

**Synonyms** : Coryphaenoididae Gilbert & Hubbs, 1916; Macrouroididae Smith & Radcliffe, 1912.

**FAO Names** : **En** - Grenadiers, Rattails, Whiptails; **Fr** - Grenadiers; **Sp** - Colas de ratón, Granaderos, Ratones.

**General Features** : Trunk short; tail compressed and greatly elongated, tapering to a slender point that lacks a caudal fin (except in *Trachyrincus* which has a small caudal fin; other species may develop what appears to be a caudal fin when the tail tip is broken off and the dorsal and anal rays overgrow the broken end). Head small to enormously inflated; shape compressed, rounded, or cylindrical, with a bluntly rounded to sharply pointed snout; mouth large and terminal to small and inferior; chin barbel usually present; eyes moderate to very large in most; teeth on premaxilla and mandible only, none on roof of mouth; arrangement on jaws variable from sparse single series of enlarged canines to broad villiform bands; gillrakers tubercular in most, long and slender in subfamilies Bathygadinae, Macrouroidinae and *Trachyrincinae*; branchiostegal rays 6 or 7 (rarely 8). Dorsal fins two, except in Macrouroidinae with one; first dorsal high, the two anteriormost rays spinous except in *Trachyrincinae* and Macrouroidinae; first spinous ray minute and closely appressed to base of long stiff second ray; second dorsal and anal fins long, usually with more than 80 rays, both fins meet at tip of tail; pectoral fins narrow-based, positioned high on trunk; pelvic fins narrow-based, thoracic to almost jugular in position, with 5 to 17 rays (fin absent in **Macrouroides**). Anus closer to pelvic fins than to anal fin in some species; a light organ present on ventral midline of trunk in some species. Scales cycloid, but exposed field of each scale often covered with sharp spinules sometimes arranged in ridgelike rows; a stout terminal, scutelike scale at tip of snout in some species; ridgelike rows of coarse, scutelike scales on head of some species. A well developed swimbladder in all but the bathypelagic species (lost or rudimentary); retia and gasglands usually 2 to 6 (to as many as 11 in a few species).

**Habitat, Distribution and Biology** : This is a large, diverse family of about 300 species of primarily benthopelagic deep-sea fishes; a few species are bathypelagic. Grenadiers occupy all oceans, except the high Arctic, and almost all basins with deep oceanic connections; none normally occur in depths shallower than about 100 m, but many are found at abyssal depths, one species to more than 6 000 m; most species are found between 200 m and 2 000 m. In the Pacific, members of the family apparently compose the greatest vertebrate biomass at depths of 2 000 to 6 000 m. Their size ranges from about 25 cm to more than 1.5 m.

Marshall (1973) provides a thorough summary of much of what is known about the anatomy and biology of the group. Gordon (1979) adds to this with interesting views of their life style and phenology in relation to age, growth, reproduction and feeding. Little is known about the reproduction, early life history, and biology of even the most common species. Marshall (1973) suggests that eggs are spawned near the bottom but float slowly surfaceward; the newly hatched larvae live near the seasonal thermocline; the older and metamorphosing individuals live deeper and closer to the bottom. Food of these fishes is highly variable depending on the species and life stage and consists of a wide range of fish and both benthic and pelagic invertebrates. Bathypelagic larvae are known to gorge themselves on pelagic copepods. In some species, the young feed primarily on small benthic invertebrates whereas the adults feed on larger pelagic organisms such as decapod crustaceans, fish, and cephalopods.

**Interest to Fisheries** : Except for four species, the present economic importance of most grenadiers is minimal, although many species are taken by commercial bottom trawlers as bycatch and used either fresh or processed, for fishmeal and fish paste. The roundnose grenadier (*Coryphaenoides rupestris*) has been the source of an important fishery in the North Atlantic for the past two decades. Three species of *Macrourus* (*M. berglax* in the North Atlantic and *M. carinatus* and *M. holotrachys* in the South Atlantic) are also commercially targeted. The giant grenadier (*Albatrossia pectoralis*) of the North Pacific was the source for a large Soviet trawl fishery in the Okhotsk and Bering seas in the sixties; but after a period of reduced effort, the catch has increased in recent years. The Pacific grenadier (*Coryphaenoides acrolepis*) is taken in small quantities by a few vessels off California and sold as fillets in the fresh-fish market. Numerous species taken off Japan are used for fish paste. Catch statistics are not available for grenadiers in most countries so their use is generally unknown.

The total catch of Macrouridae reported to FAO for 1987 amounted to 51 226 metric tons, of which 20 846 t corresponded to *Coryphaenoides rupestris* in the western and eastern North Atlantic and 30 380 t to other species in the southwestern Atlantic (mostly *Macrourus*) and in the northwestern Pacific. Furthermore, 33 173 t of unidentified gadiforms were reported for 1987, of which a large proportion probably corresponded to macrouroids.

The statistical data for the past decade show a decreasing trend for the catches of *Coryphaenoides rupestris* in the western North Atlantic, (in excess of 100 000 t in 1975) while the catches of *Macrourus* in the southwestern Atlantic are rapidly increasing.

**Remarks :** The arrangement of this family follows Marshall (1973) and Iwamoto (1989), although it is recognized that other classifications, particularly that of Howes (1988, 1889), may be found to more truly reflect phylogenetic relationships. Evidence for the removal of bathygadines from the suborder Macrouroidea is strong, and supportive of long-held ideas that this group of rattails is quite different from others generally included in the Macrouridae. Each of the remaining three subfamilies have also been treated as distinct families, but for now, it is convenient to treat them in a traditional manner, as they appear more closely related to each other than to any other gadiform group.

The individual treatment of genera and species is spotty, although all genera are included in appropriate keys in the subfamily descriptions, and a figure of a representative of each genus is provided. The decision to include an account of a genus or species was based on its current or potential interest to the fishing industry. This effectively eliminated the abyssal and bathypelagic grenadiers, and those species that are very small (e.g., *Hymenocephalus*) or are known only from few captures.

Because taxonomic information on genera and species were based on sometimes incomplete or inadequate descriptions or illustrations from the literature, part of the keys and diagnoses presented in the catalogue should be considered as tentative. Some features used in keys (e.g. posterior extent of upper jaw and naked areas on head in *Coryphaenoides*) may prove inadequate or insufficient to separate some species with certainty. In general, the keys are not designed for identifying juveniles which often differ from adults in some key characters. Furthermore, when using the keys, it should be understood that they are usually based on near-average counts or measurements applicable to about 80 to 90% of the population, but do not necessarily account for possible individual variations not yet studied due to inavailability of enough material. In the case of couplets of keys using a combination of characters rather than a single feature, the user should make sure that all of them agree with the specimen examined (because of possible overlapping in range of individual characters).

Characters given in Distinguishing Features sections may not always be comparable because data were gathered from many different sources. To aid comparisons, an attempt was made to keep descriptions as closely parallel as possible within each genus treated. Although the descriptions have been gleaned heavily from the literature, much of the data are supplemented from my own examination of specimens.

**Key to Subfamilies**

- 1a. One continuous dorsal fin, anterior portion not elevated; pelvic fins absent or small, with 5 rays. Head massive, soft, greatly inflated (Fig. 173) ..... **Macrouroidinae**
- 1b. Two dorsal fins, the first elevated; pelvics with 6 to 17 rays. Head shape variable
  - 2a. Second dorsal fin better developed than anal fin and starting close behind first dorsal (Figs 175,176). Outer gill rakers on first arch slender, lathlike, not tubercular (Fig. 174a). Outer gill slit not restricted by folds of skin connecting upper and lower extent of first gill arch with operculum
  - 2b. Second dorsal fin better developed than anal fin and starting close behind first dorsal (Figs 175,176). Outer gill rakers on first arch tubercular
  - 3a. Snout long, pointed; mouth inferior; body scales spinous, with rows of enlarged scutes along dorsal and anal fins. A post-temporal fossa present (Fig. 175) ..... **Trachyrincinae**

