Lethrinus Cuvier, 1829

LETH Leth

Genus: *Lethrinus* Cuvier, 1829: 184. Type species, ***Sparus choerorynchus*** Bloch & Schneider, 1801 [***L. nebulosus*** (Forsskål, 1775)], by subsequent species designation (Jordan & Thompson, 1912).

Synonyms: Genus *Lethrinella* Fowler, 1904; Subgenus ***Lethrinichthys*** Jordan & Thompson, 1912.

Diagnostic Features: Medium to large-sized emperors with an oblong, laterally compressed body. Profile of head in front of eye convex, nearly straight or concave, the snout slope fairly steep or gradual. Mouth size moderate, sometimes reaching to level of anterior orbit; lateral teeth in jaws conical or molariform; outer surface of maxilla with or without a pronounced ridge, or with a knob; ascending process of premaxilla longer than alveolar ramus. Subocular shelf absent; epiotic-pterotic suture broad; vertical sphenotic flange entire. Dorsal fin continous, with 10 spines and 9 soft rays; anal fin with 3 spines and 8 soft rays; pectoral fin with 13 rays; caudal fin strongly to moderately forked, with pointed or rounded lobes. Lateral-line scales 42 to 49, often with 2 additional tubed scales extending onto base of caudal fin; scale rows above lateral line to middle spines at base of dorsal fin 4 ½ to 5 ½ (sometimes recorded as 5 or 6 respectively); cheek naked; inner surface of pectoral fin base densely or sparsely scaled, or without scales. **Colour**: body colour silvery, grey, olive, greenish, bluish, tan, brown or reddish, often with dark blotches or bars that can either be persistent or appear and disappear depending on the emotional state of the fish; sometimes bright red markings on or near base of pectoral fin, on pelvic, on anal and dorsal fin membranes near the base of the fin, on opercular and preopercular margins, and on head, these markings often variable within species; fins clear, pale, bluish, yellowish or reddish, often blotched, the edge of fins often reddish.

Biology, Habitat and Distribution: Inhabits coastal waters, often over sandy bottom and including seagrass beds, mangrove swamps, coral reefs, rocky reefs, to depths of 220 m. They usually occur solitary or in small groups and form large aggregations while spawning. The diet consists mostly of echinoderms, crustaceans, molluscs, fish and poliychaetes.

Geographical Distribution: Tropical eastern Atlantic, Indian and western Pacific Oceans.

Interest to Fisheries: Moderate to significantly important in fisheries; in certain countries, members of this genus are the most important catch by weight. Caught primarily by handlines, traps, trawls, shore seines and vertical longlines.

Remarks: Some authors separate this genus into ***Lethrinella*** and ***Lethrinus*** based mostly on snout length. Snout length and shape varies widely within the genus however, with many intermediates. We defer recognizing any supraspecific taxa within this group, pending detailed phylogenetic analysis.

Key to the species of *Lethrinus*

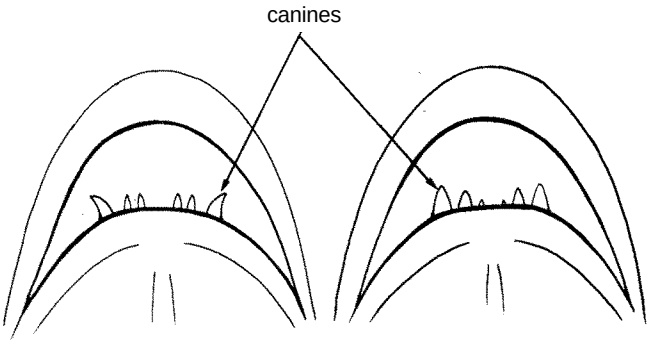
Notes on the use of the key : Two of the most useful characters in differentiating species of ***Lethrinus*** are the presence or absence of scales in the axil of the pectoral fin and the number of scale rows above the lateral line to the middle spines of the dorsal fin (Table 5). These characters are relatively constant for most species of ***Lethrinus*** but in a few species they vary widely. Because of this variation, some of the previous keys have tended to de-emphasize the use of these characters. After examining the variation of these characters in many specimens however, we have found that the advantages of using them far outweighs the disadvantages of their variation. The strategy to tolerate this variation has been to treat the variable species early in the key, to have species occur more than once in the key and, to add redundant diagnostic characters. Despite this strategy, the identification of species of ***Lethrinus*** can still be a formidable task. We have added frequency tables of meristic characters that have been included in this key as aids in visualizing the degree of variation within species. These tables are particularly useful for those characters that have not been used in previous keys to the species of ***Lethrinus***, i.e. lateral-line scales (Table 5), scale rows below the lateral line to the origin of the anal fin (Table 6), scales in the supratemporal scale patch (Table 7) and, scale rows in the lower series of scales surrounding the caudal peduncle (Table 6). These tables will help verify an identification when several specimens of a species are available.

1a. Second dorsal spine distinctly longer than other dorsal spines; canines of lower jaw substantially curved outward (Fig. 62a) and, lateral teeth in jaws conical in adults (Fig 65a).. ***L. genivittatus*** (Fig. 63, Plate IV, 22)

1b. Third, fourth, or fifth dorsal spine the longest; canines in front of lower jaw almost straight or curved backward slightly (Fig. 62b) or, if curved outward, the lateral teeth in jaws include strong molars (Fig. 65c) (other species with conical, rounded or slightly molariform teeth).

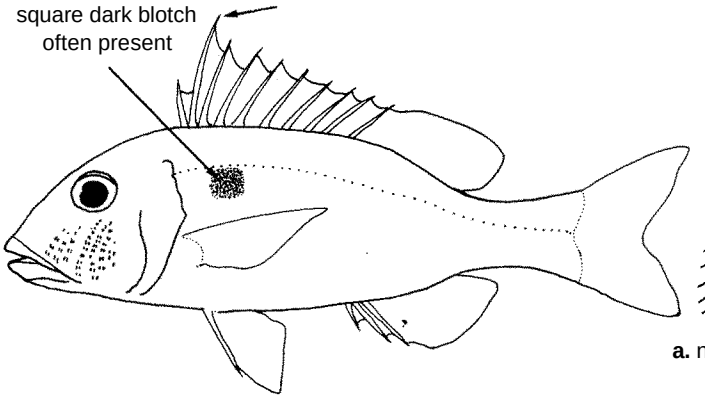
2a. Inner surface of pectoral fin base without scales (Fig. 64a) or, with a few scales covering less than 1/2 the inner base of the fin

3a. Longitudinal scale rows between lateral line and base of middle dorsal spines 4 1/2*; lateral teeth in jaws conical (Fig. 65a)

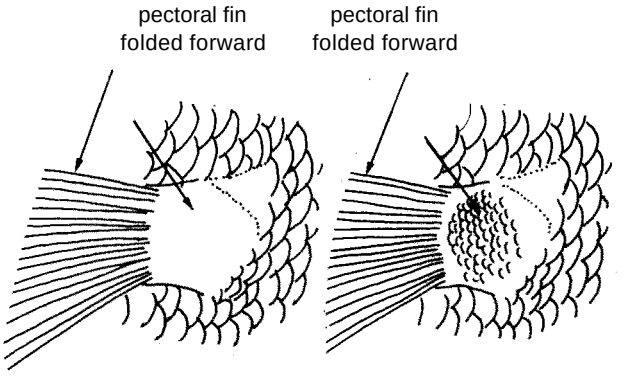


a. ***L. genivittatus*** **b**. other ***Lethrinus*** species

Anterior view of canines in lower jaw (teeth in upper jaw not shown) **Fig. 62**

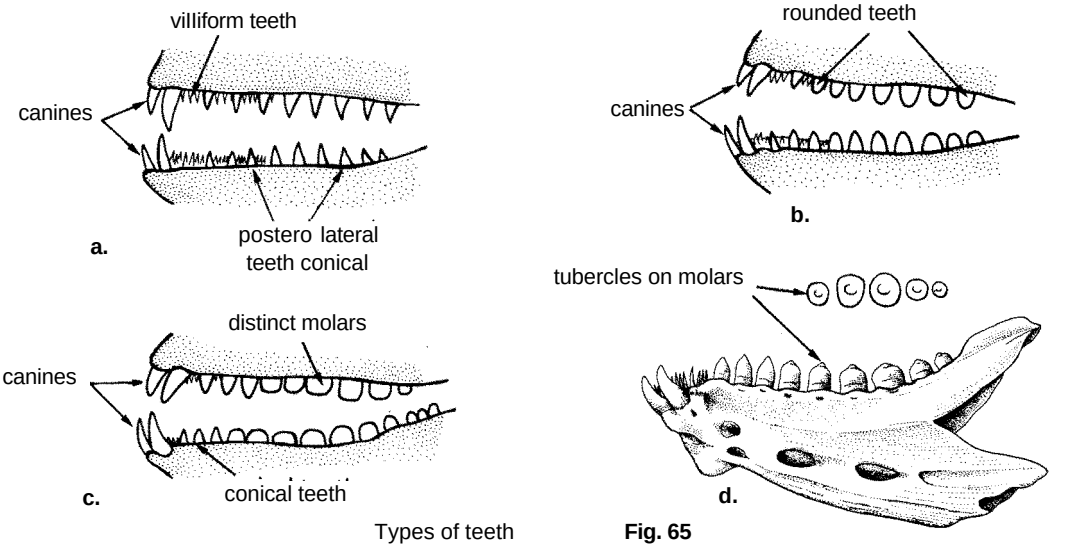


L. genivittatus **Fig. 63**



a. no scales on inner base **b.** scales on inner base

Inner surface of pectoral fin **Fig. 64**



Types of teeth **Fig. 65**

* For method of counting scale rows see Glossary of Technical Terms, Fig. 17

4a. Head length less than or almost equal to body depth (Figs 66-68)

5a. Found in Atlantic Ocean; 42 to 45 lateral- line scales; 13 or 14 scale rows in lower series around caudal peduncle* ..... ***L. atlanticus*** (Fig. 66, Plate III, 13)

5b. Found in the Indo-Pacific region; 47 to 50 lateral-line scales; 15 scale rows in lower series around caudal peduncle*

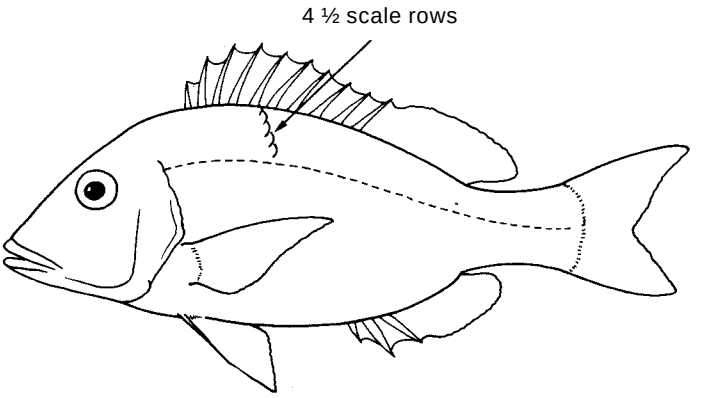
6a. Third dorsal spine usually the longest, its length 2.3 to 2.9 times in body depth; snout profile concave; in life, red markings around eye ..... ***L. miniatus*** (Fig. 67, Plate VI, 32-34)

6b. Fourth dorsal spine usually the longest, its length 2.8 to 3.7 times in body depth; snout profile approximately straight or slightly concave; in life, blue markings around eye ..... ***L. haematopterus*** (Fig. 68, Plate IV, 23)

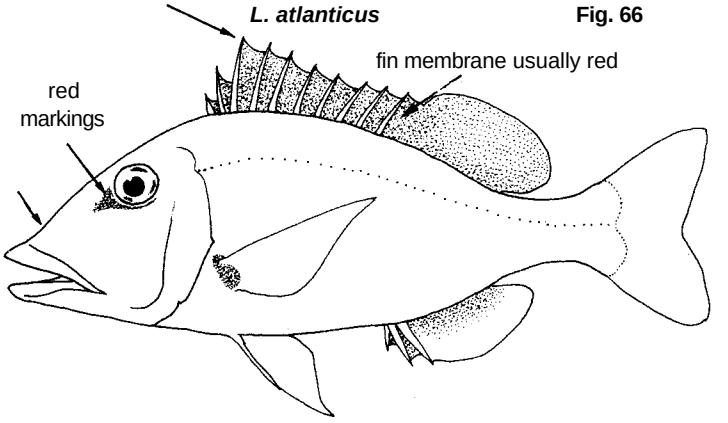
4b. Head length distinctly greater than body depth (Figs 69, 70, 73, 74, 76, 77, 79, 80, 81, 82)

7a. Body very slender, the depth 3.4 to 3.9 times in the standard length; scale rows in transverse series below lateral line 13 or 14** ..... ***L. variegatus*** (Fig. 69, Plate VIII, 45)

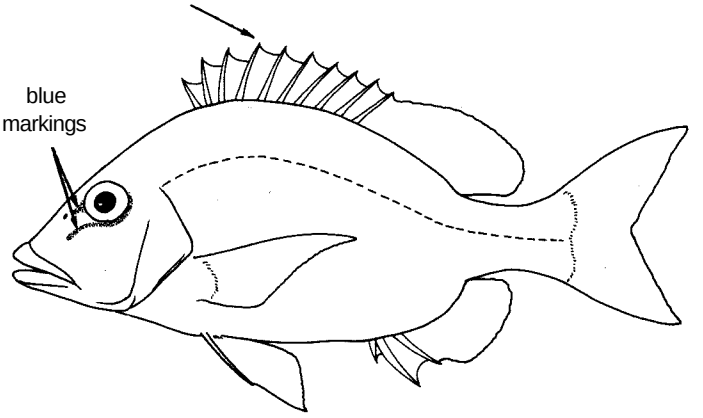
7b. Body depth 2.9 to 3.3 times in standard length; scale rows in transverse series below lateral line 15 to 17**



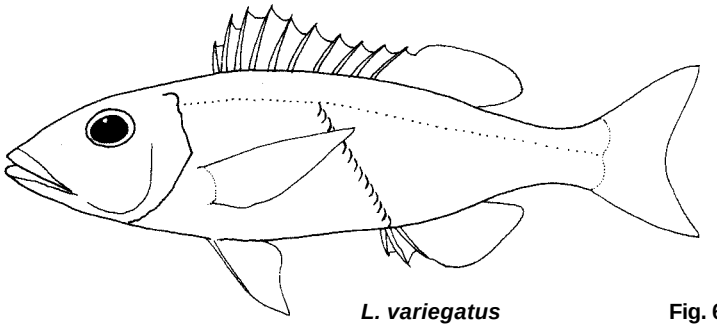
L. atlanticus **Fig. 66**



L. miniatus **Fig. 67**



L. haematopterus **Fig. 68**



L. variegatus **Fig. 69**

* For method of counting scale rows around caudal peduncle see Glossary of Technical Terms, Fig. 16

** For method of counting scale rows below lateral line see Glossary of Technical Terms, Fig. 17

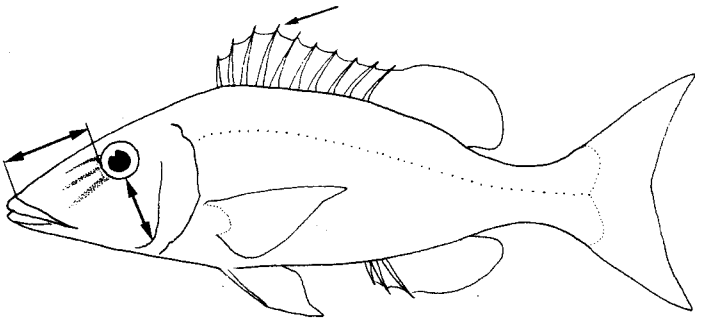
8a. Snout long, measured without the lip it is 1.3 to 1.4 times the cheek height; fourth dorsal spine usually the longest; three dark streaks radiating forward from eye on snout usually visible; inner surface of pectoral-fin base never red in life ..... ***L. microdon***
(Fig. 70, Plates V, 30 and VI, 31)

8b. Snout measured without the lip is 1.1 to 1.25 times the cheek height; third dorsal spine usually the longest; three distinct dark streaks radiating from the eye not readily apparent; inner surface of pectoral fin base sometimes red

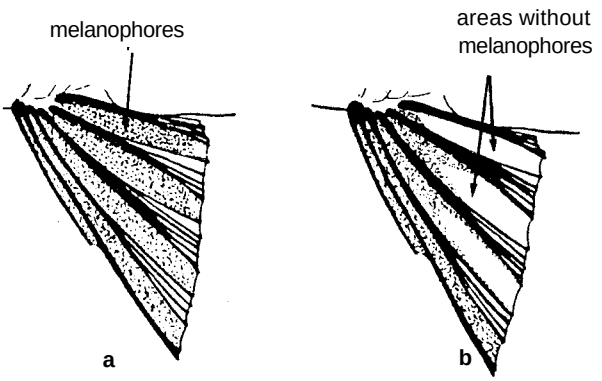
9a. Membrane between inner rays of pelvic fin mostly covered with melanophores (Fig. 71 a)

10a. Interorbital area distinctly convex (Fig. 72a); 9 to 11 scales in supratemporal patch; 16 or 17 scales in transverse series below lateral line ..... ***L. amboinensis***
(Fig. 73, Plate II, 11)

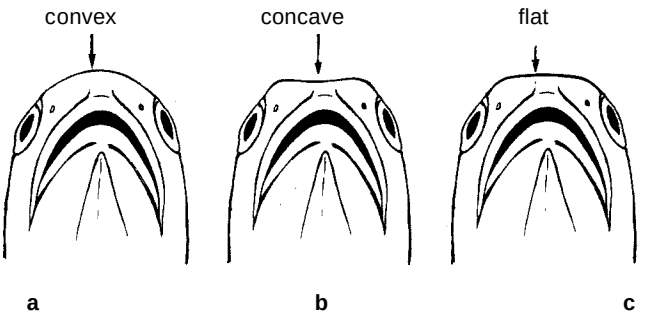
10b. Interorbital area distinctly concave (Fig 72b); 5 to 8 scales in supratemporal patch; 15 or 16 scales in transverse series below lateral line ..... ***L. xanthochilus***
(Fig. 74, Plate VIII, 46)



L. microdon **Fig. 70**

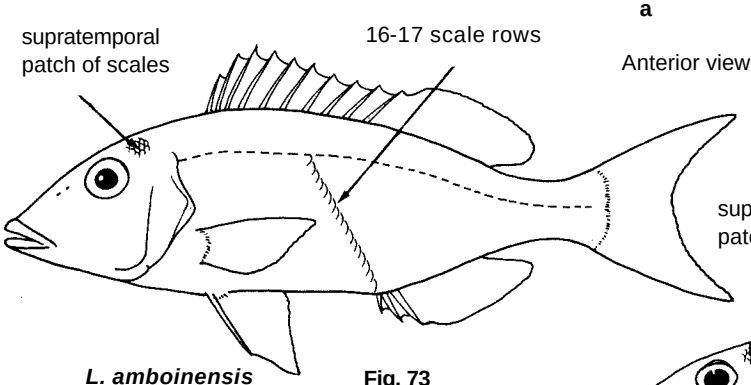


Pectoral fin **Fig. 71**

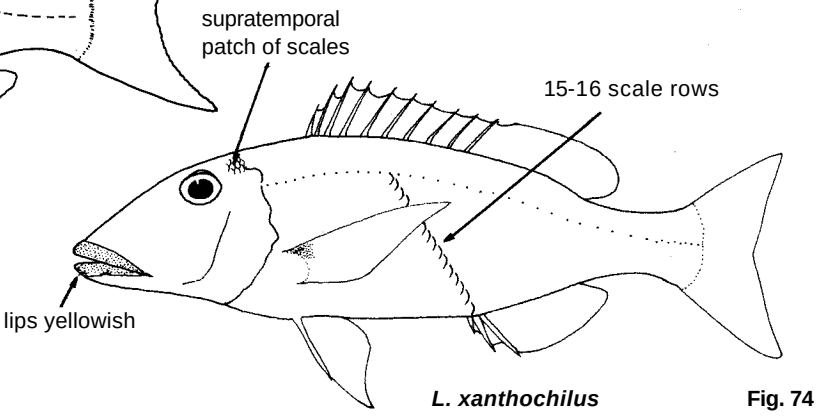


Anterior view of head showing shape of interorbital region

Fig. 72



L. amboinensis **Fig. 73**



L. xanthochilus **Fig. 74**

9b. Membrane between pelvic fin rays closest to body without a dense covering of melanophores (Fig. 71 b)

11a. Area on snout directly in front of eye with a prominent hump, snout profile distinctly concave (Fig. 75a)

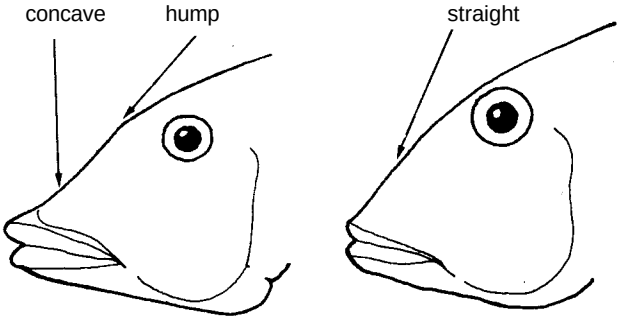
12a. Bright red subtriangular blotch above pectoral fin base; pectoral fin base, edge of opercle and lips also red in life ..... ***L. conchyliatus*** (Fig. 76, Plate III, 15)

12b. Posterior edge of preopercle, upper posterior edge of opercle, and base of pectoral fin red in life ... ***Lethrinus* sp.1** (Fig. 77, Plate VII, 43)

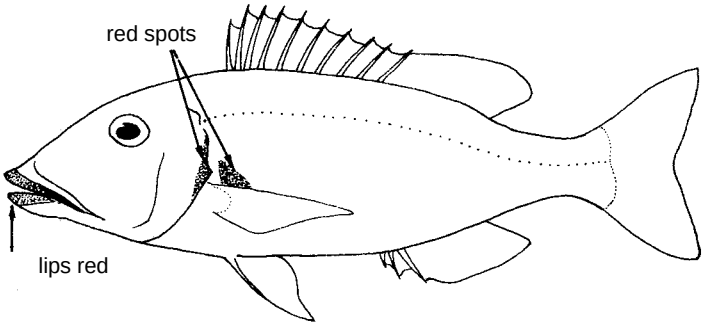
11b. Area on snout in front of eye without a prominent hump, profile of snout nearly straight or slightly concave (Fig. 75b)

13a. Wide scaleless area on upper posterior margin of opercle (Fig. 78a) ... ***L. rubrioperculatus*** (Fig. 79, Plate VII, 41)

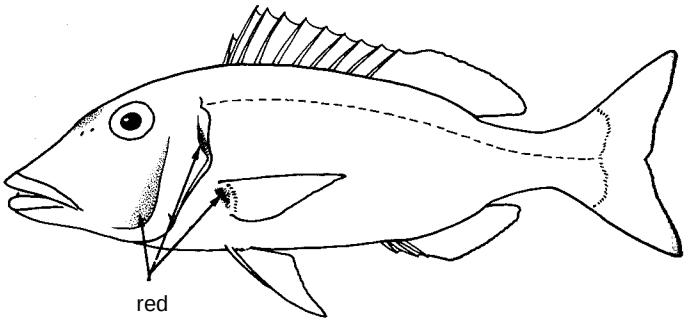
13b. Upper posterior margin of opercle without wide scaleless area (Fig 78b)



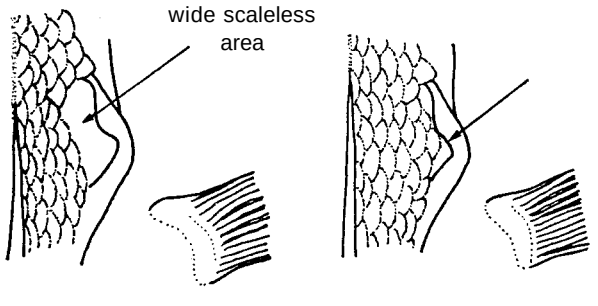
Snout profiles **Fig. 75**



L. conchyliatus **Fig.76**

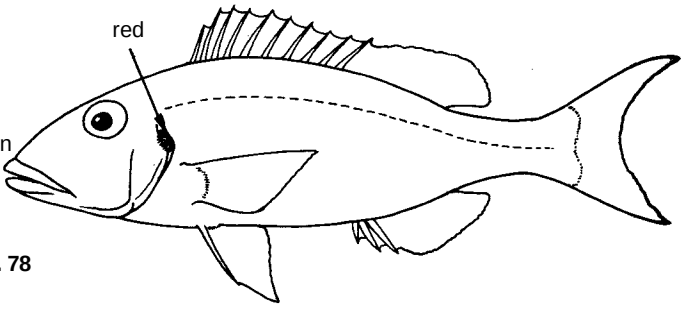


***Lethrinus* sp 1** **Fig. 77**



a scaleless region **b** fully scaled region

Posterior margin of opercle **Fig. 78**



L. rubrioperculatus **Fig. 79**

14a. Interorbital area usually concave (Fig. 72b); base of pectoral fin, upper posterior edge of opercle and posterior edge of preopercle red in life ..... ***L. reticulatus***
(Fig. 80, Plate VII, 40)

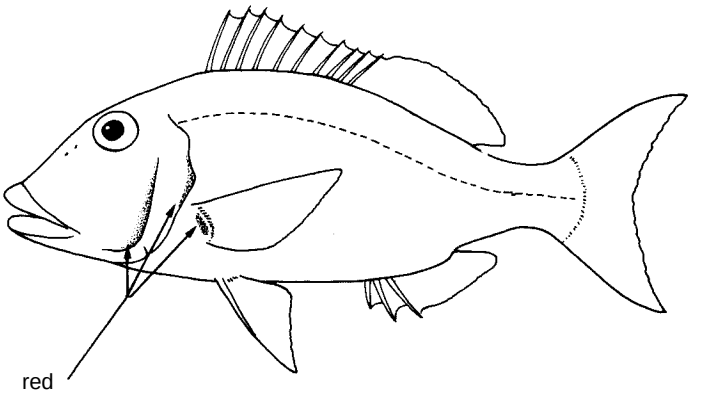
14b. Interorbital area flat (Fig. 72c) or convex (Fig. 72a); no red markings in life

15a. Angle of snout relative to upper jaw 57 to 60 degrees*; a large irregular black blotch on sides, bordering under the lateral line and below the soft-rayed portion of the dorsal fin .... ***L. semicinctus***
(Fig. 81, Plate VII, 42)

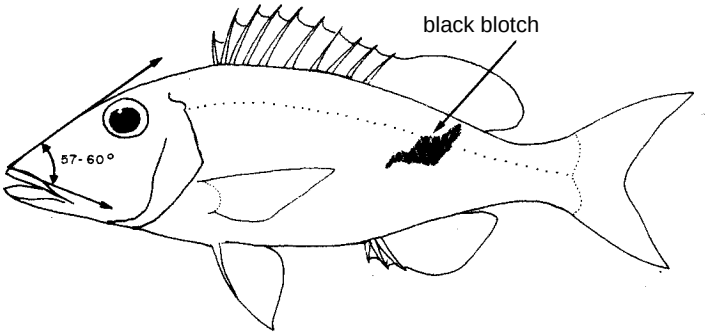
15b. Angle of snout relative to upper jaw 61 to 66; no large black blotch on side . ***L.* sp 2**
(Fig. 82, Plate VIII, 44)

3b. Longitudinal scale rows between lateral line and base of middle dorsal spines 5 ½; lateral teeth in jaws conical, rounded, molars or molars with a tubercle (Fig. 65)

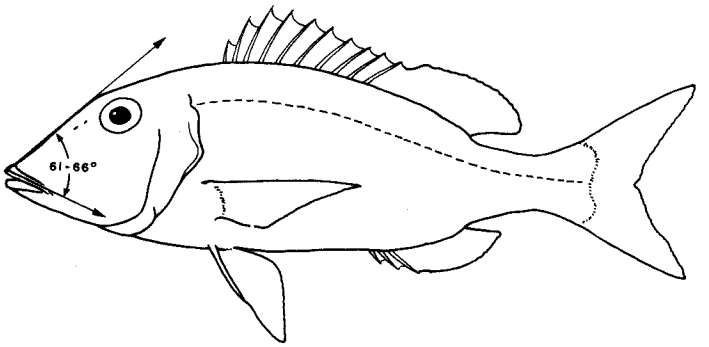
16a. Snout long, when measured without the tip it is 1.4 to 1.5 times the cheek height; body relatively stender, depth 3.0 to 3.2 times in standard length; no red markings on opercie or base of pectoral fin in life ..... ***L. olivaceus***
(Fig. 83, Plate VII, 38)



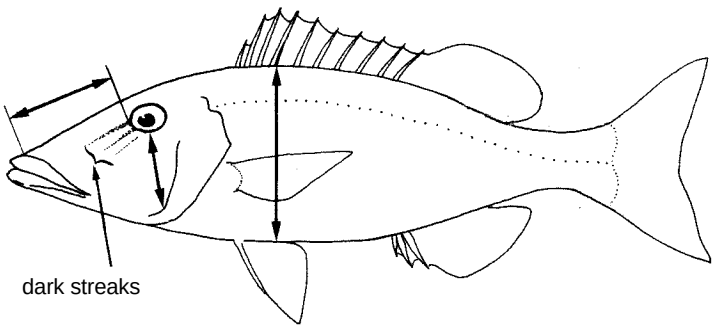
L. reticulatus **Fig. 80**



L. semicinctus **Fig. 81**



***Lethrinus* sp.2** **Fig. 82**



L. olivaceus **Fig. 83**

* For measurement of snout angle see Glossary of Technical Terms, Fig. 5

16b. Snout when measured without lip is 1.0 to 1.1 times the cheek height; body deep, its depth 2.6 to 2.8 times in standard length; posterior margin of opercle red and base of pectoral fin often red in life ..... ***L. lentjan*** (Fig. 84, Plate V, 26,27)

2b. Most of the inner surface of pectoral fin base covered with scales (Fig. 64b)

17a. Small dark blotches around lower rim of orbit, usually persistent in preserved material (longitudinal scale rows between lateral line and base of fifth dorsal spine variable, changing from 5 ½ to 4 ½ under the second to seventh dorsal spines) ..... ***L. enigmaticus*** (Fig. 85, Plate III, 17)

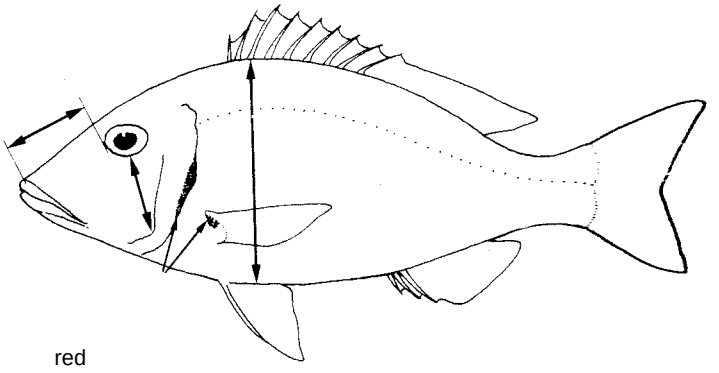
17b. No persistent small dark blotches around lower rim of orbit

18a. A large black blotch bordering below the lateral line and centered on the posterior tip of the pectoral fin, usually persistent in preserved specimens (longitudinal scale rows between lateral line and base of fifth dorsal spine variable, either 4 ½ or 5 ½ scales) ..... ***L. harak*** (Fig. 86, Plate IV, 24)

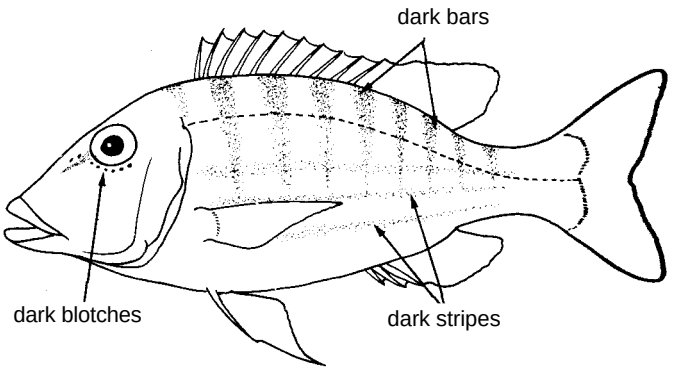
18b. No dark blotch below lateral line

19a. Longitudinal scale rows between lateral line and base of middle dorsal spines 4 ½

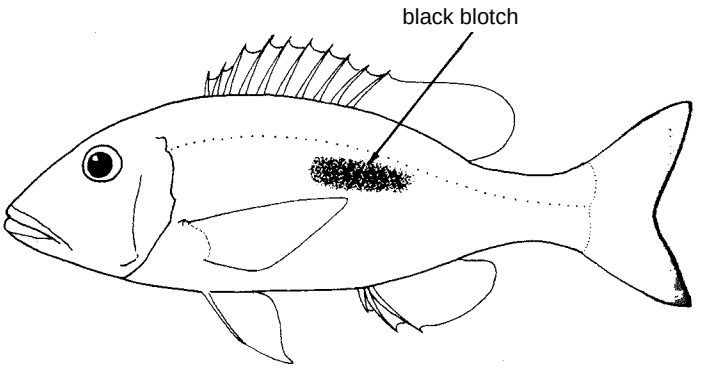
20a. The third, fourth or fifth anal rays usually the longest, much longer than the length of the base of the soft rayed portion of the anal fin, the length of the longest anal ray 0.9 to 1.1 times the length of the entire anal fin*



L. lentjan **Fig. 84**



L. enigmaticus **Fig. 85**



L. harak **Fig. 86**

* For measurement of anal fin base see Glossary of Technical Terms, Fig. 6

21 a. Lateral line scales usually 47 or 48, sometimes 46; lateral teeth in jaws conical or rounded (Fig. 65a,b); body depth 2.5 to 2.7 times in standard length; membranes between inner rays of pelvic fin usually densely covered with melanophores (Fig. 71 a) ..... ***L. erythracanthus***
(Fig. 87, Plate IV,18- 20)

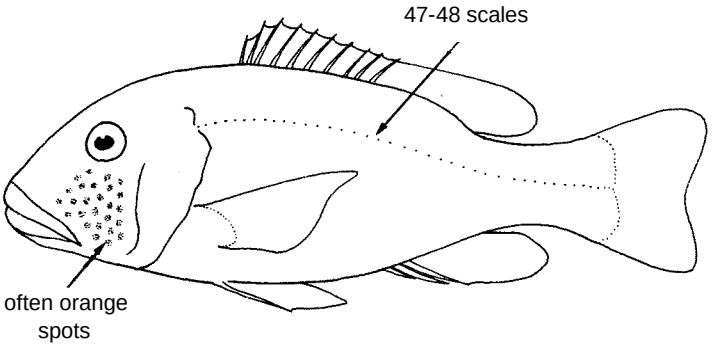
21 b. Lateral-line scales 44 to 46; lateral teeth in jaws usually with distinct molars (Fig. 65c); body depth 2.3 to 2.6 times in standard length; membranes between inner rays of pelvic fin usually not densely covered with melanophores (Fig. 71 b) ..... ***L. erythropterus***
(Fig. 88, Plate IV,21)

20b. The first or second anal ray usually the longest, its length either less than, approximately equal to, or slightly longer than the length of the soft portion of the anal fin, its length 0.6 to 0.8 times in length of the base of the entire anal fin

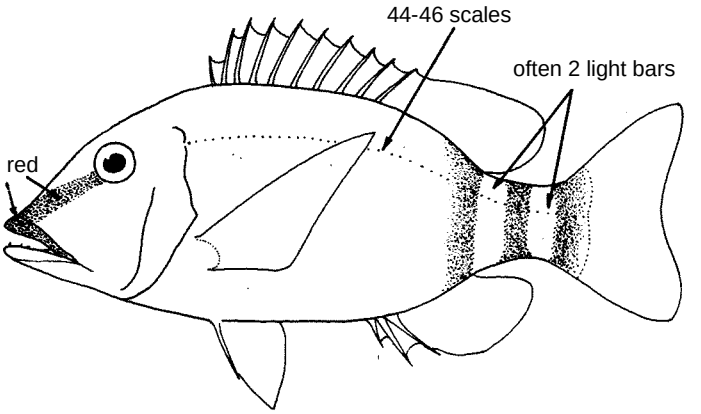
22a. Angle of the snout relative to upper jaw 52 to 62 degrees; lateral teeth in jaws conical (Fig. 65a); the third dorsal spine usually the longest ..... ***L. miniatus***
(Fig. 89, Plate VI, 32-34)

22b. Angle of the snout relative to upper jaw 65 to 80 degrees; lateral teeth in jaws rounded or molars (Fig. 65b,c); the fourth dorsal spine the longest

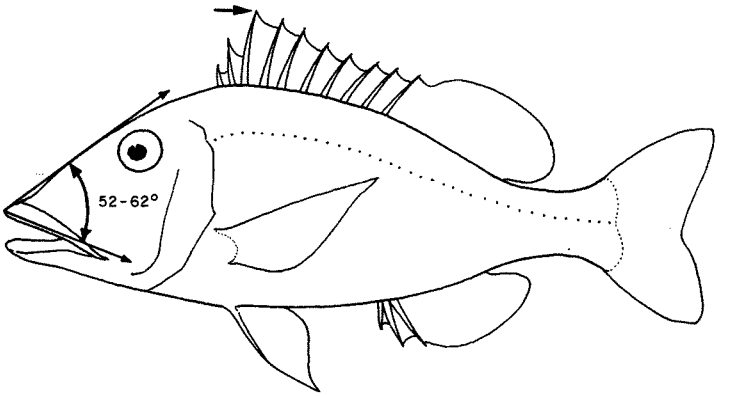
23a. Profile of head around eye nearly straight; usually 4 or 5 (rarely 3 or 6) scales in supratemporal patch ... ***L. mahsena***
(Fig. 90, Plate V, 28,29)



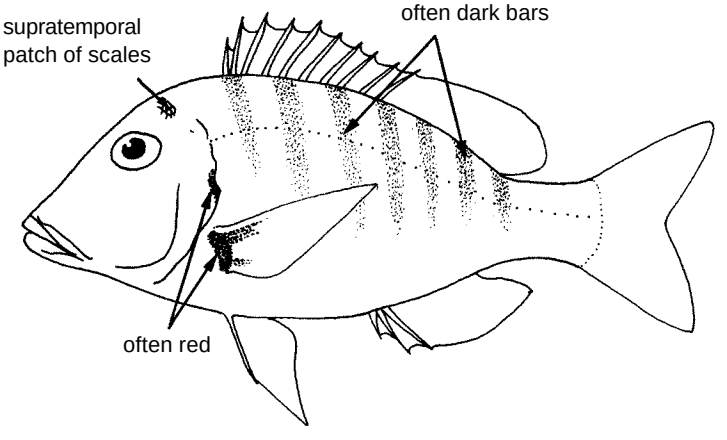
L. erythracanthus **Fig. 87**



L. erythropterus **Fig. 88**



L. miniatus **Fig. 89**



L. mahsena **Fig. 90**

23b. Profile of head around eye distinctly convex and angular; usually 6 or 7 (rarely 4, 5 or 8) scales in supratemporal patch...***L. atkinsoni*** (Fig. 91, Plate III, 12)

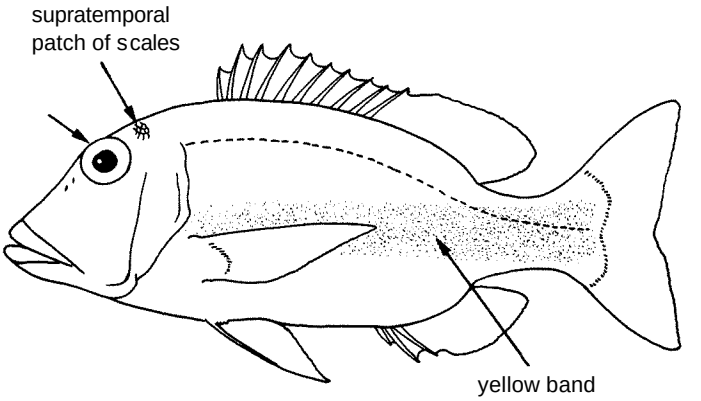
19b. Longitudinal scale rows between lateral line and base of middle dorsal spines 5 ½.

24a. Body depth 2.2 to 2.4 times in standard length; head length 0.8 to 0.9 times in body depth; profile of head around eye nearly straight or slightly concave

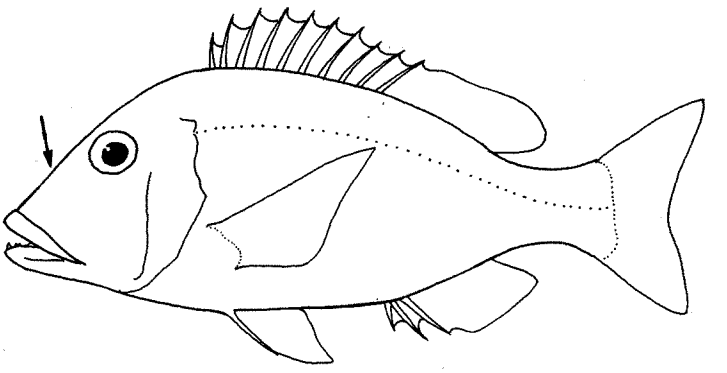
25a. Profile of snout straight or nearly straight; lateral teeth in jaws rounded, or molars (Fig. 65b,c); no blue stripes in front of eye in life ..... ***L.crocineus*** (Fig. 92, Plate III, 16)

25b. Profile of snout concave; lateral teeth in jaws conical (Fig. 65a); 3 blue stripes radiating in front of the eye in life ..... ***L. laticaudis*** (Fig. 93, Plate V, 25)

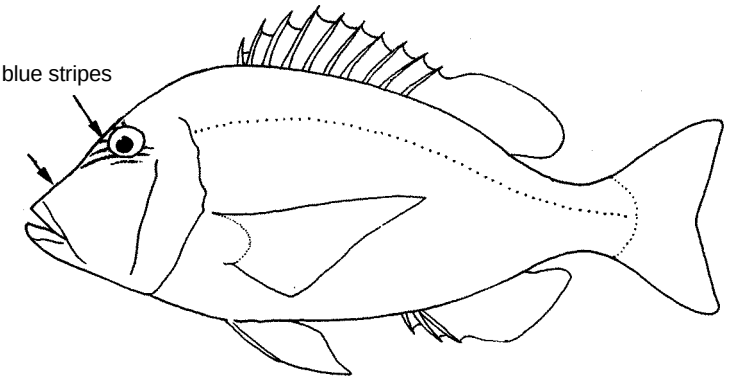
24b. Body depth either 2.5 to 2.9 times in standard length and profile of head around eye either concave, nearly straight, or slightly convex or, body depth 2.4 to 2.6 times in standard length and profile of head around eye distinctly convex; head length either 0.9 to 1.1 times in body depth and profile of head around eye either concave, nearly straight, or slightly convex or, head length 0.8 to 0.9 times in body depth and profile of head near eye convex



L. atkinsoni **Fig. 91**



L. crocineus **Fig. 92**



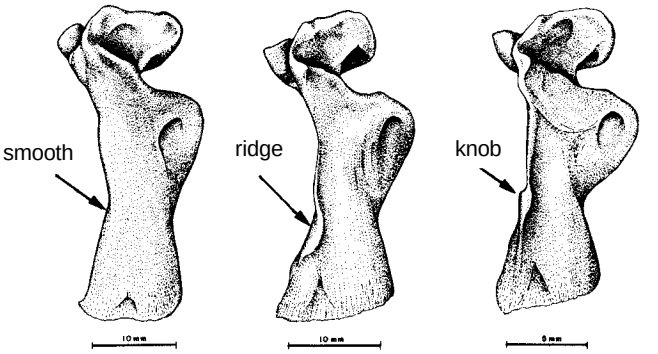
L. laticaudis **Fig. 93**

26a. Posterior edge of preopercle and opercle red in life; snout relatively short and blunt, preorbital width 0.7 to 0.8 times in cheek height*; angle of snout relative to upper jaw 64 to 73 degrees; outer surface of maxilla usually smooth, without a prominent ridge or knob (Fig. 94a); head length 0.8 to 0.9 times in body depth; profile of head around eye distinctly convex ..... ***L. ornatus***
(Fig. 95, Plate VII, 39)

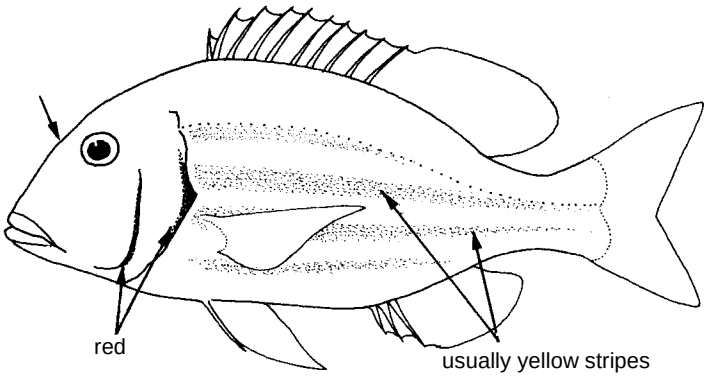
26b. Posterior edge of preopercle not red, but edge of opercle and base of pectoral fin sometimes red in ***L. lentjan***; snout blunt or sharp, the preorbital width 0.7 to 1.0 times in cheek height, if the preorbital width is less than 0.8 times in cheek height, there is a prominent ridge (Fig. 94b) or knob (Fig. 94c) on the surface of the maxilla; angle of snout relative to the upper jaw 52 to 69 degrees; if this angle is greater than 64 degrees, there usually is a ridge or knob on the surface of the maxilla; head length 0.9 to 1.1 times in body depth; profile of head around eye slightly concave, nearly straight, or convex.

27a. Scale rows in lower series around caudal peduncle usually 13-14**; lateral teeth include distinct molars (Fig. 65c); eye relatively large, 3.4 to 4.0 times in head length, and close to the dorsal profile; profile of head near eye often slightly convex ..... ***L. borbonicus***
(Fig. 96, Plate III, 14)

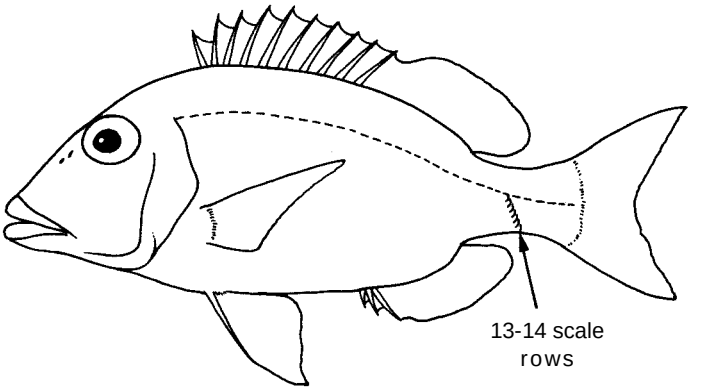
27b. Scale rows in lower series around caudal peduncle most frequently 15; lateral teeth in jaws either rounded (Fig. 65b), molars with tubercles (Fig. 65d), or simple molars (Fig. 65c); eye 3.8 to 5.1 times in head length, usually not very close to the dorsal profile; profile of head near eye nearly straight or slightly concave



Outer surface of left maxilla **Fig. 94**



L. ornatus **Fig. 95**



L. borbonicus **Fig. 96**

* For method of measuring cheek height and preorbital width, see Fig. 9

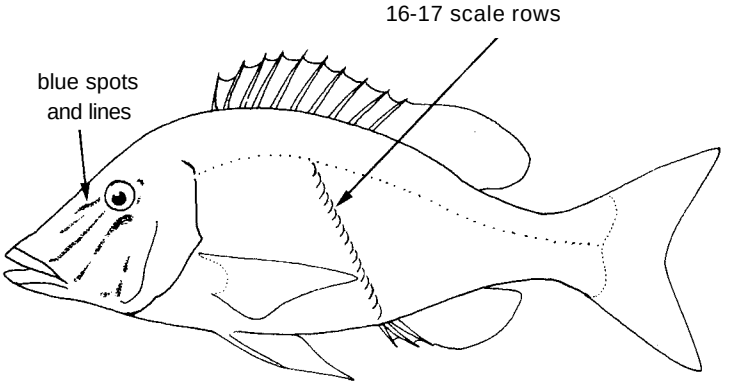
** For method of counting scale rows, see Fig. 6

28a. Melanophores covering most of pelvic fin membranes, including the area near inner rays (Fig. 71a); 16 or 17 scale rows in transverse series from origin of anal fin to lateral line; three blue lines and/or rows of blue spots radiating forward from eye on snout in life ..... ***L. nebulosus*** (Fig. 97, Plate VI, 35,36)

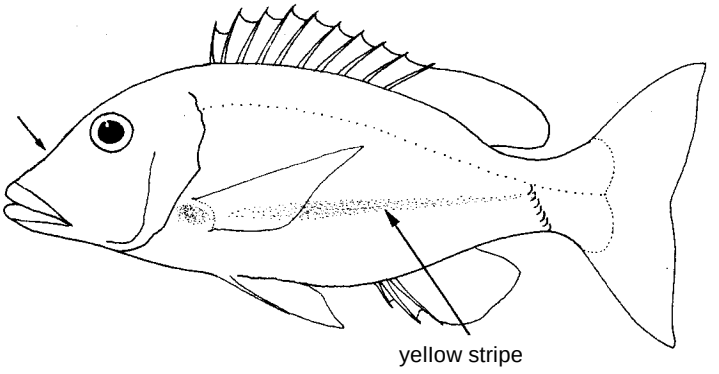
28b. Melanophores largely absent on membranes of inner rays of pelvic fins (Fig. 71 b); 15 or 16 scale rows in transverse series from origin of anal fin to lateral line; no prominent blue lines radiating from eye in life

29a. Posterior edge of opercle and sometimes outer base of pectoral fin red in life; surface of maxilla smooth or with a ridge (Fig.94a,b); lateral teeth in jaws either rounded, molars with a tubercle or simple molars (Fig. 65); profile of snout straight …… ***L. lentjan*** (Fig. 84, Plate V, 26,27)

29. Posterior edge of opercle and outer base of pectoral fin never red; maxilla with a knob (Fig. 94c); lateral teeth in jaws rounded (Fig. 65b); profile of snout concave ..... ***L. obsoletus*** (Fig. 98, Plate VI, 37)



L. nebulosus **Fig. 97**



L. obsoletus **Fig. 98**

Table 5

Variation in presence or absence of pectoral axil scales, number of scale rows in transverse series above lateral line to base of mid-dorsal spines, and number of lateral-line scales for species of ***Lethrinus***

	Pectoral axil scales		**Scale rows above Lateral line**		**Number of lateral-line scales**						
	+	-	4½	5½	42	44	45	46	47	48	49
L. amboinensis		4	4						3	1	
L. atkinsoni	18		18					6	12		
L. atlanticus		16	16		1	1	13	1			
L. borbonicus	12			12				5	6	1	
L. conchyliatus		2	1							1	
L. crocineus	5			5				3	2		
L. enigmaticus		9	6	3					3	6	
L. erythracanthus	12		12					2	8	2	
L. erythropterus	21		21			5	11	5			
L. genivittatus	44	8	18					7	11		
L. haematopterus		12	12						3	7	2
L. harak	16		1	15			1	5	10		
L. laticaudis	2			2					2		
L. lentjan	148	66		18		1		10	7		
L. mahsena	15		15				1	3	8	3	
L. microdon		10	10						7	3	
L. miniatus	8	1	8						2	6	
L. nebulosus	22			22				5	13	4	
L. obsoletus	18			18			1	3	12	2	
L. olivaceus		12		12				1	5	6	
L. ornatus	18			18		1		7	10		
L. reticulatus		12	12					1	8	3	
L. rubrioperculatus		13	13						7	5	1
L. semicinctus		14	14					1	5	8	
***Lethrinus* sp. 1**		5	5						2	3	
***Lethrinus* sp.2**		5	5							4	1
L. variegatus		13	13				1	10	2		
L. xanthochilus		13	12						6	6	

Table 6

Variation in number of scale rows in transverse series below lateral line to origin of anal fin and scale rows around lower caudal peduncle for species of ***Lethrinus***

	Scale rows below the lateral line					**Scale rows around lower caudal peduncle**			
	13	**14**	**15**	**16**	**17**	**13**	**14**	**15**	**16**
L. amboinensis				3	1			3	1
L. atkinsoni		4	12	2		2	12	4	
L. atlanticus	4	12				14	2		
L. borbonicus			10	2		3	8	1	
L. conchyhatus				1				1	
L. crocineus			1	2	2			4	1
L. enigmaticus				4	5			8	1
L. erythracanthus			3	7	2			11	1
L. erythropterus			5	15	1			20	1
L. genivittatus			8	10			1	17	
L. haematopterus			1	7	4			11	1
L. harak		2	13	1		8	8		
L. laticaudis				1	1			2	
L. lentjan			9	9		1	4	13	
L. mahsena		1	8	6		1	7	7	
L. microdon				8	2		1	8	1
L. miniatus			1	5	2			8	
L. nebulosus			1	13	8		3	19	
L. obsoletus			8	10			2	16	
L. olivaceus				2	10			12	
L. ornatus			14	4		3	4	11	
L. reticulatus			7	5			1	11	
L. rubrioperculatus			6	7			1	12	
L. semicinctus		1	13					14	
***Lethrinus* sp. 1**			5					5	
***Lethrinus* sp.2**			2	3				4	1
L. variegatus	2	11					6	7	
L. xanthochilus			4	8				12	

Table 7

Frequency distribution of scales in supratemporal (parietal) patch of scales

	3	4	5	6	7	8	9	10	11
L. amboinensis							1	1	2
L. atkinsoni		1	2	10	4	1			
L. atlanticus		1	8	4	3				
L. borbonicus				3	8	1			
L. conchyliatus					1				
L. crocineus				3	1	1			
L. enigmaticus		6	2	1					
L. erythracanthus			1	8	3				
L. erythropterus			5	7	3	3	3		
L. genivittatus			10	5	2	1			
L. haematopterus			6	4	1	1			
L. harak		2	5	6	3				
L. laticaudis				1		1			
L. lentjan		1	2	7	5	2	1		
L. mahsena	1	6	7	1					
L. microdon					1		3	3	3
L. miniatus		1	5	2					
L. nebulosus			1	6	4	7	4		
L. obsoletus		2	3	5	7		1		
L. olivaceus					5	5	2		
L. ornatus	1	1		11	3	2			
L. reticulatus					2	3	3	4	
L. rubrioperculatus					4	5	3	1	
L. semicinctus		1	7	5	1				
***Lethrinus* sp. 1**						2		3	
***Lethrinus* sp.2**				2	1	2			
L. variegatus		2	6	4	1				
L. xanthochilus			4	5	1	2			