Mycteroperca rosacea (Streets, 1877) Fig. 476; Pl. XXVIIIA **SERRAN Myct 12**

Epinephelus rosaceus Streets, 187751 (type locality: Angel Island, Gulf of California).

Synonyms: ***Mycteroperca pardalis*** Gilbert, 1892551 (type locality: La Paz Bay, Baja California).

FAO Names: En - Leopard grouper; **Fr** - Mérou leopard; **Sp** - Cabrilla sardinera.

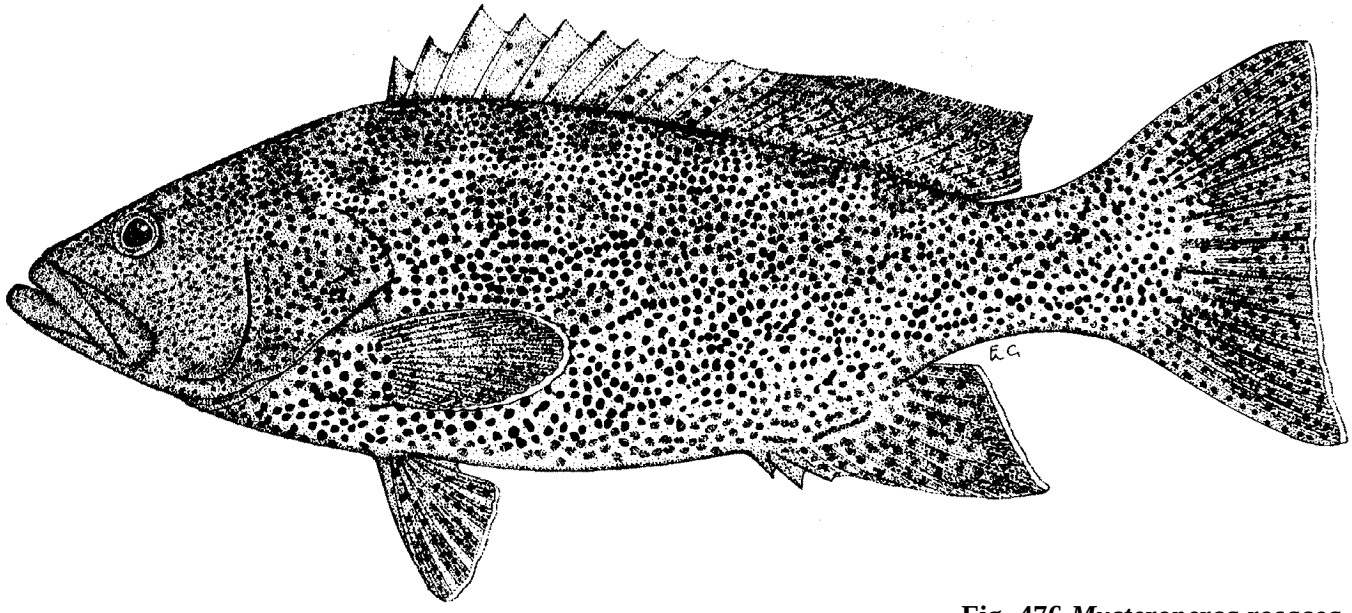

Fig. 476 ***Mycteroperca rosacea***
(about 560 mm standard length)

Diagnostic Features: Body depth less than or subequal to head length, depth contained 2.7 to 3.1 times in standard length (for fish 11 to 61 cm). Head length contained 2.6 to 2.8 times in standard length; preopercle angle of adults with a weakly-developed serrate lobe; posterior nostrils of large adults 2 or 3 times larger than anterior nostrils. Total gill rakers 38 to 43, more than 21 rakers on lower limb. Dorsal fin with XI spines and 16 to 18 rays, the interspinous membranes distinctly indented, the margin of soft-rayed part of fin in large adults with a low point posteriorly; anal fin with III spines and 10 or 11 rays, the fin margin pointed (except in small juveniles) with fifth or sixth ray elongated; pectoral-fin rays 15 to 17; no exserted fin rays; caudal fin truncate or concave posteriorly, without exserted rays projecting beyond the fin membranes. Midlateral-body scales ctenoid; lateral-line scales 72 to 77; lateral-scale series 106 to 120. **Colour:** Two colour patterns: the more common one is greenish to greyish brown, covered with small reddish brown spots and irregular pale spots and lines, the fins with a white margin; the second pattern is exhibited by a few juveniles (less than 5%) that change from the usual brown-spotted pattern to a bright yellow-orange, often with a few irregular black spots.

Geographical Distribution: Eastern Pacific, from southwest coast of Baja California throughout the Gulf of California to Jalisco, Mexico (Fig. 477).

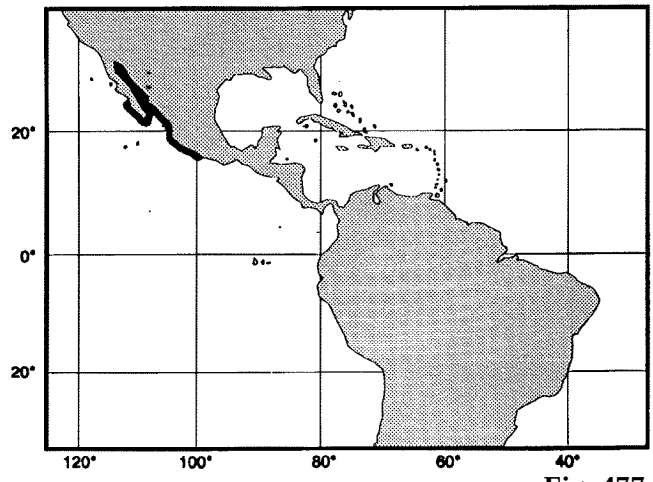

Fig. 477

Habitat and Biology: ***M. rosacea*** prefers rocky areas in shallow water, and it is not found deeper than 50 m. Hobson (1968) did an intensive study of the predatory behaviour of this pecies. Adults feed primarily on the flatiron herring, *Harengula thrissina* (Jordan and Gilbert), and anchoveta, *Cetengraulis mysticetus* (Günther), when these schooling species are available. If these clupeiods are not available, adults feed on other schooling fishes and, to a lesser extent, on non-schooling fishes. Most feeding occurs at dawn and dusk, with a peak in activity about 20 minutes after sunset. Schooling fishes are usually attacked from below, with a quick rush that often carries the fish right out of the water. Juvenile ***M. rosacea*** (less than 30 cm) feed throughout the day on a variety of benthic fishes and crustaceans, but they also take schooling fishes at dawn and dusk and some prey at night. Juveniles and small adults often follow other fishes (especially moray eels) and octopus that are foraging over the reef in order to catch small fishes and invertebrates flushed out by the foraging species (Strand, 1988).

Size: Maximum total length about 70 cm.

Interest to Fisheries: This abundant species is undoubtedly important in local fisheries of the Gulf of California. It is caught with hook-and-line and speared by divers.

Local Names: MEXICO: Cabrilla calamaria, Cabrilla pintita, Golden grouper.

Literature: Rosenblatt and Zahuranec (1967); Thomson et al. (1979); Montgomery (1975).

Remarks: ***M. rosacea*** has more gill rakers than any of the other species of ***Mycteroperca*** in the eastern Pacific. It also differs from ***M. prionura*** and ***M. xenarcha*** in lacking the exserted caudal-fin rays that are typical of large adults of these two species.

Mycteroperca rubra (Bloch, 1793) Fig. 478; Pl. XXVIIIB **SERRAN Myct 6**

Epinephelus ruber Bloch, 1793:22, pl. 331 (type locality probably eastern Atlantic or Mediterranean; given erroneously by Bloch as “Japan”).

Synonyms: ?***Serranus nebulosus Cocco,*** 1833:21 (type locality: Messina; preoccupied by ***Serranus nebulosus*** Valenciennes, 1828). ?***Serranus tinca*** Cantraine, 1835:207 (type locality: Messina). ***Cerna macrogenis*** Sassi, 1846:139 (type locality: Ligurian Sea).?***Serranus armatus*** Osorio, 1895:174 (type locality: eastern Atlantic, São Tome).

FAO Names: En - Mottled grouper (formerly: Comb grouper); **Fr** - Badèche rouge (formerly: Mérou royale); **Sp** - Gitano.

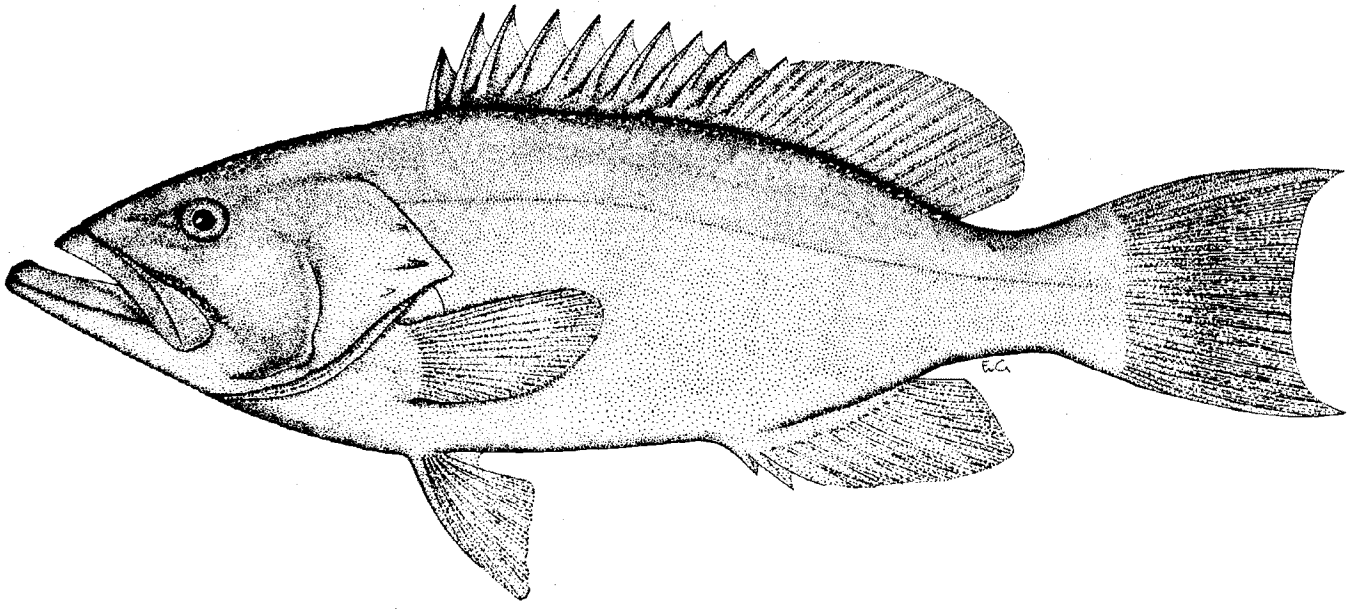

Fig. 478 ***Mycteroperca rubra***
(490 mm standard length)

Diagnostic Features: Body oblong, compressed, the depth less than head length, depth contained 2.8 to 3.2 times in standard length (for fish 17 to 59 cm standard length). Head length contained 2.5 to 2.7 times in standard length; interorbital area convex; preopercle serrae enlarged at the angle, forming a rounded lobe set off by the indentation immediately above; nostrils subequal in juveniles, the diameter of rear nostrils about twice that of front ones in a fish of 59 cm standard length; maxilla width 3.8 to 4.5% of standard length for fish 17 to 37 cm standard length, 4.8% of standard length for a fish of 59 cm standard length. Gill rakers 16 to 18 on upper limb and 28 to 31 on lower limb (including 1 to 3 rudiments on each limb), total 44 to 49. Dorsal fin with XI spines and 15 to 17 rays, the interspinous membranes distinctly indented, the posterior margin of fin rounded; anal fin with III spines and 11 or 12 rays, the fin margin angular in adults; pectoral-fin rays 16 or 17; caudal-fin margin convex in juveniles less than about 20 cm standard length, truncate in fish of 20 to 50 cm standard length, and concave in adults over 50 cm standard length. Lateral-line scales 69 to 76; lateral-scale series 94 to 108. **Colour:** Generally uniform reddish brown; sometimes mottled with blackish or pale grey spots; a black streak above maxilla. Juveniles with a black saddle blotch on peduncle.

Bauchot and Pras (1980:pl. 10) show a brownish fish with irregular white spots and blotches on body, dorsal part of head and dorsal fin; 2 dark stripes from eye towards pectoral fin.

Geographical Distribution: Continental shores of the eastern Atlantic Ocean from Portugal to southern Angola. Probably all of the records of ***"Mycteroperca rubra"*** from the Mediterranean and shores of Europe and Africa are based on this species. We have examined specimens from Italy, Lebanon, Israel, Egypt, Algiers, and Angola (Fig. 479). Reports of ***M. rubra*** from islands of the eastern Atlantic require confirmation; all of the 18 specimens of ***Mycteroperca*** that Heemstra (1991) examined from Madeira, the Azores, the Canary Islands, and the Cape Verde Islands are ***M. fusca.***

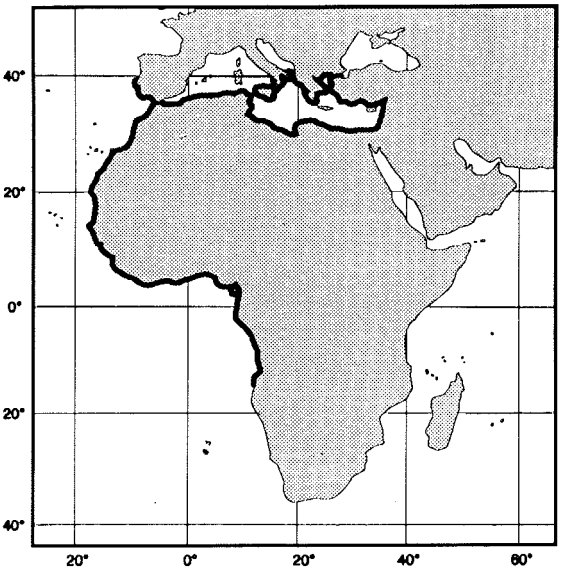

Fig. 479

Habitat and Biology: Rocky and sandy bottoms in depths of 15 to 200 m. According to Bini (1968) ***M. rubra*** feeds on molluscs (presumably cephalopods) and small fishes.

Size: Maximum total length at least 80 cm. We examined a 59 cm standard length (75 cm total length) specimen from Angola at the Museu Bocage in Lisbon.

Interest to Fisheries: ***M. rubra*** is probably of some commercial importance in fisheries of the Mediterranean and along the west coast of Africa. In the Mediterranean, it does not seem to be as common as species of ***Epinephelus.*** Bouain et al. (1983) state that it is rare in Tunisian waters. According to Séret (1981) it is very common along the coast of Senegal.

Local Names: FRANCE: Badèche rouge, Mérou royal; GREECE: Piga; ITALY: Cernia rossa; ISRAEL: Miktorit; PORTUGAL: Badejo; SPAIN: Gitano; TURKEY: Tashanisi.

Literature: We presume that all of the literature based on ***"Mycteroperca rubra"*** from the continental coast of Africa and the Mediterranean pertains to ***M. rubra*** rather than ***M. fusca*** (which is known only from islands of the eastern Atlantic) or ***M. acutirostris*** (of the western Atlantic). The accounts of ***M. rubra*** by Smith (1971) and Tortonese (1975 and 1986) pertain to all three species, but the gill-raker counts given by Smith (1971:208) are of ***M. acutirostris,*** and those given by Tortonese are of ***M. rubra.*** Furnestin et al. (1958) and Séret (1981) published good illustrations of ***M. rubra.***

Remarks: Recent authors (Smith, 1971; Tortonese, 1975, 1986; Bauchot, 1987) have regarded ***M. rubra*** as occurring on both sides of the Atlantic Ocean. Heemstra (1991) restricted this species name to the eastern Atlantic continental population, which differs from ***M. acutirostris*** of the western Atlantic in having fewer gill rakers (lower-limb rakers 28 to 31, versus 32 to 36 in ***M. acutirostris***) and a narrower maxilla (maxilla width 3.8 to 4.5% of standard length for 7 fish of 12 to 37 cm standard length, versus 4.4 to 5.8% of standard length in 13 ***M. acutirostris*** of 10 to 34 cm standard length). ***M. rubra*** is very similar to ***M. fusca*** of the eastern Atlantic Macaronesian islands, but the latter has only 20 to 24 lower gill rakers.

In the original description of ***Epinephelus ruber*** Bloch, the type locality was given erroneously as "Japan". Gill-raker counts of the holotype of ***M. rubra*** (17 on upper limb and 31 on lower limb of left side and 18 on upper limb and 31 on lower limb of right side) indicate that it came from the continental shores of the eastern Atlantic.

Mycteroperca tigris (Valenciennes, 1833) Fig. 480; Pl. XXVIIIC,D **SERRAN Myct 7**

Serranus tigris Valenciennes in Cuv. and Val., 1833:440 (type locality: Santo Domingo, Dominican Republic).

Synonyms: ***Serranus camelopardalis*** Poey, 1860:132 (type locality: Cuba). ***Serranus felinus*** Poey, 1860:134 (type locality: Cuba). ***Serranus rivulatus*** Poey, 1860:135 (type locality: Cuba). ***Serranus repandus*** Poey, 1860:135 (type locality: Cuba). ***Trisotropis reticulatus*** Gill, 1865:105 (type locality: Barbados). ***Mycteroperca hopkinsi*** Jordan and Rutter, 1898:105 (type locality: Jamaica).

FAO Names: En - Tiger grouper; **Fr** - Badèche tigre; **Sp** - Cuna gata.

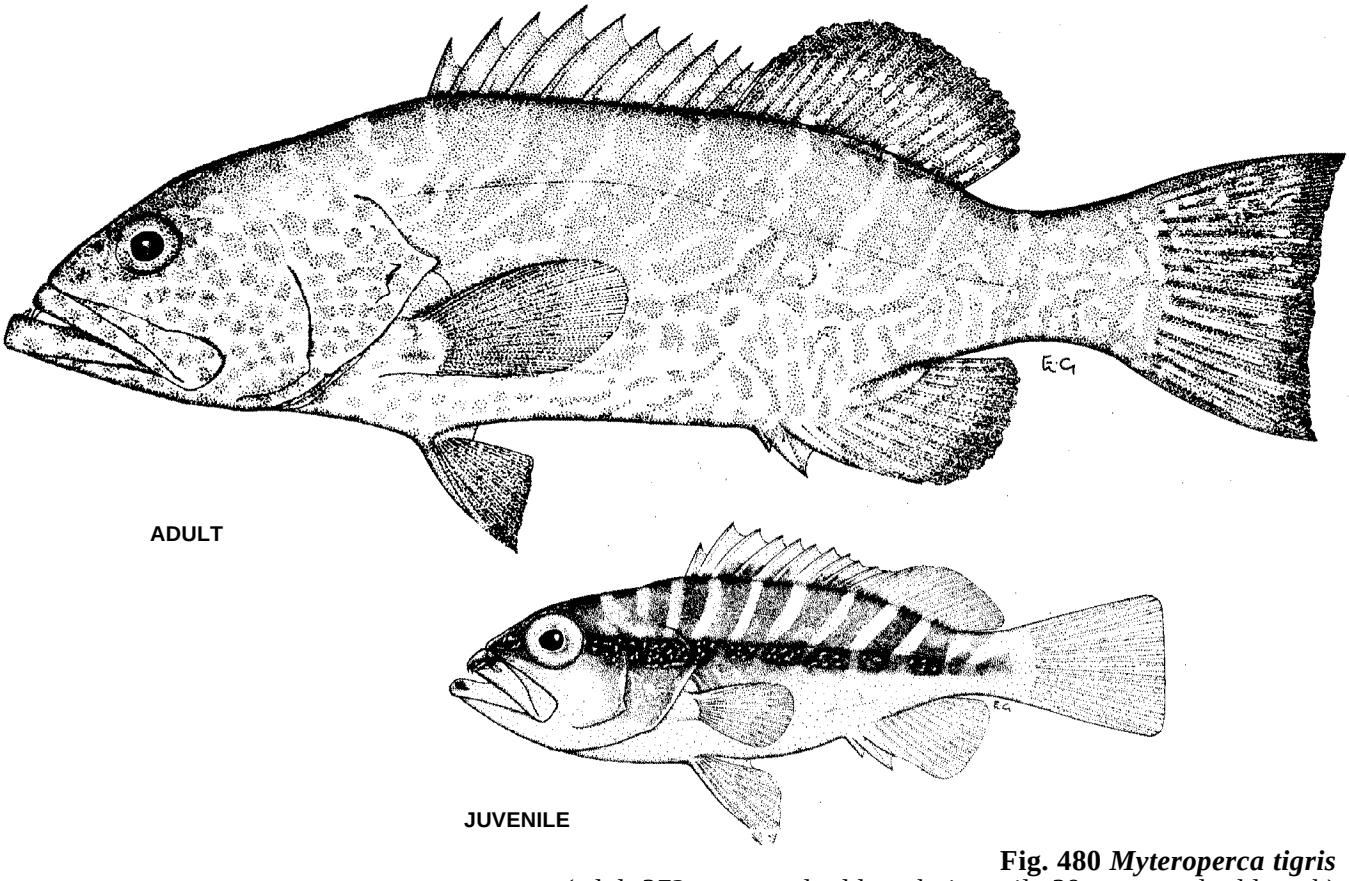

Fig. 480 ***Myteroperca tigris***
(adult 372 mm standard length, juvenile 39 mm standard length)

Diagnostic Features: Body depth less than head length,,depth contained 3.1 to 3.6 times in standard length (for fish 19 to 43 cm standard length). Head length contained 2.5 to 2.8 times in standard length; interorbital area flat; preopercle rounded, without a lobe at "corner"; diameter of posterior nostrils 3 to 5 times larger than anterior nostrils in fish larger than 40 cm; teeth large, canines well developed. Gill rakers short, 8 on upper limb and 15 to 17 on lower limb (including 5 or 6 rudiments on upper limb and 8 or 9 on lower limb), total 23 to 25. Dorsal fin with XI spines and 15 to 17 rays, the interspinous membranes distinctly indented; anal fin with III spines and 11 rays; in large adults the soft dorsal and anal fins are pointed, with the middle rays elongate; pectoral-fin rays 17; caudal fin rounded in juveniles, truncate to emarginate in adults; in fish larger than 60 cm, the caudal-fin rays are exserted. Midlateral-body scales ctenoid in juveniles, smooth in adults; lateral-line scales 82 to 83; lateral-scale series about 120. **Colour:** Adults greenish brown to brownish grey with pale rivulations; head and body darker dorsally, with 9 to 11 wavy oblique pale stripes; median fins with irregular pale spots and stripes; pectoral fins pale yellow distally. Live coloration of small juveniles (25 to 100 mm standard length) yellow, with a blackish brown midlateral stripe from tip of lower jaw through eye and along body almost to caudal fin (P. Colin, pers. comm.). The longitudinal stripes of the left and right sides do not meet on the lower jaw, and they become fainter with growth, being mostly obscured by the dark oblique dorsal bars of the adult colour pattern on fish of about 20 cm standard length. Bardach et al. (1958:fig. 2a) illustrated a juvenile 39 mm standard length with the bicoloured pattern of preserved specimens: the dorsal half of head and body is dark, crossed by 11 oblique pale lines.

Geographical Distribution: Western Atlantic: Bermuda, south Florida, Gulf of Mexico, Bahamas, Cuba, Haiti, Jamaica, Virgin Islands, Venezuela, and probably throughout the Caribbean to southern Brazil. Dennis and Bright (1988b) suggested that ***M. tigris*** was transient species in the northwestern Gulf of Mexico, but that it has recently become abundant on the Flower Gardan Banks off Texas (Fig. 481).

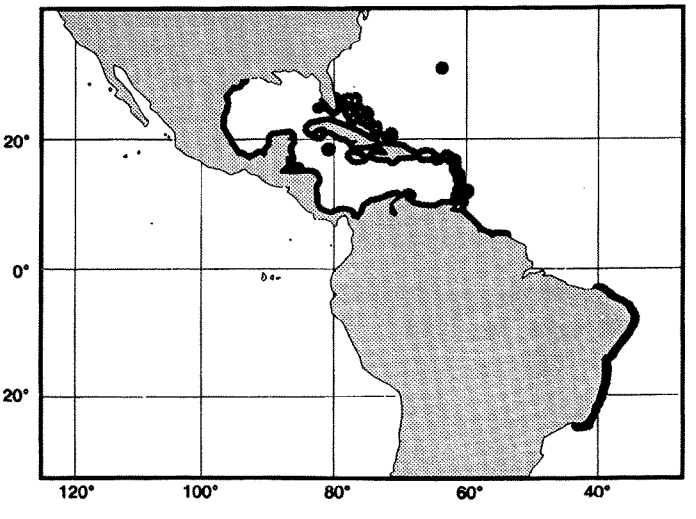

Fig. 481

Habitat and Biology: Coral reefs and rocky bottom in depths of 10 to 40 m; common in shallow water at Bermuda (C.L. Smith, 1958). The size versus sex distribution of the Bermuda population indicates that ***M. tigris*** is a protogynous hermaphrodite: all fish less than 37 cm total length were females and all fish larger than 45 cm total length were males (Smith, 1958).

Randall (1967) found that the food of 59 specimens of 15 to 57 cm standard length were 100% fishes of a variety of species. According to Nagelkerken (1981), ***M. tigris*** does not cruise over the reef like ***M. interstitialis;*** instead, it is an ambush predator that hides among the coral and sponges and is easy for divers to approach.

Size: Maximum total length 100 cm; maximum weight at least 10 kg.

Interest to Fisheries: ***M. tigris*** is of commercial importance in Bermuda and of minor interest in the Caribbean area. Caught with traps, hook-and-line (including trolled lures), and with spear.

Local Names: BERMUDA: Gag; CUBA: Bonaci gato.

Literature: Smith (1971); Cervigón and Velasquez (1966); Munro (1983); Bullock and Smith (1990).

Remarks: In addition to its colour pattern, ***M. tigris*** differs from the other western Atlantic species of ***Mycteroperca*** in having fewer gill rakers (9 to 16 developed rakers on lower limb in the other species) and the interorbital part of the head is flat (convex in the other species). ***M. venenosa*** and ***M. bonaci*** also have the rear nostrils of adults not much bigger than the anterior nostrils and no exserted caudal-fin rays. ***M. phenax, M. interstitialis,*** and ***M. microlepis*** also have a prominent serrated lobe at the corner of the preopercle.

Mycteroperca venenosa (Linnaeus, 1758) Fig. 482; Pl. XXVIIIE, F **SERRAN Myct 8**

Perca venenosa Linnaeus, 1758:292 (type locality: America).

Synonyms: ***Bonaci cardenal*** Parra, 1787:29, pl. 16, fig. 1 (type locality: Cuba). ***Bodianus apua*** Bloch, 1790:50, pl. 229 (type locality: probably Brazil, based on a drawing in the collection of Prince Maurice). ***Johnius guttatus*** Bloch and Schneider, 1801:77 (type locality: Cuba; after Parra, 1787). ***Bodianus marginatus*** Bloch and Schneider, 1801:331 (type locality: probably Brazil; after Marcgrave). ***Serranus cardinalis*** Valenciennes in Cuv. and Val., 1828:378 (type locality: Cuba; after Parra). ***Serranus rupestris*** Valenciennes in Cuv. and Val., 1833:437 (type locality: Santo Domingo, Dominican Republic). ***Serranus petrosus*** Poey, 1860:136 (type locality: Cuba). ***Mycteroperca bowersi*** Evermann and Marsh, 1902:158, fig. 45 (type locality: Culebra Island, Puerto Rico).

FAO Names: En - Yellowfin grouper; **Fr** - Badèche de roche; **Sp** - Cuna de piedra.

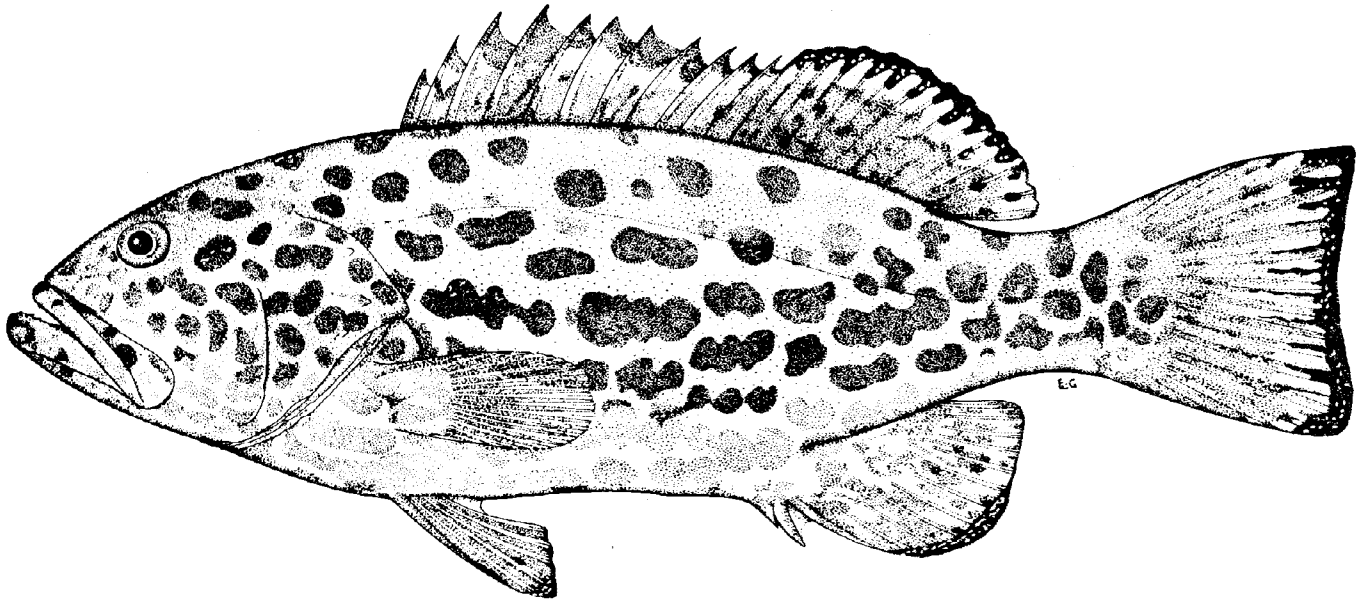

Fig. 482 ***Mycteroperca venenosa***
(235 mm standard length)

Diagnostic Features: Body depth less than head length, depth contained 2.9 to 3.2 times in standard length (for fish 15 to 54 cm standard length). Head length contained 2.6 to 2.9 times in standard length; interorbital area convex; preopercle evenly rounded or with a slight notch, but no projecting bony lobe at the angle; nostrils subequal or rear nostrils about twice diameter of anterior nostrils. Gill rakers 8 to 10 on upper limb and 17 or 18 on lower limb, including 4 to 7 rudiments on each limb, total 24 to 27. Dorsal fin with XI spines and 15 or 16 rays, the interspinous membranes distinctly indented between the spines; anal fin with III spines and 10 to 12 rays; soft dorsal- and anal-fin margins rounded; no exserted dorsal- and anal-fin rays; pectoral-fin rays 16 to 18; caudal fin truncate in juveniles, concave in adults. Midlateral-body scales ctenoid in juveniles, smooth in adults, with numerous auxiliary scales; lateral-line scales 72 to 81; lateral-scale series 111 to 125. **Colour:** Two colour morphs: a deep-water reddish form and a shallow-water greenish form; both colour morphs show the following markings: head and body with oblong dark blotches overlying groups of small black spots; ventral part of head and body with small, dark red spots; soft dorsal, anal, and caudal fins with dark margin and white edge; distal third of pectoral fins abruptly yellow, the basal part of fin with small, irregular dark spots.

Geographical Distribution: Western Atlantic: Bermuda (common), Bahamas, Gulf of Mexico (rare), Cuba, Jamaica, Virgin Islands, Honduras, Nicaragua, Venezuela (common at Islas Los Roques and Blanquilla), and south to São Paulo, Brazil (Fig. 483).

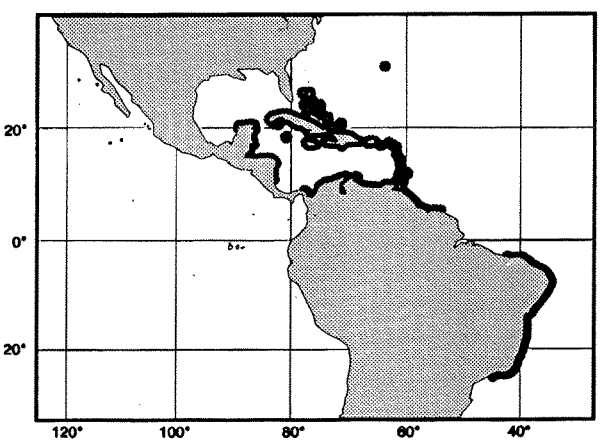

Fig. 483

Habitat and Biology: Juveniles occur in shallow turtle grass beds; adults are usually found on rocky and coral reefs in depths of 2 to 137 m, but ***M. venenosa*** has also been taken in trawls over mud bottom in the northern Gulf of Mexico. Spawning occurs at Bermuda in July, in the Florida Keys during March, and on the Florida Middle Ground in the eastern Gulf of Mexico from March to August. Batch fecundity estimates of vitellogenic eggs for two ripe fish, 696 and 725 mm standard length, (from data of Bullock and Smith, 1991) are 2.0 x 10^6 and 2.8 x 10^6 respectively. Ovulated eggs were 0.80 to 1.16 mm in diameter, transparent with a single oil droplet. Ripe males as small as 54 cm standard length were found in the Florida Keys population. The egg count of 1 425 443 given by C.L. Smith (1961) for a fish of unspecified length with a gonad weighing only 120.8 g and a sample of gonad tissue with 1 003 eggs weighing 0.85 g, is wrong by a factor of 10; the correct egg total for this gonad is

(120.8/0.85) x 1003 = 142 544 eggs.

Randall (1967) examined the stomach contents of 51 ***M. venenosa*** (18 to 75 cm standard length); the food was 95% fishes (mainly coral reef species) and 4% squid.

Size: Attains at least 90 cm total length. The 1990 edition of World Record Game Fishes published by the International Game Fish Association list the all-tackle record for ***M. venenosa*** as a 15.43 kg fish caught at Largo, Florida.

Interest to Fisheries: The yellowfin grouper is one of the more important commercial fishes in Bermuda and is one of the most abundant groupers in the Caribbean area. Although it is often implicated in ciguatera poisonings (as its name implies), ***M. venenosa*** is a desirable food fish; and even large (5 to 10 kg) fish from areas considered safe are sold in markets. Caught with traps, spear and hook-and-line (including surface trolling).

Local Names: BERMUDA: Red rockfish, Princess rockfish; CUBA: Bonaci cardenal, Arigua, Bonaci de piedra; VENEZUELA: Cuna cucaracha.

Literature: Cervigón and Velasquez (1966); Brownell and Rainey (1971); Smith (1971); Thompson and Munro (1978); Bullock and Smith, 1991.

Remarks: ***M. cidi, M. interstitialis, M. microlepis,*** and ***M. phenax,*** differ from ***M. venenosa*** in having a projecting bony lobe at the corner of the preopercle; adults of ***M. cidi, M. interstitialis,*** and ***M. phenax*** also have exserted caudal-fin rays; and ***M. microlepis*** has more lateral-line scales (88 to 96). ***M. tigris*** differs from ***M. venenosa*** in having fewer gill rakers (4 to 8 developed rakers on lower limb), interorbital area flat, adults with exserted caudal-fin rays, and rear nostrils 3 to 5 times larger than anterior nostrils. ***M. bonaci*** differs from ***M. venenosa*** in colour pattern.

Mycteroperca xenarcha Jordan, 1888 | Fig. 484 | **SERRAN Myct 13**

Mycteroperca xenarcha Jordan, 1888:387 (type locality: "James Island, Galapagos" [probably erroneous] see Remarks, below).

Synonyms: ***Mycteroperca boulengeri*** Jordan and Starks in Jordan, 1895445, pl. 38 (type locality: Mazatlan, Mexico).

FAO Names: En - Broomtail grouper; **Fr** - Mérou genêt-queue; **Sp** - Mero brujo.

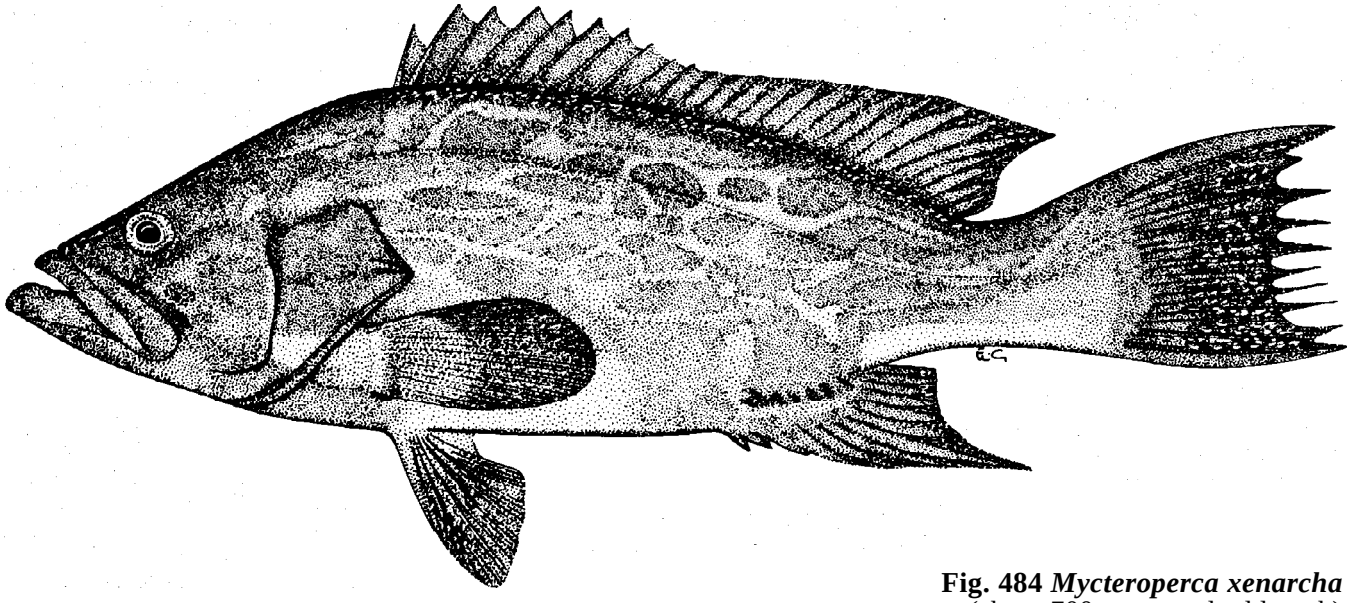

Fig. 484 ***Mycteroperca xenarcha***
(about 700 mm standard length)

Diagnostic Features: Body depth less than head length, depth contained 2.9 to 3.1 times in standard length (for fish 16 to 60 cm standard length). Head length contained 2.6 to 2.8 times in standard length; preopercle angular, with a distinct serrate lobe at the angle; posterior nostrils not notably larger than anterior nostrils. Gill rakers 29 to 33 (total, not counting rudiments). Dorsal fin with XI spines and 15 or 16 rays, the interspinous membranes not indented, the margin of the soft-rayed part becomes pointed (with rays 9 to 11 elongated) in fish larger than 20 cm; anal fin with III spines and 10 or 11 rays, the fin margin also pointed (rays 4 to 6 elongated) in fish larger than 10 cm; pectoral-fin rays 16 to 18; caudal fin truncate, with exserted rays in fish larger than 20 cm standard length. **Colour:** Two colour patterns: The blotched pattern is brown, grey, or greyish green, with oblong dark blotches (most enclosing a pale line) dorsally, close-set in juveniles, forming an irregular maze-like, pale reticulum; in adults the dark blotches are more widely spaced, with the pale reticulum expanded to form a general pale ground colour; ventral part of body with irregular dark elongate markings; juveniles with conspicuous black saddle on caudal peduncle. The plain colour pattern is uniform greyish or brown, the fins darker and edged with white. Large adults are mostly plain, but may assume the blotched pattern momentarily.

Geographical Distribution: Eastern Pacific: Southern California (one sight record from San Francisco Bay), Baja California, Gulf of California south to Peru (Fig. 485). One record (the holotype) purported to be from the Galapagos; see Remarks below.

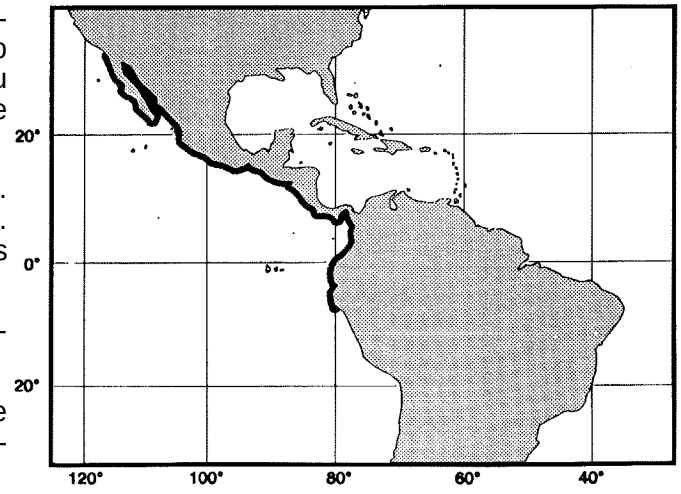

Fig. 485

Habitat and Biology: According to Thomson et al. (1979), ***M. xenarcha*** prefers mangrove estuaries. Adults and juveniles occur in shallow water, and adults are also found to depths of 60 m.

Size: Maximum total length about 150 cm; maximum weight at least 45 kg.

Interest to Fisheries: Because of its large size, the broomtail grouper is of interest to anglers and spearfishermen.

Local Names: MEXICO: Mangrove grouper (Gulf of California).