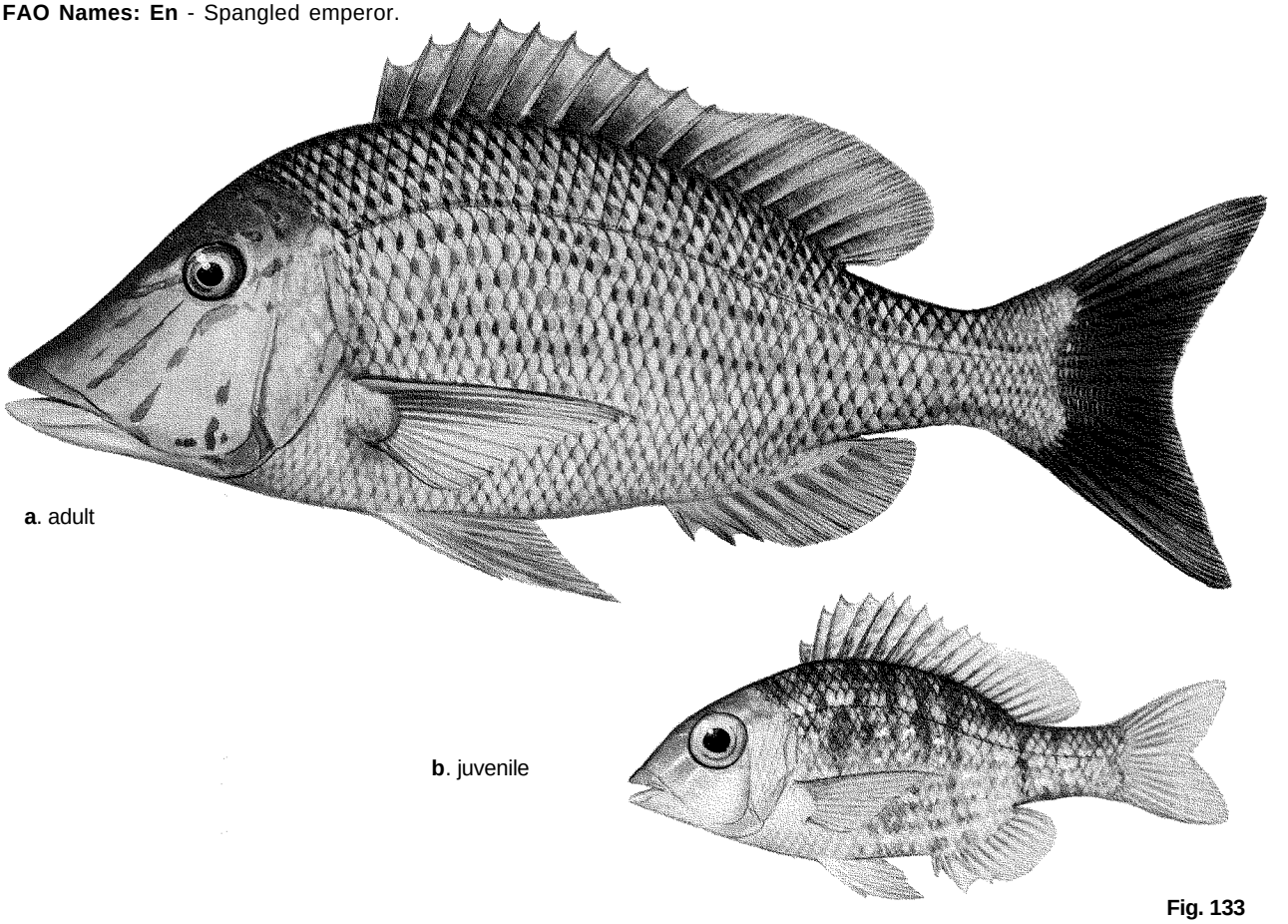
Lethrinus nebulosus (Forsskål, 1775) Fig. 133, Plate VI, 35, 36 **LETH Leth 15**

Sciaena nebulosa Forsskål, 1775, Descrip.Animal.:xi, 52 (Arabia).

Synonyms: ***Lethrinus choerorynchus*** Bloch & Schneider (1801); ***Lethrinus alboguttatus*** Valenciennes (1830); ***Lethrinus centurio*** Valenciennes (1830); ***Lethrinus erythrurus*** Valenciennes (1830); ***Lethrinus esculentus*** Valenciennes (1830); ***Lethrinus fasciatus*** Valenciennes (1830); ***Lethrinus fraenatus*** Valenciennes (1830); ***Lethrinus gothofredi*** Valenciennes (1830); ***Lethrinus karwa*** Valenciennes (1830); ***Lethrinus korely*** Valenciennes (1830); ***Lethrinus maculatus*** Valenciennes (1830); ***Lethrinus cyanoxanthus*** Richardson (1843); ***Lethrinus anatarius*** Richardson (1844); ***Lethrinus guntheri*** Bleeker (1873); ***Lethrinus aurolineatus*** Macleay (1883); ***Lethrinus scoparius*** Gilchrist & Thompson (1908); ***Lethrinus carinatus*** Weber (1913); ***Lethrinus devisianus*** Whitley (1929); ***Lethrinus perselectus*** Whitley (1933).

FAO Names: En - Spangled emperor.



a. adult

b. juvenile

Fig. 133

Diagnostic Features : Body moderately deep, its depth 2.5 to 2.8 times in standard length. Head length 0.9 to 1.0 times in body depth, 2.6 to 2.9 times in standard length, dorsal profile near eye nearly straight, or in large individuals, distinctly concave; snout moderatly long, its length about 1.8 to 2.3 times in head length, measured without the lip the snout is 0.8 to 1.0 times in cheek height, its dorsal profile nearly straight, snout angle relative to upper jaw between 50 and 65 degrees; interorbital space usually convex; posterior nostril an oblong longitudinal opening, closer to orbit than to anterior nostril or, about halfway between orbit and anterior nostril; eye removed from dorsal profile except in some small individuals it is situated fairly dose to dorsal profile, its length 3.8 to 5.5 times in head length; cheek moderatly high, its length 2.6 to 3.0 times in head length; lateral teeth in jaws rounded with points or molars that often have tubercles; outer surface of maxilla smooth or with a longitudinal ridge. Dorsal fin with 10 spines and 9 soft rays, the fourth or fifth dorsal spine usually the longest, its length 2.8 to 3.5 times in body depth; anal fin with 3 spines and 8 soft rays, the first soft ray usually the longest, its length almost equal to or slightly shorter than the length of the base of the soft-rayed portion of the anal fin and 0.6 to 0.8 times in the length of the entire anal fin base; pectoral rays 13; pelvic fin membranes between the rays closest to the body usually with dense melanophores. Lateral-line scales 46 to 48; cheek without scales; 5 ½ scale rows between lateral line and base of middle dorsal fin spines; 16 or 17 scale rows in transverse series between origin of anal fin and lateral line; usually 15 rows in lower series of scales around caudal peduncle; 5 to 9 scales in supratemporal patch; inner surface of pectoral

fin densely covered with scales; posterior angle of operculum fully scaled. **Colour**: body yellowish or bronze, lighter below, centers of many scales with a white or light blue spot, sometimes irregular dark indistinct bars on sides and a square black blotch above pectoral fin bordering below the lateral line; three blue streaks or series of blue spots radiating forward and ventrally from eye; fins whitish or yellowish, the pelvic dusky, the edge of the dorsal fin reddish.

Geographical Distribution : Widespread in the Indo-West Pacific including Red Sea and Arabian (Persian) Gulf, East Africa to southern Japan and Samoa (Fig. 134).

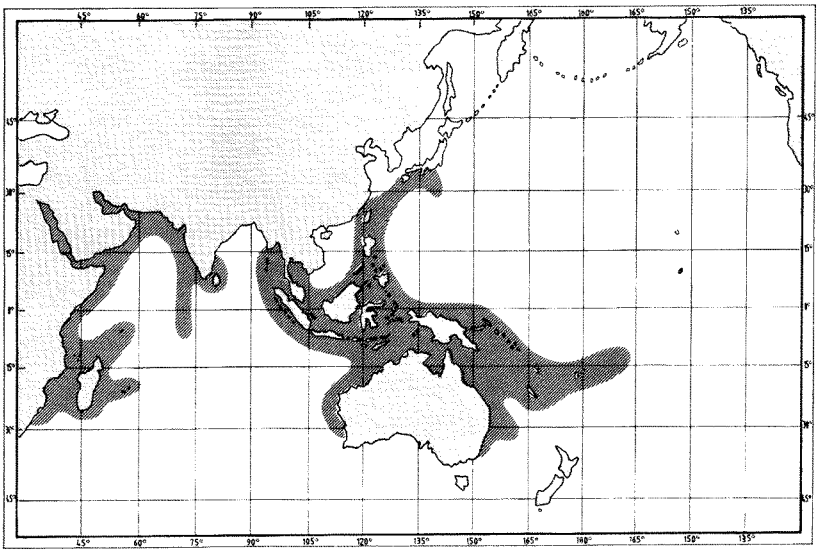


Fig. 134

Habitat and Biology: Inhabits nearshore and offshore coral reefs, coralline lagoons, seagrass beds, mangrove swamps and, coastal sand and rock areas, to depths of 75 m. Adults occur alone or in small schools; juveniles form large schools in shallow, sheltered sandy areas. Feeds primarily on echinoderms, molluscs and crustaceans, and to a lesser extent on polychaetes and fish.

Spawning activity has been reported to peak between April and July in the northern Red Sea, in March to May and September in the Gulf of Aden, between May and June in the northern Arabian (Persian) Gulf, in July and August in Australia and, between July and October in New Caledonia. Mean age at first sexual maturity was found as 4.6 years for males and 5.9 years for females in the northern Red Sea. In the northern Arabian (Persian) Gulf, maturity is reached at around age three for males and age four for females. Length of larval life was found to be 37 days (19.1 mm SL) for one individual that first settled on a coral reef of the Great Barrier Reef, Australia.

Estimates of maximum age (t_{max}), asymptotic length ($L_{infinity}$), coefficient of growth (K), and rate of natural mortality (M) have been made for a number of populations. In the northern Red Sea these are: $L_{infinity}$ = 86 cm total length, K = 0.11, M = 0.3. In the Gulf of Aden they have been estimated as: t_{max} = 21 years, $L_{infinity}$ = 71.6 cm fork length, 85.9 cm fork length, 87.0 cm fork length and 99.9 cm total length, K = 0.21, 0.101, 0.1 and 0.09, and M = 0.88 and M = 0.44. In the northern Arabian (Persian) Gulf they are: t_{max} = 20 years, $L_{infinity}$ = 62.7 cm total length, K = 0.19, and M = 0.36. In Papua New Guinea they are estimated as: $L_{infinity}$ = 54.7 and 55.8 cm fork length, K = 0.41 and 0.31, and M = 0.74 and 0.56. In Fiji they are: $L_{infinity}$ = 80.0 cm fork length, K = 0.23, M = 0.51. In New Caledonia they are: t_{max} = 24 years for males and 27 years for females, $L_{infinity}$ = 50.9 cm standard length for males and 54.3 cm standard length for females, K = 0.22 for males and 0.21 for females, and M = 0.54 for males and 0.51 for females. Length - weight relationships have been estimated as: total weight W (g) = 0.0173 $*L^{3.01}$ (L = total length in cm) in the Arabian (Persian Gulf) and, total weight W (g) = 0.0161 $*L^{2.97}$ (L = total length in cm) in the northern Red Sea.

Size: Maximum total length to around 80 cm, commonly between 20 and 50 cm total length.

Interest to Fisheries: Taken by handlines, traps, trawls, seines and gill nets. It is considered one of the best food fishes in many countries, although in a few areas in the Indian Ocean it is said to sometimes have a disagreeable coppery or iodine taste and smell. Marketed mostly fresh. A favorite sport fish in Kuwait and Australia because it is a powerful and determined adversary on a line. A very important commercial fish in some countries. In New Caldedonia it is the most important commercial fish, reported to comprise around 25% of the total commercial catch.

In Japan, research has been conducted that indicates this species may be used in aquaculture. In China, this species is being cultured in sea cages. It has been shown that ***L. nebulosus*** can survive for long periods in salinities as low as 10 parts per thousand and therefore it is a potential estuarine aquaculture species.

Local Names: AUSTRALIA: Spangled emperor, Sand snapper, Nor'-west snapper, Yellow sweetlip; JAPAN: Hama-fuefuki; KENYA: Changu nyamvi, Tukwana, Kiuwa; KUWAIT: Sheiry; MAURITIUS: Créole, Capitaine créole, Capitaine; MOZAMBIQUE: Husutoni, Ladrao, Tsongue, Phelele; NEW CALDEDONIA: Bec de cane, Lethrinus nuageux; PAKISTAN: Gadeer, Mulla, Starry pigface bream; PHILIPPINES: Bitilya, Katambak, Kilawan; SAUDI ARABIA: Shaoor mehseny, Sheiry; SEYCHELLES: Capitaine rouge, Eclair; SOUTH AFRICA: Blue emperor, Blou keiser; SRI LANKA: Pulii vella meen, Vella meen; TANZANIA: Changu tewa, Changu m'zizi, Changu koko, M'changu.

Literature: Gloerfelt-Tarp & Kailola (1984); Fourmanoir & Laboute (1976); Grant (1982); Lee (1986); Masuda et al. (1984); Randall (1983); Sainsbury et al. (1985); Schroeder (1980); Smith, J.L.B. (1959); Smith, M.M. (1986).

Remarks: This species has had more names applied to it than any other lethrinid. It is widespread and very common throughout its range which is the perhaps the mai n reason for the long list of synonyms; it is easily recognizable both fresh and preserved.

See also remarks under ***L. laticaudis***.

Lethrinus obsoletus (Forsskål, 1775)

Fig. 135, Plate VI, 37

LETH Leth 16

Sciaena obsoleta Forsskål, 1775, Descrip.Animal., :xi, 52 (Arabia).

Synonyms: ***Sciaena ramak*** Forsskål (1775); ***Lethrinus cutambi*** Seale (1909).

FAO Names: En - Orange-striped emperor.

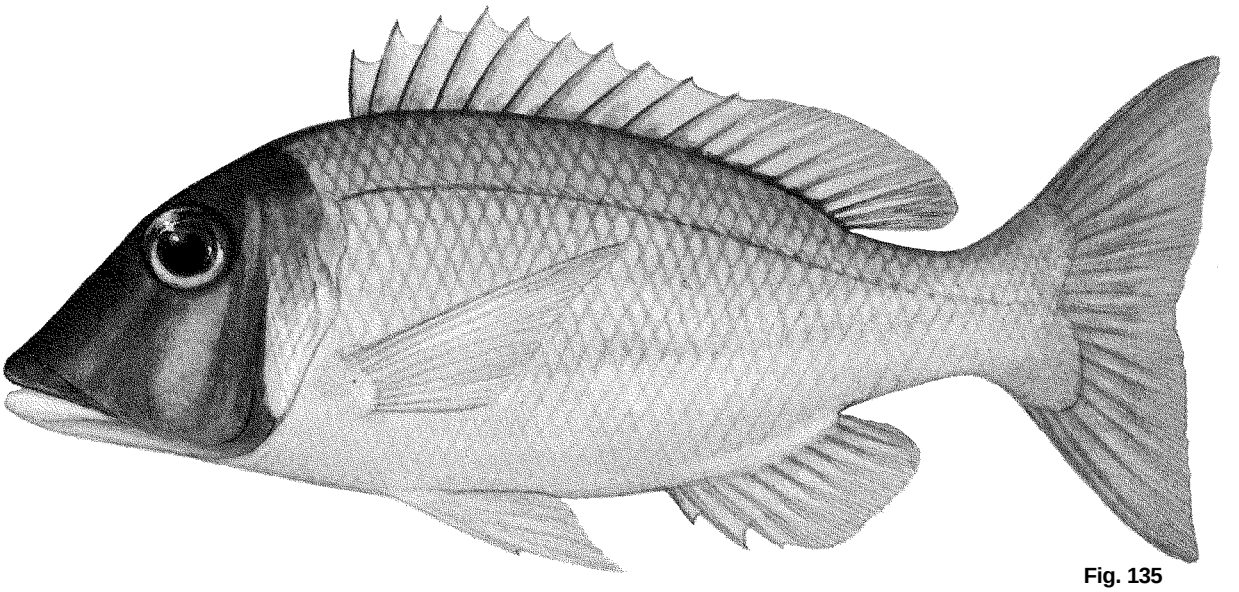


Fig. 135

Diagnostic Features : Body moderately deep, its depth 2.6 to 2.9 times in standard length. Head length 1.0 to 1.1 times in body depth, 2.6 to 2.9 times in standard length, dorsal profile near eye nearly straight or slightly convex; snout length about 1.8 to 2.3 times in head length, measured without the lip the snout is 0.8 to 0.9 times in cheek height, its dorsal profile slightly concave, snout angle relative to upper jaw between 50 and 60 degrees; interorbital space convex; posterior nostril an longitudinal opening, closer to orbit than to anterior nostril; eye situated close to or removed from dorsal profile, its length 3.5 to 5.0 times in head length; cheek length 2.5 to 3.2 times in head length; lateral teeth in jaws conical or rounded; outer surface of maxilla with a distinct knob. Dorsal fin with 10 spines and 9 soft rays, the fourth or fifth dorsal spine the longest, its length 2.5 to 3.4 times in body depth; anal fin with 3 spines and 8 soft rays, the first soft ray usually the longest, its length either almost equal to, longer, or shorter than the length of the base of the soft-rayed portion of the anal fin and 0.7 to 0.8 times in the length of the entire anal fin base; pectoral rays 13; pelvic fin membranes betw een the rays closest to the body without dense melanophores. Lateral-line scales 45 to 48; cheek without scales; 5 ½ scale rows between lateral line and base of middle dorsal fin spines; 15 or 16 scale rows in transverse series between origin of anal fin and lateral line; usually 15 rows in cower series of scales around caudal peduncle; usually 5 to 7 scales in supratemporal patch; inner surface of pectoral fin densely covered with scales; posterior angle of operculum fully scaled. **Colour:** body light tan or olive to brown, lighter below; centers of scales often lighter than background colour; an orange-yellow stripe on lower side at the level of the pectoral fin base, with two additional more faint orange-yellow stripes above and one below this stripe; head often with several broad indistinct vertical and diagonal light and dark bands; sometimes white spots below eye; posterior edge of operculum dark brown; fins whitish or tan, sometimes mottled.

Geographical Distribution : Widespread in the Indo-West Pacific including the Red Sea, East Africa to the Ryukyu Islands, Tonga and Samoa (Fig. 136).

Habitat and Biology: Inhabits seagrass beds, and sand and rubble areas of lagoons and reefs to depths of around 30 m. Feeds mostly on crustaceans, molluscs and echinoderma. In Belau it is reported to spawn at the outer reef edge on the first five days of the lunar month, from November through April. Maximum reported age for this species is 14 years.

Size: Maximum total length reported as 60 cm, commonly between 20 and 30 cm total length.

Interest to Fisheries: Caught mostly by traps and shore seines, occasionally by gillnets, handlines and trawls. Marketed mostly fresh.

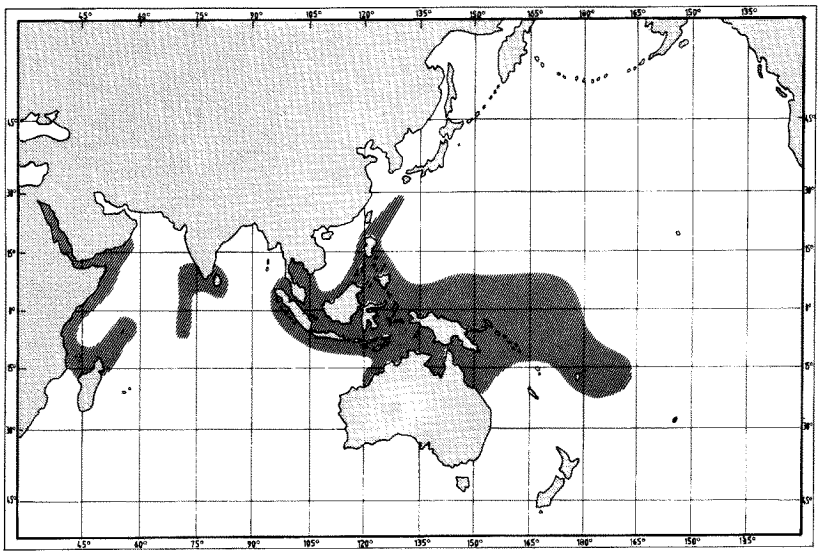


Fig. 136

Local Names: AUSTRALIA: Orange-striped emperor; BELAU: Chudch; JAPAN: Tateshima-fuefuki; LACCADIVES: Metti; NEW CALEDONIA: Bossu d'herbe; PHILIPPINES: Bitilya, Katambak, Kilawan; SAMOA: Magauli, Mailafo'u; SEYCHELLES: Dame berry, Lascar; SOUTH AFRICA: Orange-stripe emperor, Oranjestreep-keiser; SRI LANKA: Hini gadeya, Velia meen; TANZANIA: Changu, Njana.

Literature: Grant (1982); Masuda et al. (1984, as ***L. ramak***); Myers (1989, as ***L. ramak***); Schroeder (1980, as ***L. variegatus***); Smith (1959); Smith (1986, as ***L. ramak***).

Remarks: There has been doubt expressed as to the correct designation of the Forsskål type for this species. I have examined the type however, and found it to have the distinctive knob on the outer surface of the maxilla. There is little doubt that the type has been designated correctly.

The name ***Lethrinus ramak*** has most frequently been used for this species. Smith (1959) however, demonstrated that Forsskål intended the term 'ramak' as a listing of the common name and ***obsoletus*** was intended for the species name. The confusion occurred because Forsskål first included the name in a species list (page xii) as: "***Sciaena obsoleta***: flaveo-violaceo lineata. Ramak.", and subsequently described the species on page 52: "***Sciaena ramak***, ***obsoleta***" and ends the description: "Arab. Ramak", with the name Ramak written with Arabic letters. The inclusion of ***'ramak'*** with the genus name was apparently a manuscript error. Despite the obvious manuscript error, the name ***ramak*** could still be construed as being available to rep resent this species. Both names could be considered available, and both names are in the same publication; therefore, according to the Code of Zoological Nomenclature, the first revisor should choose which name to use. Sato (1971, 1978) chose to use ***L. ramak*** based on the more common usage of this name, and because it had not been used for a period of 50 years. The Code of Zoological Nomenclature no longer recognizes this as a proper justification to relegate a name to junior synonymy. Smith was first revisor and his use of ***L. obsoletus*** should be followed.

Lethrinus olivaceus Valenciennes, 1830

Fig. 137, Plate VII, 38

LETH Leth 5

Lethrinus olivaceus Valenciennes in C. & V., 1830 Hist.nat.Poiss., 6: 295 (Java).

Synonyms: ***Lethrinus rostratus*** Valenciennes (1830); ***Lethrinus waigiensis*** Valenciennes (1830); ***Lethrinus xanthopterus*** (?) Valenciennes (1830); ***Lethrinus longirostris*** Playfair & Günther (1866); ***Lethrinus rostratus specificus*** Borodin, 1932.

FAO Names: En - Longface emperor.

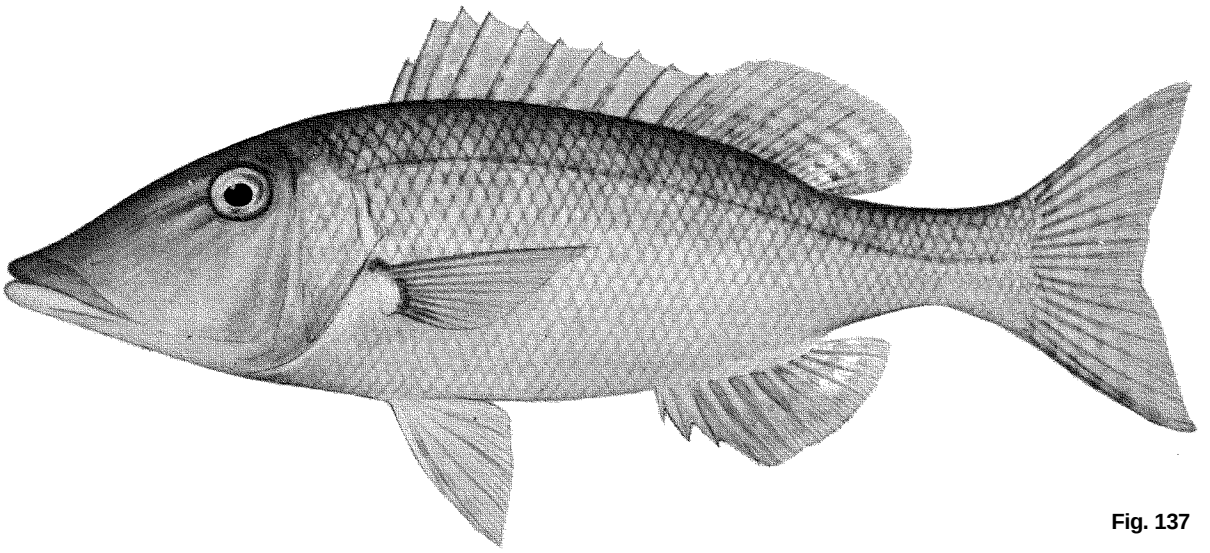


Fig. 137

Diagnostic Features : Body moderately elongate, its depth 3.0 to 3.3 times in standard length. Head length 1.1 to 1.3 times in body depth, 2.4 to 2.9 times in standard length, dorsal profile near eye nearly straight; snout length about 1.8 to 2.0 times in head length, measured without the lip the snout is 0.65 to 0.7 times in cheek height, its dorsal profile slightly concave, in large individuals there is sometimes a hump on snout directly in front of the eye, snout angle relative to upper jaw between 40 and 50 degrees; interorbital space convex to flat; posterior nostril a longitudinal oblong opening, closer to orbit than to anterior nostril; eye situated close to or removed from dorsal profile, its length 4.4 to 6.2 times in head length; cheek length 3.0 to 3.6 times in head length; lateral teeth in jaws conical; outer surface of maxilla smooth. Dorsal fin with 10 spines and 9 soft rays, the third or fourth dorsal spine the longest, its length 2.5 to 2.8 times in body depth; anal fin with 3 spines and 8 soft rays, the first soft ray usually the longest, its length almost equal to or slightly shorter than the length of the base of the soft-rayed portion of the anal fin and 0.6 to 0.7 times in the length of the entire anal fin base; pectoral rays 13; pelvic fin membranes between the rays closest to the body with dense melanophores. Lateral-fine scales 46 to 48; cheek without scales; 5 ½ scale rows between lateral fine and base of middle dorsal fin spines; 16 or 17 (usually 17) scale rows in transverse series between origin of anal fin and lateral line; 15 rows in lower series of scales around caudal peduncle; usually 7 to 9 scales in supratemporal patch; inner surface of pectoral fin without scales; posterior angle of operculum fully scaled. **Colour**: body grey, lighter ventrally, often with scattered irregular dark blotches; snout with wavy dark streaks, upper jaw, especially near corner of month sometimes edged behind with red.

Geographical Distribution : Widespread in the Indo-West Pacific, including the Red Sea, East Africa to the Ryukyu Islands and Samoa (Fig. 138).

Habitat and Biology: Inhabits sandy coastal areas, lagoons and reef slopes, occurring to depths of 185 m; juveniles are found in shallow sandy areas. Often occurs in large schools. Feeds mostly on fish, crustaceans and cephalopods. In Belau it spawns throughout the year on the first few days of the lunar month along the edges of reefs.

Estimates of asymptotic length ($L_{infinity}$), coefficient of growth (K) and rate of natural mortality (M) have been made for a population in Papua New Guinea: $L_{infinity}$ = 75.0 cm standard length, K = 0.25, and M = 0.59.

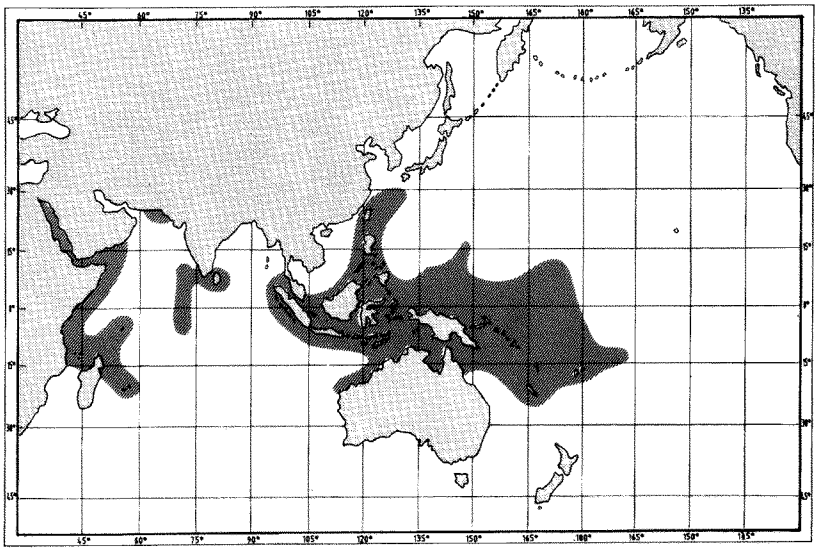


Fig. 138

Size: Total length to 100 cm, commonly to 70 cm total length.

Interest to Fisheries: Caught mostly with handlines and traps, occasionally by trawls and gillnets. Large individuals are often ciguatoxic in New Caledonia, the Tuamotus, the Marquesas, the Marshall Islands, and possibly elsewhere in Oceania. It is the object of one of the most important fisheries in Belau where they are reportedly overfished. In both Belau and Tahiti this species is actively fished in locations and times known to have large spawning aggregations. Thirty-two specimens of this species from Mourea and the Marquesas were introduced to Hawaii in 1956 to enhance fisheries, but three apparently did not become established.

Local Names: AUSTRALIA: Long-nosed emperor; BELAU: Mlangmud; JAPAN: Kitsune-fuefuki; KENYA: Nyavi Nyanvi; MAURITIUS: Kaya la gueule rouge; NEW CALEDONIA: Bec de cane malabar, Lethrinus à museau long; PAKISTAN: Gadeer, Mulla, Longnose pigface bream; PAPUA NEW GUINEA: Adia, Gawasa, Vanaka; PHILIPPINES Batilya, Katambak, Kilawan, Sapingan; POLYNESIA: Aaravi, Guitora, Meko, Odeo uturoa, Tipuake; SEYCHELLES: Capitaine gueule longue; Gueule de vin; SOUTH AFRICA: Longnose emperor, Langneus-keiser; SRI LANKA: Hota ula, Palu hakka, Thinan, Ura hota; TANZANIA: Changu-mdomo, Changu, Roba.

Literature: Bagnis et al. (1972, as ***L. miniatus***); Fourmanoir & Laboute (1976, as ***L. miniatus***); Gloerfelt-Tare & Kailola (1984, as ***L. elongata***); Lee (1986, as ***L. minutus***); Masuda et al. (1984 as ***L. miniatus***); Myers (1989, as ***L. elongatus***); Smith (1959, as ***L. miniatus***); Smith (1986, as ***L. elongatus***).

Remarks: The names most frequently applied to this species are ***L. elongatus*** and ***L. miniatus***. As mentioned previously, the name ***L. miniatus*** properly belongs to the species most commonly called ***L. chrysostomus***. I have examined the type of ***L. elongatus*** and it is undoubtedly the same species as ***L. microdon***. Two, and possibly three other names are available for this species: ***L. rostratus***, ***L. waigiensis***, and possibly ***L. xanthopterus***. The type of ***L. olivaceus*** is in excellent shape, while the types of ***L. waigiensis*** and ***L. rostratus*** are not and, there is no type specimen for ***L. xanthopterus***. As first revisor, I choose the name ***L. olivaceus*** on the basis of page priority and the advantage of having a type specimen in good condition (this is also being followed in a paper currently in press by Randall and Wheeler).

Lethrinus ornatus Valenciennes, 1830

Fig. 139, Plate VII, 39

LETH Leth 7

Lethrinus ornatus Valenciennes in C. & V., 1830 Hist.nat.poiss., 6: 310 (Java).

Synonyms: ***Lethrinus xanthotaenia*** Bleeker (1851 b); ***Lethrinus insulindicus*** Bleeker (1873).

FAO Names: En - Ornate emperor.

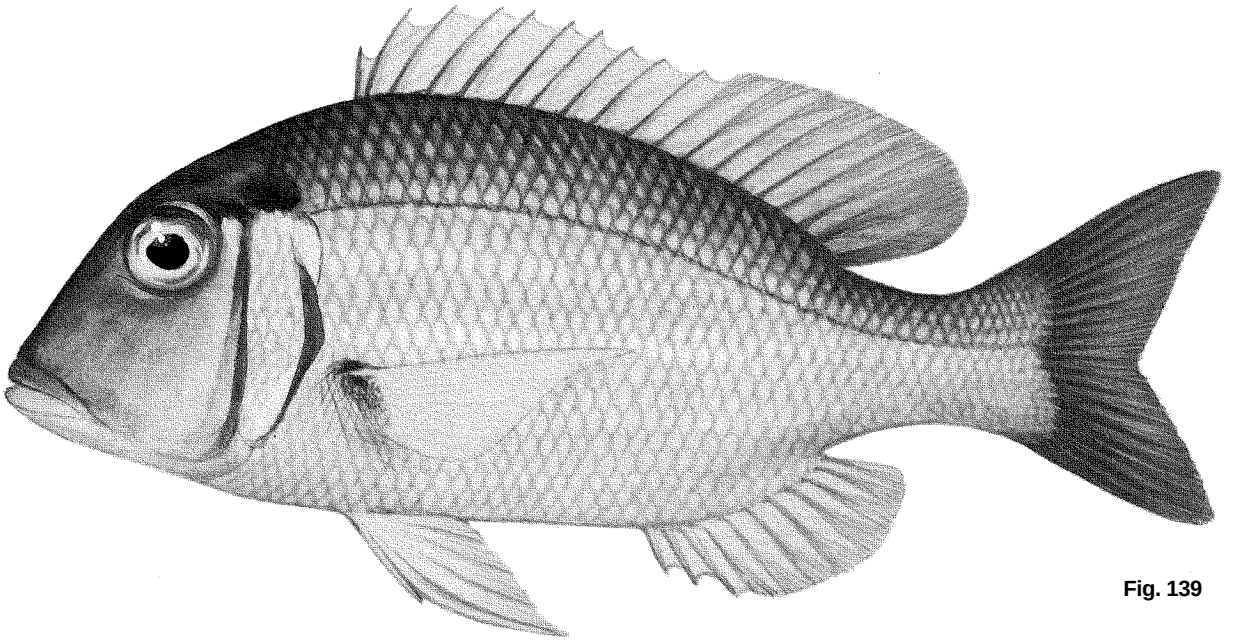


Fig. 139

click for next page