchial arch with 3-4 + 11-13 long, thin gillrakers, which do not change shape with age. Origin of first dorsal fin behind a vertical line through the base of the pectoral fins; 12 or 13 rays on the first dorsal fin while the second dorsal fin has about 124 rays. Pectoral fins with 15 to 17 rays. Ventral fins, which are shorter than the pectoral fins and in a thoracic position, have 9 or 10 rays. Anal fin, with about 109 rays, is slightly smaller than the second dorsal fin. Abdominal vertebrae 19 or 20 and caudal vertebrae 90. Live colour unknown.

Additional Information: See *L. brachycolus*.

Geographical Distribution: Rarely captured. Isolated references in the southern Atlantic, Madagascar shelf, southern Australia, and to the east of New Zealand. Probably distributed around the Antarctic.

Habitat and Biology: As *L. brachycolus*.

Size: Maximum length of rarely known samples, up to 60 cm.

Interest to Fisheries: None.

Local Names: None.

Literature: Günther (1887); Marshall (1966); Marshall (1973); Svetovidov *in* Whitehead *et al.* (1973); Fahay and Markle (1984); Cohen (1984); Cohen *in* Smith and Heemstra (1986); Matallanas and Lloris (1987); Cohen *et al.* (1990); Eschmeyer (1990); Howes (1991); Evseenko and Suntsov (1995).

Macruronus Günther, 1873

Trans. Proc. N.Z. Inst., v. 3 (1870), 1871: 103 (replacement of the genus of the type species *Coryphaenoides novae-zelandiae* Hector, 1871, New Zealand, by original designation). *Cynogadus* Howes, 1991 (subgenus of *Macruronus*) *Bull. Br. Mus. Nat. Hist. (Zool.)*, 5(1): 103.

Etymology: Generic name *Macruronus* from the Greek: *Makros* = large and *oura* = tail.

Diagnostic Features: Head and body compressed with tapering tail. Second dorsal, anal and caudal fins confluent. Scales cycloid and not very adherent. No pseudobranchs. Two dorsal fins, the first has a barely noticeable spine preceding a fully developed first ray. Anal fin shorter than the second dorsal fin and its anterior rays longer than the rest, forming a conspicuous lobe. One or 2 rows of teeth on the premaxillaries, a single row on the lower jaw. Teeth are large on the external row of the premaxillary and on the single row of the lower jaw; those of the inner row of the premaxillary, on species that have 2 rows, are very small and covered in buccal membrane making them barely noticeable; 2 rows of small, irregular, articulated teeth on the vomer. Front part of branchiostegal membranes attached and joined at the isthmus. Long, spear-shaped gillrakers, with 6-8 + 21-27 on the first branchial arch.

Macruronus capensis Davies, 1950

Fig. 10

Macruronus capensis Davies, 1950, *Ann. Mag. Nat. Hist.*, 12(3): 512 (type locality: 50 miles northwest of Capetown, depth 426 m).

Synonyms: None.

FAO Names: **En** – Cape grenadier; **Fr** – Grenadier du Cap; **Sp** – Granadero del Cabo.

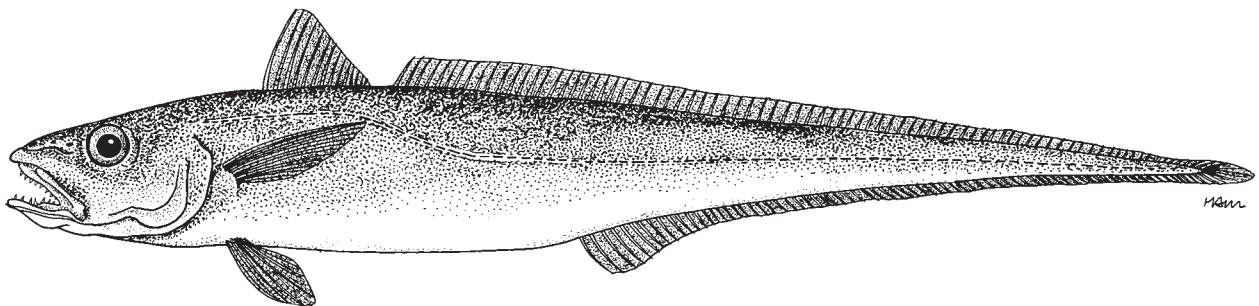


Fig. 10 *Macruronus capensis*

Diagnostic Features: Body depth 6.3 to 7.8 times in total length. The lateral line runs along the middle of the body, except towards the anterior part where it runs near the dorsum. The head is contained 5.7 to 6.1 times into the total length. Mouth rather large, terminal and oblique, the maxillary reaches a vertical line through the posterior margin of the eye. Teeth strong but small, sharp, and curved, according to the original description of the species, and are in a single

row on the premaxillaries, the lower jaw, and the vomer; canine-like teeth absent on the anterior part of the premaxillaries. Eyes large, their diameter 3.8 to 4.6 times in head length. Branchial openings large. A total of 27 to 29 (6-7 + 21-23) gillrakers on the first branchial arch. The first dorsal fin, which has its origin behind a vertical line through the base of the pectoral fins, has a small anterior spine and 11 to 13 rays; the second dorsal has 88 to 98 rays. Pectoral fins are short, with 15 to 20 rays. Ventral fins with 8 rays, shorter than the pectoral fins and inserted in a thoracic position. Anal fin with 75 to 102 rays. **Colour:** blue, darker in the dorsal region, becoming lighter along the sides, the ventral region being almost white; all fins are dark-coloured.

Additional Information: It was not possible to examine a sample of this species. Davies (1950) based his description on a single specimen and placed it apart from *Macruronus novaezelandiae* and *M. magellanicus* as it possessed a small spine preceding the first dorsal fin. However this bone has been proven to be characteristic of the genus. Davies (1950) mistakenly believed that *M. magellanicus* lacked teeth on the premaxillary and that having 2 rows present was a character specific to *M. novaezelandiae*. In this study we have seen that *M. novaezelandiae* as well as *M. magellanicus* have 2 rows of teeth on the premaxillaries; doubt remains on whether *M. capensis* possesses this character.

Geographical Distribution: Known only in the southeastern Atlantic (South Africa): Cape of Good Hope, Mossel Bay and Algoa Bay (Fig. 11).

Habitat and Biology: A supposedly bathypelagic species, which probably lives in rocky depths or in midwaters, to about 426 m depth.

Size: Maximum length about 100 cm.

Interest to Fisheries: None.

Local Names: SOUTH AFRICA: Bandstert, Strap-tail.

Literature: Davies (1950); Smith (1965); Cohen in Smith and Heemstra (1986); Inada in Cohen *et al.* (1990).

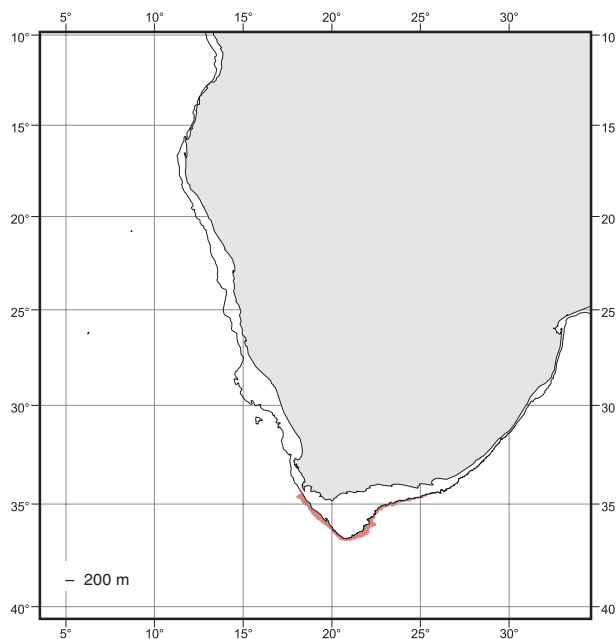


Fig. 11 *Macruronus capensis*
Known distribution

***Macruronus novaezelandiae* (Hector, 1871)** **Fig. 12**

Coryphaenoides novae-zelandiae Hector 1871, *Trans. Proc. N.Z. Inst.*, v. 3 (1870), 1871: 103 (Port Nicholson, New Zealand).

Synonyms: *Coryphaenoides tasmaniae* Johnston, 1883, *Proc. R. Soc. Tasmania*: 143 (Kangaroo Bluff, Tasmania, Australia). *Macruronus magellanicus* Lönnberg, 1907, *Ergeb. Hamb. Magalh. Sammeir.*, 1, Fische: 15, Fig. 2 (Smyth Channel, Chile). *Macruronus argentineae* Lahille, 1915, *Anal. Mus. Nac. B. Aires*, 26: 22, p. v, Fig. 1.

FAO Names: En – Blue grenadier; Fr – Grenadier bleu; Sp – Merluza de cola.

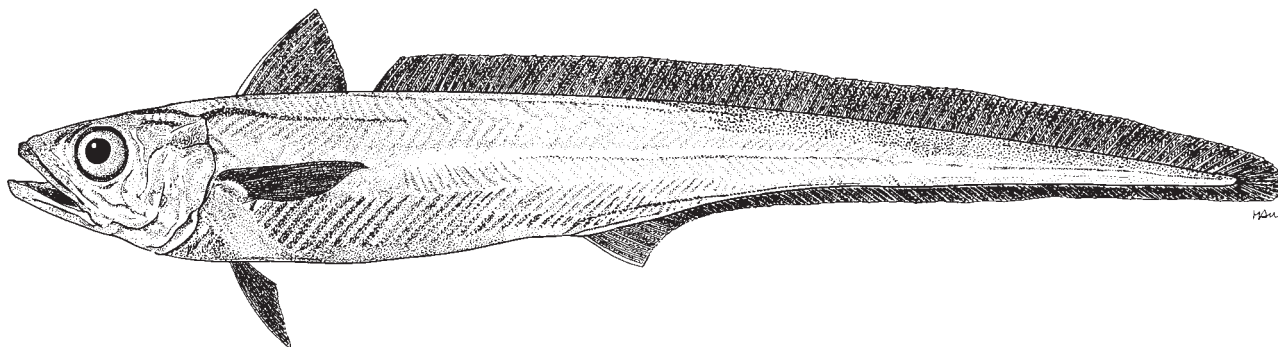


Fig. 12 *Macruronus novaezelandiae*

Diagnostic Features: Body depth 6.7 to 8.5 times in total length; lateral line with 77 to 182 scales, running along the middle of the body except anteriorly where it runs near the dorsum. Head 4.8 to 6.6 times in total length. Mouth large, terminal and oblique, the maxillary extends to a vertical line through the posterior part of the eye. Two rows of teeth on the premaxillary, the inner row with very small, regularly disposed, articulated teeth; the outer row with larger canine-like teeth towards the front, followed by curved teeth, most of which are fixed. A single row of teeth on the lower jaw with a few small articulated teeth near the symphysis, followed by a canine, shorter and placed further back than on the premaxillary, with various long, arrow-shaped teeth, some being articulated. Two irregular rows of small articulated teeth on the vomer. Eye diameter 3.2 to 4.6 in head length. Large branchial openings. There are 27 to 35 gillrakers (6-8 + 21-27) on the first branchial arch. Two dorsal fins; the first, its origin behind a vertical line through the base of the pectoral fins, has a small spine and 10 to 13 rays; the second dorsal fin has 90 to 102 rays. Pectoral fins short, with 15 to 19 rays. Ventral fins, with 8 rays, are shorter than the pectoral fins and inserted slightly behind the latter. Anal fin with 83 to 95 rays. **Colour:** overall blue, darker in the dorsal region and becoming lighter along the sides, the ventral region being almost white; silvery surface with greenish tinges when animal is alive.

Additional Information: The results of the examination of specimens of *Macruronus novaezelandiae* (Hector, 1871) from the type locality and of others (*M. magellanicus* Lönnberg, 1907) captured in the Beagle Channel and Argentinian Sea, demonstrates that there are no significant differences that permit maintaining both binomials at the level of species.

The systematic value which diverse authors accredit to different meristic characters which are subject to a great deal of variability, such as number of vertebrae, gillrakers, fin rays and scales on the lateral line, is, to our mind, unjustified. Therefore, such characters have only been taken into account as indicative of the existence of different populations. Consequently, the following trinomena are proposed with their respective meristic formulas, where a degree of overlap can be noted.

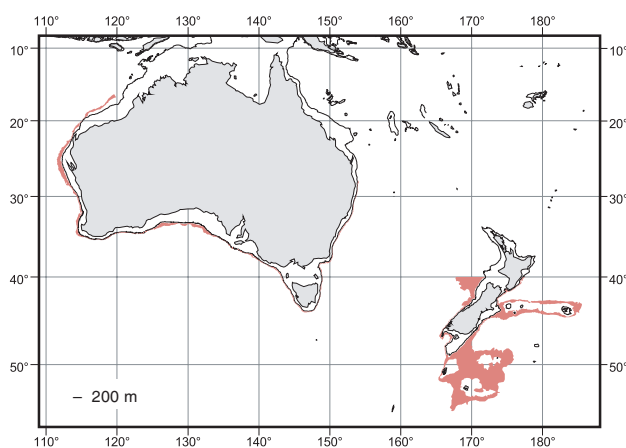
Macruronus novaezelandiae novaezelandiae (Hector, 1871)
(Australia, Tasmania and New Zealand)

1D. 10-12; **2D.** 96-102; **A.** 89-95; **P.** 15-18; **V.** 8; **Gr.** 6-7 + 21-24: 27-30

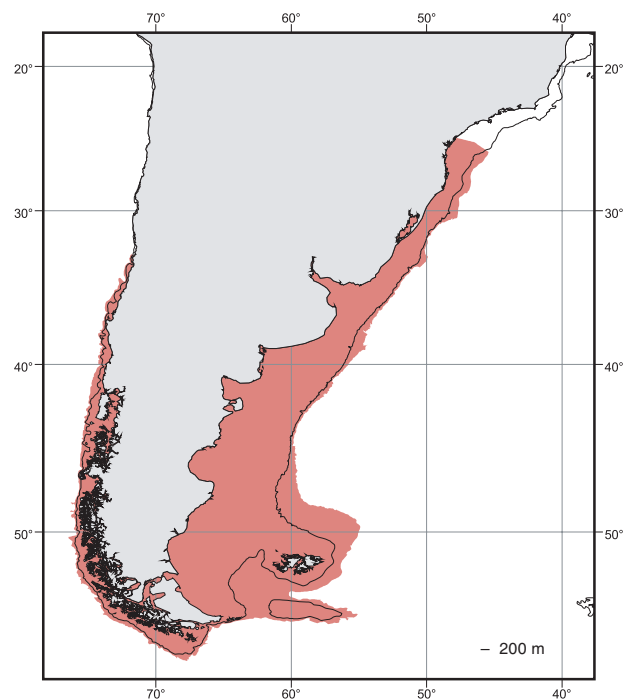
Macruronus novaezelandiae magellanicus Lönnberg, 1907
(Southern South America: Chile and Argentina)

1D. 10-13; **2D.** 90-102; **A.** 83-92; **P.** 17-19; **V.** 8; **Gr.** 7-8 + 23-27: 30-34

Geographical Distribution: Found in waters to the south of Australia, Tasmania and New Zealand (subspecies: *Macruronus novaezelandiae novaezelandiae*) and on both sides of southern South America (subspecies: *M. n. magellanicus*): in the southeastern Pacific (Chilean coast), from Valparaíso to the Straits of Magellan and Beagle Channel. It is also present in the southwestern Atlantic (Argentinian coast), from Beagle Channel to southern Brazil, following the isobaths from 200 to 800 m depth (Fig. 13).



a) *Macruronus novaezelandiae novaezelandiae*



b) *Macruronus novaezelandiae magellanicus*

Fig. 13 *Macruronus novaezelandiae* ■ Known distribution

Habitat and Biology: The species is characteristic of cold or temperate waters, found between 200 and 800 m depths, and also present between 30 and 40 m. Juvenile specimens, and especially adults belonging to the American subspecies, have been caught with trammel nets and bottom trawls in the Beagle Channel from the coastal zone (0.5 m depth) to 110 m. It is voracious, generally feeding in similar proportions on fish (sardines, anchovies, myctophids) and crustaceans (Mysidacea, Euphausiacea, Amphipoda), as well as on cephalopods. The females are similar in size to males when they cannot be differentiated from the status of their gonads; the size of the liver is bigger in females. Spawning takes place in midwaters during the southern winter (June-August-September).

Size: The maximum established length is 120 cm; the common length from 50 to 100 cm.

Interest to Fisheries: Blue grenadier (*Macruronus novaezelandiae*) are caught by trawl in Australia, Tasmania, and above all, in New Zealand, where it is the main fishery. Japanese fleets began fishing in the 1970s, reaching maximum activity in the second half of the 1980s and the beginning of the 1990s; they were progressively taken over by local fleets. In the southwestern Pacific (Australia and New Zealand), Japanese and Russian trawlers began fishing in the 1970s, with catches amounting to 100 000 tonnes in 1977 and then dropping to less than 20 000 tonnes in 1978, which coincided with the declaration of the New Zealand EEZ. In the 1980s, catches grew steadily to 216 000 tonnes, mostly owing to New Zealand and Japanese catches; they remained between 177 000 and 213 000 tonnes during the first half of the 1990s, during which nearly all of the catches were progressively made by New Zealand fleets. In 1999, catches exceeded 300 000 tonnes, and a slight drop was recorded in 2000. In the southeastern Pacific off the South American coast, Chilean trawlers have been catching blue grenadier since the beginning of the 1970s. In recent years catches have fluctuated and reached a maximum of over 350 000 tonnes and a minimum of 70 000 to 80 000 tonnes. Blue grenadier is marketed filleted or frozen in blocks.

In the Atlantic, fishing started by the end of the 1970s with fleets from various countries. In the second half of the 1980s and particularly in the 1990s, Argentinian trawlers replaced these fleets. Atlantic catches were mostly made by Argentinian fleets (96 000 tonnes in 1998), and to a lesser extent by the Spanish (16 000 tonnes in 1998) and the Falkland Islanders (4 000 tonnes in 1998). However, different distant-water fleets maintained a high level of catch, such as the Bulgarians in the second half of the 1980s, and in particular, the Polish throughout the 1980s. In this region it is marketed frozen as well as fresh and is also used for fishmeal production.

Since 1995 annual catches of less than 25 tonnes have been recorded in the Antarctic region, as well as in the Atlantic area (carried out by the United Kingdom, Spain, South Africa, the Russian Federation, the Korean Republic, Chile, and Argentina) and in the Indian Ocean zone (carried out by South Africa, France and Australia).

Local Names: ARGENTINA: Argentino, Merluza de cola; AUSTRALIA: Blue grenadier; CHILE: Huaica, Huelca, Huilca, Merluza de cola de rata; FRANCE: Grenadier patagonienne, Merluce patagonienne; GERMANY: Langschwanz-Seehecht; JAPAN: Dekora, Hoki; NEW ZEALAND: Blue hake, Hoki, Whiptail; SPAIN: Merluza azul, Merluza de cola, Merluza hoki; UNITED STATES: New Zealand whiptail, Patagonian whiphake, Tailed hake.

Literature: Hector (1871); Günther (1873); Johnston (1883); Lönnberg (1907); Lahille (1915); Norman (1937); Fowler (1945); Hart (1946); Graham (1953); Ladiges *et al.* (1958); Angelescu and Gneri (1960); Ringuelet and Arámburu (1960); Marshall, (1966); Bellisio and López (1973); Marshall (1973); Svetovidov (1973); Stehmann, (1979); Torno and Tomo (1980); Ojeda (1983); Cohen (1984); Fahay and Markle (1984); Menni and López (1984); Menni *et al.* (1984); Pequeño (1984); Cohen (1986); Inada *in* Nakamura *et al.* (1986); Paxton *et al.* (1989); Pequeño (1989); Yamada *in* Amaoka *et al.* (1990); Inada *in* Cohen *et al.* (1990); Howes (1991); Lloris and Rucabado (1991); Andrews (1992); Wilkens and Dohse (1993); Gomon *et al.* (1994); López *et al.* (1996).

2.3

Subfamily: Merlucciinae Svetovidov, 1948

Body elongated and little compressed; caudal fin and penduncle well differentiated. Dorsal profile of the anterior part of the head flat, with wide and slightly depressed snout. Eye diameter smaller than interorbital distance, which in turn is smaller than the snout. Nasal orifices very close together, the anterior is rounded, the posterior is crescent-shaped and concave towards the front; the nasal membrane into which they open pointing towards snout. Mouth more or less oblique and moderately long; corner of mouth reaching below the anterior part of the eye or slightly behind; the maxillary extends to the posterior edge of the pupil or farther back. Lower jaw slightly protruding. Two rows of teeth on premaxillaries, on both lower jaws, and on vomer; teeth in external row fixed and small; internal row with longer inward-retracting teeth; 2 rows of teeth on vomer set as on the maxillary, only smaller. Branchial openings rather large, with branchiostegal membranes united anteriorly. First branchial arch (Fig. 14 and Plate VI) with well-developed, cushion-shaped gillrakers, clearly separated from the spiny tubercles. Gillrakers with a smooth external side and the

internal side with denticles; gillrakers on the upper part of the arch inserted on the epibranchial, the lower are inserted on the ceratobranchial, and possibly also on the hypobranchial. The Merlucciinae hyomandibular is complex with a prominent external blade that carries the anterior intermuscular process and the posterior preopercular process. This is of great diagnostic value. The urohyal is also used for diagnosis of different species in the group, although its degree of ossification, which increases with age, may slightly change its shape (Fig. 15 and Plates: V, VIII, X and XI). Two dorsal fins, the first high and triangular, the second less high and with a depression towards its middle. One anal fin opposed to the second dorsal and of a similar shape and size. A depression separates these 2 fins into two similar-length parts, although usually the posterior part has a few rays more than the anterior, as the last rays are thinner and closer together. Independent caudal fin with procurent rays. Origin of pectoral fins on the lower half of flanks. Ventral fins with 7 rays and inserted in front of the pectoral fins (subjugular). Body completely covered in scales, including breast and base of pectoral fins; between 101 and 186 oblique rows of scales, from the upper anterior edge of the branchial openings to the end of the hypurals. Head scales smaller than those on body and arranged in a specific manner (Fig. 16a and Plate III); absent on jaws and ventral part of head; more scales on head in Euro-African hake species than in American hake species (Fig. 16a and b). Upper part of the head, including nasal membrane in Euro-African species, totally covered in scales; only tip end of the snout lacks scales in almost all species. Opercular and subopercular completely covered with scales. Scales on the preopercular and the interopercular, as well as on cheek and lacrimal vary from one species to another. Otoliths can be used to distinguish 2 groups, Euro-African, with plesiomorphic characters, and American, except for *Merluccius albidus* and *Merluccius angustimanus* with apomorphic characters (Fig. 17 and Plates: VII and XII). Single, short, conical pyloric caecum with wide base. Lacks pseudobranchs.

Species and subspecies of this subfamily are distributed throughout the eastern and western Atlantic, the Mediterranean, and the Red Sea; in the Indian Ocean (South Africa and Madagascar); in the western and eastern Pacific (eastern coast of Japan, New Zealand, and along the western American coast).

Includes a single genus: *Merluccius*, which comprises 13 species.

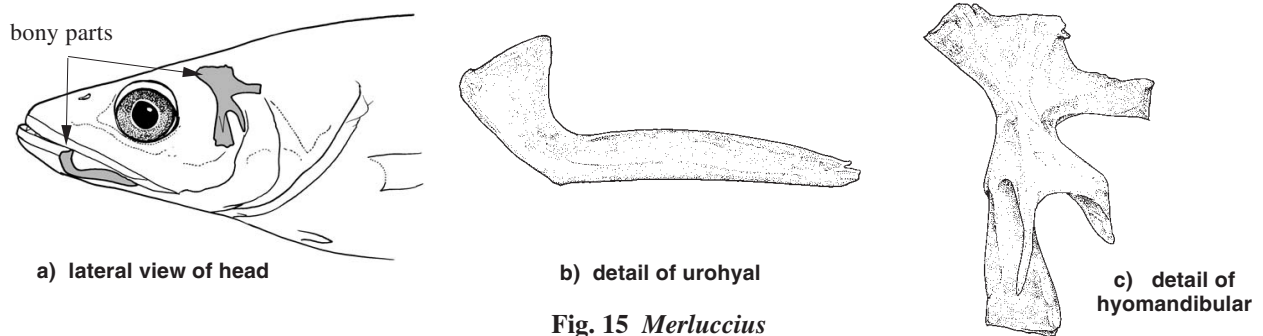


Fig. 15 *Merluccius*

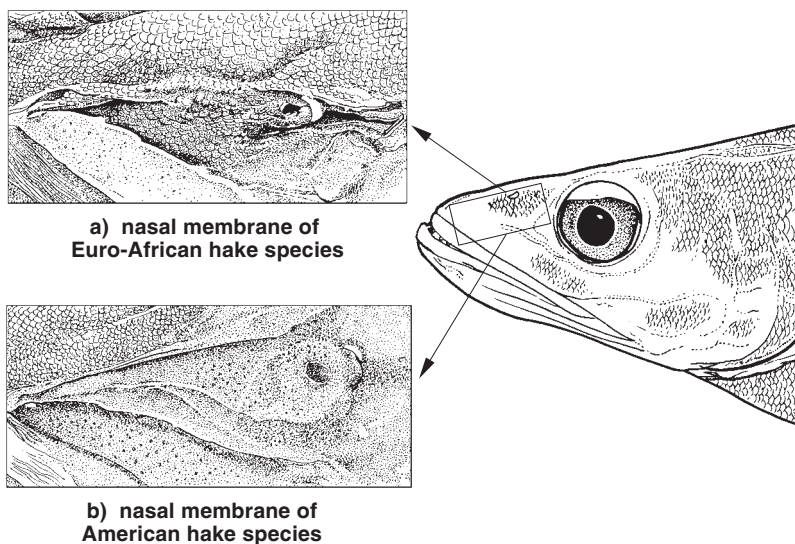


Fig. 16 Head scales

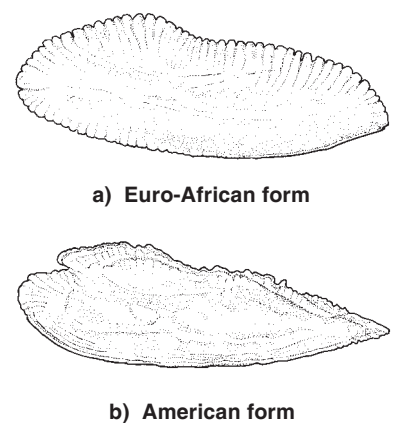


Fig. 17 *Merluccius* otoliths (sagitta)