



ON THE IDENTITY OF BLUE STRIPED SNAPPERS (PISCES: PERCIFORMES: LUTJANIDAE) OF INDIA

R. P. BARMAN*, A. DAS AND S. S. MISHRA

Zoological Survey of India, 27, J.L. Nehru Road, Kolkata-700 016

*Email : r_p_barman@rediffmail.com

INTRODUCTION

The snappers (Perciformes: Lutjanidae) are known to be represented by 9 genera and 41 species in India (Talwar, 1991), while 17 genera with about 105 species are recognized in the world (Nelson, 2006). The genus *Lutjanus* Bloch is represented by 68 species (Froese and Pauly, 2013), of which a few species are characterized in having pale or yellowish ground colour with 4 to 8 blue longitudinal stripes (brownish in preservative). Such blue striped snappers are namely, *L. bengalensis* (Bloch, 1790), *L. coeruleolineatus* (Ruppell, 1830), *L. kasmira* (Forsskal, 1775), *L. notatus* (Cuvier, 1828), *L. quinquelineatus* (Bloch, 1790) and *L. viridis* (Valenciennes, 1846) (Allen, 1985). The last named species is known from eastern Pacific Ocean from Mexico to Ecuador, including offshore islands like Galapagos Island, while other five are having distribution in Indo-Pacific region. While *L. notatus* is known only from Mozambique, Natal in South Africa, Madagascar, Réunion and Mauritius in the south-west Indian Ocean, *L. coeruleolineatus* occurs in seas around Arabian Peninsula (Allen, 1985).

The review of snappers of India was last made by Talwar and Kacker (1984), wherein they recognized only one blue-striped species, i.e., *L. kasmira*, from Indian waters while other known species with blue stripes were treated as synonym of this. Fischer and Bianchi (1984) stated the distribution of *L. coeruleolineatus* along Red Sea, Gulf of Aden and Arabian Sea, but the map

therein shows its occurrence along west coast of India too. In the given circumstance, it is required to examine the Indian blue striped snappers to confirm their identities and distribution along the coasts of India. It is, therefore, an attempt has been made to examine the specimens present in the National Zoological Collections, Zoological Survey of India, Kolkata to confirm their specific identity with their distribution in our coast. The diagnoses of these species characterized in having conspicuous blue lateral bands on light ground colour; scales above lateral line obliquely slanting to dorsal profile and with a crescentic vomerine tooth patch without posterior extension are provided hereunder with a key to identification of the blue striped snappers. The key characters are mainly following Allen (1985).

Key to the blue striped species of the genus *Lutjanus* Bloch

- 1a. Dorsal fin with XI or XII spines 2
- 1b. Dorsal fin with X spines 3
- 2a. Gill rakers on lower limb of first arch 17 to 20; no black spot on lateral line below anterior soft part of dorsal fin..... *L. bengalensis*
- 2b. Gill rakers on lower limb of first arch 10 to 13; a black spot usually on lateral line below anterior soft part of dorsal fin.....*L. notatus*
- 3a. Cheek with 5 to 8 rows of scales..... 4
- 3b. Cheek with 10 or 11 rows of scales 5

- 4a. Body with 4 stripes on sides; cheek scales in 5 or 6 rows; upper edge of pectoral fin distinctly darker.....*L. kasmira*
- 4b. Body with 5 stripes on sides; cheek scales in 7 or 8 rows; pectoral fin uniform, upper edge of pectoral fin not darker..... *viridis*
- 5a. Preopercular notch and knob well developed; body with 5 lateral stripes; snout and cheek without spots or broken narrow bands
.....*L. quinquelineatus*
- 5b. Preopercular notch and knob absent or poorly developed; body with 7 to 8 lateral stripes; snout and cheek with spots and broken narrow bands*L. coeruleolineatus*

MATERIAL AND METHODS

As a part of the programme on 'the study of Snappers of India' the Lutjanid collections of the National Zoological Collections, Zoological Survey of India (ZSI), Kolkata have been carefully examined. Materials present at Marine Biological Regional Center (MBRC), Z.S.I., Chennai are also included for the purpose. Further, the authors have specially visited several fish landing centers (survey tours), mostly along west coast of India and the lutjanid specimens in the landing center itself were examined, although those could not brought to the laboratory as being commercial food fishes and large in size. The observations in the field and laboratory are now put together to distinguish the blue striped snappers of the genus *Lutjanus* Bloch found along coasts of India. Identification of the specimens is following the key given above.

Materials examined: L. bengalensis: ZSI 1706 (Original of pl. 10, fig. 4 of Day, 1875), 1 ex., 160 mm SL; Madras (Tamil Nadu), Dr. F. Day, undated.

L. kasmira: ZSI F 10634/2, 1 ex., 104 mm SL, Lakshadweep Island, Ch. Satyanarayana & party, 31.01.2008; ZSI F 10634/2, 2 ex., 165-175 mm SL, Port Blair, Andaman, Dr. K.K. Tiwari (purchased), 03.03.1959; ZSI F 2744/2, 2 ex., 165-175 mm SL, Port Blair, Andaman, Dr. K.K. Tiwari

(purchased), 03.03.1959 (labeled as *L. spilurus*), ZSI F 4355/2, 1 ex., 175 mm SL, Port Blair, Andaman, H.C. Ray, 15.03.1952; ZSI F 10748/2, 3 ex., 145-200 mm SL, Cochin Fishing harbour, Cochin, Kerala, R.P. Barman, 30.10.2012.

L. quinquelineatus: ZSI/MBRC/F 546, 2 ex., 85-100 mm SL, Eravadi, Chennai, Tamil Nadu, C. Venkataraman & party, 29.09.2010; ZSI/MBRC/F 1007, 1 ex., 95 mm SL, Hut Bay, Little Andaman, S. Krishnan & party, 24.10.1991; ZSI/MBRC/F 1008, 1 ex., 85 mm SL; Hut Bay, Little Andaman, S. Krishnan & party, 24.10.1991; ZSI/MBRC/F 3648, 1 ex., 123 mm SL, Nagapattinam, Tamil Nadu, M. Srinivasan & party, 24.02.1991.

RESULTS AND DISCUSSION

Systematic account of *L. bengalensis*, *L. coeruleolineatus*, *L. kasmira* and *L. quinquelineatus* with their diagnosis and distribution has been furnished below for easy identification. Although the authors could not examine any specimen of *L. coeruleolineatus*, it is included here for a species has been recorded by Day (1889) with this name and details are after Allen (1985).

1. *Lutjanus bengalensis* (Bloch, 1790) (Bengal snapper)

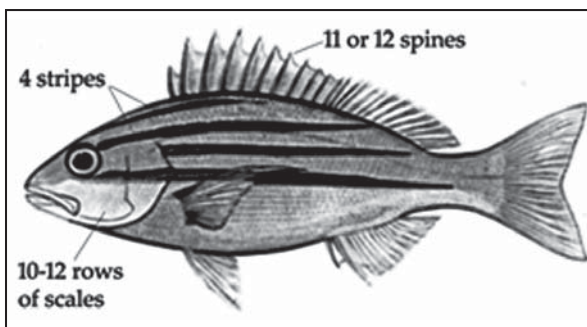
1790. *Holocentrus bengalensis* Bloch, *Naturges. ausland. Fische*, 4: 102, pl. 246, fig. 2 (Bengalen [Bengal, Bay of Bengal, eastern Indian Ocean]).

1985. *Lutjanus bengalensis*, Allen, *FAO Fish. Synop.*, (125) 6: 61-62, pl.12, fig.45.

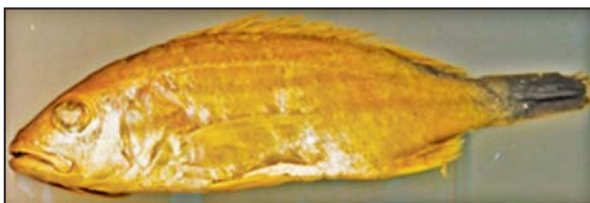
Diagnosis: D XI-XII, 13-14; A III, 8; P 16-17; V I, 5; LL 47-48. Body fusiform, its depth 2.92 to 3.20 in standard length. Head greater than body depth, its length 2.67 to 2.73 in standard length. Dorsal head profile convex. Eye diameter 4.57 to 4.62 in head length. Preorbital space (distance below upper jaw and eye) 7.5 to 8.0 in headlength (3.3 to 8.9 in head length in Allen, 1985). Preorbital space relatively narrow, its width usually less than eye diameter; 1.63 to 1.75 in eye diameter. Preopercular notch and knob well developed. Tongue smooth without teeth. Pectoral fin thoracic, inserted behind first

dorsal fin spine. Preopercle/cheek with 10-12 rows of scales (counted from eye to angle of preopercle). Caudal fin truncate or emarginate. Body usually bright yellow on upper half of body and abdomen whitish. Upper side with a series of 4 blue horizontal stripes. The upper first and second stripes extend from upper posterior border of eye to base of middle of spinous part of dorsal fin and base of soft part of dorsal respectively. The third stripe extends from superior angle of gill openings to base of the last dorsal fin rays and the fourth or lowermost stripe extending from below posterior margin of eye to middle of caudal peduncle. Upper pectoral fin rays dusky. Dorsal, anal, pectoral and pelvic fins whitish.

Distribution: India: Andaman and Nicobar Islands, Maharashtra, Karnataka and West Bengal. *Elsewhere:* Sri Lanka, Red Sea, Indian Ocean: East Africa, Gulf of Oman, Seychelles, Madagascar and western Mascarenes east to Sumatra (Indonesia).



Out lined diagram of *L. bengalensis*



L. bengalensis: Original of pl. 10, fig. 4 of Day, 1875

2. *Lutjanus coeruleolineatus* (Ruppell, 1830)
(Blue lined snapper)

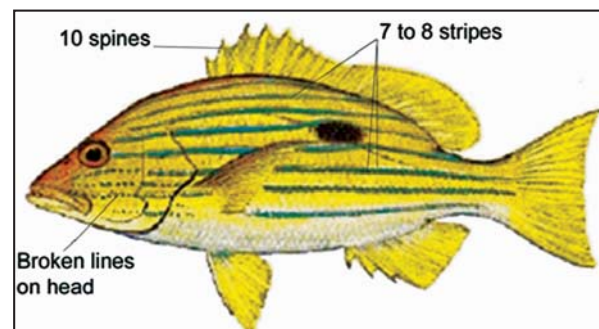
1838. *Diacope coeruleo-lineata* Ruppell, *Neve, Wirbelth., Fische*: 93 (Massaua and Djedda Sea).

1985. *Lutjanus coeruleolineatus*, Allen, *FAO Fish. Synop.*, (125) **6**: 70-71, pl.13, fig.51.

Diagnosis: D X, 12-14; A III, 8-9; P 16-17; V I, 5; LL 46-49. Body somewhat deep, its depth 2.4 to 2.6 in standard length. Snout more or less pointed. Dorsal profile of head somewhat sloped. Preorbital space almost equal or slightly narrower than eye diameter. Preopercular notch and knob poorly developed or absent. Longitudinal scale rows above lateral line rising obliquely. Scale rows on cheek 10 or 11. Caudal fin truncate or emarginate. Gill rakers on first arch, lower 14-15+ upper 7-8, total 21-23. Tongue smooth without teeth. Pectoral fins thoracic originated ahead of first dorsal fin spine. Dorsal surface of body brownish, sides yellow and abdomen whitish. Body with 7 to 8 blue stripes on sides, upper four or five lateral stripes extending to base of dorsal fin and lower three stripes extending from ahead of eye to base of caudal fin. A round dark spot in between fourth and fifth lateral stripes below anterior part of soft dorsal fin rays above lateral line present. Numerous blue spots or broken thin bands present below eye on head. Fins yellowish.

Distribution: Seas surrounding the Arabian Peninsula except northern Red Sea and the Gulf.

Remarks: *L. coeruleolineatus* is unlikely to occur along Indian coast. It is given here for this name is used by Day (1889) to describe one blue striped species from Indian coast. Further discussions are given below.



L. coeruleolineatus (after Allen, 1985)

3. *Lutjanus kasmira* (Forsskal, 1775)
(Common blue stripe snapper)

1775. *Sciaena kasmira* Forsskal, *Descript. Animal*, **11**: 46 (Arabia)

1985. *Lutjanus kasmira*, Allen, *FAO Fish. Synop.*, (125) 6: 96-97, pl.17, fig.63.

Diagnosis: D X, 14-15; A III, 7-8; P 15-17; V I, 5; LL 48-51. Body fusiform, its depth 2.74 to 3.27 in standard length. Head length 2.43 to 2.92 in standard length. Eye diameter 3.68 to 4.13 in head length. Preorbital space (distance below upper jaw and eye) wider, 5.50 to 5.85 in head length (3.3 to 8.9 in head length in Allen, 1985). Preorbital width shorter than eye diameter, 1.36 to 1.73 in eye diameter. Longitudinal scale rows on back rising obliquely above lateral line. Preopercle/cheek with 5 or 6 scale rows. Gill rakers 13-14 on lower arm of 1st gill arch, total 20-22. Preopercular notch and knob well developed. Tongue smooth without teeth. Pectoral fin thoracic ahead of dorsal fin spine. Body with 4 blue horizontal blue stripes on sides, upper 3 horizontal stripes extending from preopercular region to base of dorsal fin and fourth stripe extending from almost tip of snout to near base of caudal fin; a short lateral line stripe also present on head below fourth stripe. A dark blotch present in between second and third lateral stripes below almost two-third of body. A series of pale dusky stripes on lower most part of side. Upper part of pectoral fin rays darkish.

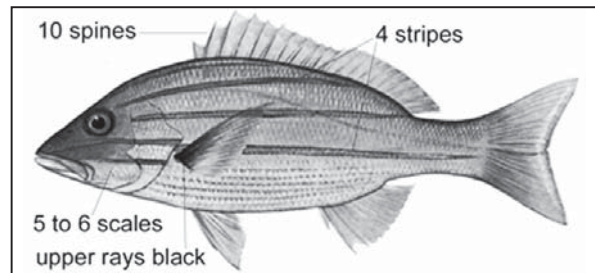
Distribution: India: Andaman & Nicobar Island, Odisha, Gujarat, Maharashtra, Karnataka, Kerala, Tamil Nadu, Lakshadweep Island. **Elsewhere:** Widespread in the Indo-Pacific from the Marquesas and Line Islands to East Africa and from Australia to southern Japan.



A huge landing of *L. L. kasmira* Cochin fishing harbour



L. kasmira (Fresh specimen)



Out lined diagram of *L. kasmira*

Remarks: Allen (1985) described preorbital width usually greater than eye diameter but sometimes less in small specimens, but the present study shows that preorbital width is shorter than eye diameter, 1.36 to 1.73 in eye diameter in the specimens measuring 140 to 190 mm standard length. During a recent survey (October, 2012) along the coastal belt of Cochin, a huge collection of the common blue stripe snappers was observed in the landing center of Cochin harbour.

4. *Lutjanus quinquelineatus* (Bloch, 1790) (Five-lined snapper)

1790. *Holocentrus quinquelineatus* Bloch, *Naturges. ausland. Fische*, 4: 84 (Japan)

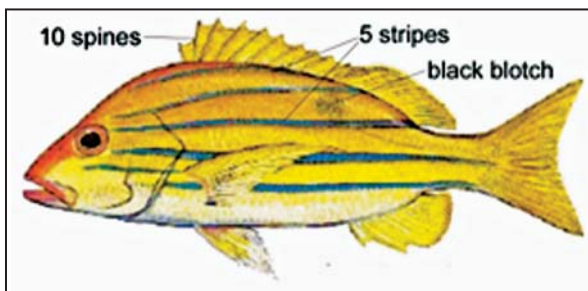
1985. *Lutjanus quinquelineatus*, Allen, *FAO Fish. Synop.*, (125) 6: 111-112, pl.19, fig.73.

Diagnosis: D X, 13-14; A III, 8; P 16-17; V I,5 ; LL 47-50 Body somewhat deep, its depth 2.30 to 2.73 in standard length. Head length 2.67 to 3.20 to in standard length. Dorsal profile of head steeply sloped. Eye diameter 2.78 to 3.06 in head length. Preorbital space (distance below upper jaw and eye) wider, 4.17 to 5.75 in head length. Preorbital width usually less than to eye diameter. Longitudinal scale rows above lateral line rising obliquely. Scale rows on cheek 10 or 11. Caudal fin truncate or emarginate. Preopercular notch and knob well developed. Gillrakers on lower arm of first arch 13-15, total 20-23. Tongue smooth without teeth. Scale rows on back rising

obliquely above lateral line. Generally bright yellow, including fins, with a series of blue stripes on the side. A round black spot, almost equal to eye diameter, is below the anterior-most soft dorsal rays and between second and third lateral stripe, touching the lateral line but mostly above it. Body with 5 blue stripes on sides (6 stripes at times), upper 3 stripes extend to base of dorsal fin and fourth and fifth stripes extend to base of caudal fin. Fins yellowish.



L. quinquelineatus (preserved specimen)



Lutjanus quinquelineatus (after Allen, 1985)

Distribution: India: Gujarat, Maharashtra, Karnataka, Kerala, Tamil Nadu, Andaman & Nicobar Islands. *Elsewhere:* Widely distributed in the Indo-Pacific from the Fiji Islands to the Gulf of Oman and the Gulf and from Australia to southern Japan.

DISCUSSIONS

L. bengalensis and *L. kasmira* are morphologically closely related species in colour pattern. Both the species possess 4 lateral blue stripes on sides. But these two species can be identified by the following characters. The former species possesses 11 to 12 dorsal spines; 10 to 12 transverse rows of scales on cheek; lower gill rakers 17 to 19; no dark spot below soft part of dorsal fin; upper rays of pectoral fin pale or dusky. In contrast to it, *L. kasmira* have 10 dorsal spines; 5 to 6 rows of transverse rows of scales on cheek, lower margin without scales; lower gill

rakers 12 to 14 including rudiments; a dark spot below soft part of dorsal fin present below soft part of dorsal fin; upper rays of pectoral fin dark. Allen (1985) is erroneous in describing *L. bengalensis* with dorsal fin spine counts 10 and 12-14 soft rays in the text but in the key to the species of *Lutjanus* it has been rightly included under the group having dorsal fin with 11 to 12 spines. This is now observed here that *L. bengalensis* well distinguished from other blue striped snappers of the area in having 11 to 12 dorsal fin spines.

L. quinquelineatus and *L. caeruleolineatus* are also almost morphologically similar species in colour pattern and having a dark blotch below front part of soft dorsal fin. But these two species can be separated from each other by the following features. *L. quinquelineatus* possess 5 lateral blue stripes; preopercular notch and knob well developed; snout and cheek without spots and broken narrow bands in former species; while *L. caeruleolineatus* have 7 to 8 lateral blue stripes on sides; preopercular notch and knob indistinct or absent; and with spots and broken narrow bands on snout and cheek. Table 1 shows a comparison of these four blue striped snappers for easy identification.

The identity of these blue striped snappers had remained a confusing subject in Indian literature. Day (1875) reported three species from the Seas of India having blue longitudinal stripes on sides, viz., *Lutjanus bengalensis* Bloch, *L. quinquelineatus* Bloch and *L. quinquelinear* Bloch. But in his subsequent work (Day, 1888, 1889) these species were treated as *L. kasmira*, *L. coeruleolineata* and *L. quinquelinear* respectively. However it has been observed that in Bloch (1970) it is spelled *quinquelinear* on plate and *quinquelineatus* in text and so, later is a valid name, not the former (Eschmeyer, 2013). Hence the last named species should be treated as *L. quinquelineatus*. *Genyoroge grammica* of Day (1871) described from Andaman Islands, *Diacope spilura* of Bennett (1833) and *Diacope decemlineata* of Valenciennes (1830) both described from Sri Lanka are considered to be synonyms of *L. quinquelineatus* Bloch (Allen, 1985).

Table 1. Comparison of four blue striped snappers.

Characters	<i>L. bengalensis</i>	<i>L. caeruleopuntatus</i>	<i>L. kasmira</i>	<i>L. quinquelineatus</i>
Dorsal fin spines	XI-XII	X	X	X
Scale rows on cheek	10-12	10-11	5-6	10-11
Lower gill rakers	17-19	14-15	12-14	13-15
Black spot below dorsal	absent	present	present	present
Upper rays of pectoral fin	pale	pale	dark	pale
Preopercular notch & knob	well developed	poorly developed	well developed	well developed
Stripes on sides	4	7-8	4	6

Sir F. Day has certainly confused *kasmira* with *bengalensis*. We have examined Day's *L. bengalensis* specimen from Madras which was figured in Day (1875) and found to be correct, but it is not *L. kasmira* as it contains XI dorsal spines, 11 rows of cheek scales, 17 gill rakers on lower arm of first gill arch and no spot on lateral line below dorsal fin.

Report of *L. coeruleolineata* from Indian waters by Day (1889) compelled us to rethink its possible occurrence along Indian coast. In having poorly developed notch and knob the specimen certainly resemble *L. coeruleolineata*, but it should usually have 7 to 8 stripes. *L. notatus* have 6 stripes on sides but differs in having 11 spines in dorsal fin, which is also unlikely to occur along Indian coast. As per the synonymy given in Day (1875), the specimen is comparable to *Mesoprion quinquelineatus* of Valenciennes (1830) which is based on 'mungî mapudi' of Russell (1803) from Visakhapatnam (east coast of India) and the specimen figured was 6 inches in length and from

the Andaman Islands. Therefore it is sure that he has seen a young specimen where the preopercular notch and knob are properly developed. During the present study, it has been observed that preopercular notch and knob becomes more prominent with age and growth. The authors also found some specimens of *L. quinquelineatus* having an extra stripe (*i.e.*, 6 stripes). From the statement of Day (1875) that "The specimen of Bloch's, *Lutianus quinquelineatus*, 9 inches long, No. 229, is undoubtedly this species", it is concluded that Day's specimen is certainly *L. quinquelineatus*, not *L. coeruleolineatus*. It is further confirmed that *L. coeruleolineatus* is not found in the Indian waters.

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REFERENCES

- Allen, G.R. 1985. FAO Species catalogue, Vol.6. The Snappers of the World. An Annotated and illustrated catalogue of the lutjanid species known to date. *FAO Fish. Synop.*, (125) **6**: 1-208.
- Bennett, E.T. 1833. Characters of new species of fishes from Ceylon. *Proceedings of the Committee of Science and Correspondence of the Zoological Society of London*, **1832**(2): 182-184.
- Day, F. 1871. On the fishes of the Andaman Islands. *Proc. Zool. Soc. London*, **1870**(3): 677-705.
- Day, F. 1875. *The fishes of India, being a Natural History of fishes known to inhabit the seas and freshwaters of India, Burma and Ceylon*. William Dawson & Sons Ltd., London, (1): 1-168, pls. 1-40.

- Day, F. 1888. *The fishes of India, being a Natural History of fishes known to inhabit the seas and freshwaters of India, Burma and Ceylon*. William Dawson & Sons Ltd., London, (supplementary): 169-368.
- Day, F. 1889. *The Fauna of British India including Ceylon and Burma. Fishes*. Vol. I, Taylor & Francis, London: 1-601.
- Eschmeyer, W. N. (ed). 2013. Catalog of Fishes. California Academy of Sciences (<http://research.calacademy.org/research/ichthyology/catalog/fishcatmain.asp>). Electronic version accessed 11 March 2013.
- Fischer, W. and Bianchi (eds.) 1984. *FAO species identification sheets for Fishery purposes. Western Indian Ocean (Fishing area 51)*, FAO, Rome, 3: pagevar.
- Froese, R. and Pauly, D. (Eds.) 2013. FishBase. World Wide Web electronic publication. www.fishbase.org, version (02/2013)
- Nelson, J.S., 2006. *Fishes of the World* (4th ed.). John Wiley & Sons, Inc, New Jersey & Canada: 601 pp.
- Russell, P. 1803. *Description and figures of two-hundred fishes collected at Vizagapatnam on the coast of Coromandal*, W. Bulmer & Co., London, 2 volumes, 198 pls.
- Talwar, P.K. 1991. Pisces. *In: Animal Resources of India*, Zool. Surv. India, Kolkata: 577-630.
- Talwar, P.K. and Kacker, R.K. 1984. *The Commercial Sea Fishes of India*. Hand Book No. 4. Zool. Surv. India, Kolkata: 997 p.
- Valenciennes, A. 1830. Additions et Corrections. *In*, Cuvier, G. and Valenciennes, A., *Histoire naturelle des poissons*. **6**: 493-559.