

A Re-description of the Little Known Rabbit Fish *Siganus lineatus* (Cuvier and Valenciennes) (Pisces : Siganidae) With Notes on Siganid Fishes of the Vembanad Lake

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Siganus lineatus (Cuv. and Val) is reported from the coast of peninsular India for the first time and a detailed description of it is given based on morphology and meristic characters. It differs from the other allied species of the genus *Siganus* Forskal in having an oval body without spots and having fifteen parallel longitudinal golden yellow bands, relatively larger last dorsal spine, maxillary position far below the level of the orbit and cheek with distinct rows of scales. *S. javus* (Linnaeus) and *S. canaliculatus* (Park) were also obtained from the Vembanad Lake. Short notes on the habitat, occurrence, abundance, seasonal and geographic distribution in relation to fluctuating hydrological conditions of the Vembanad Lake are incorporated together with a key for their identification.

During the investigations on the taxonomy and ecology of fishes of the Vembanad Lake (Lat. 9°28' and 10°10' N, Long. 76°13' and 76°31' E), the authors collected 2 specimens of *Siganus lineatus* (Cuvier and Valenciennes) (Pisces: Siganidae) which is a new distributional record from the west coast of peninsular India. *Siganus canaliculatus* (Park) and *S. javus* (Linnaeus) were also collected from the study area. Members of the family siganidae are difficult to identify because of their morphological uniformity and so the differences in colour pattern have been traditionally used to differentiate the species (Woodland & Randall, 1979). Siganids were formerly known as Teuthids, however, Nielsen & Klauswitz (1968), Taylor (1970) and Woodland (1972, 1973) have proposed to the International Commission on Zoological nomenclature that the genus *Teuthis* Linnaeus 1766 be suppressed in favour of the genus *Siganus* Forskal 1775. Family siganidae is composed of a single genus *Siganus* and the intended genus *LO* Seale 1906 has given only the subgeneric status (Grawel & Woodland, 1974).

Materials and Methods

The description of the Vembanad Lake is already given in an earlier paper by the

authors (Kurup & Samuel, 1983). The materials for the present study were collected from various types of fishing gear like cast nets, drag nets and chinese dip nets during 1978-81. Measurements and counts were made according to Grawel & Woodland (1974).

A key for the identification of rabbit fishes of the Vembanad Lake

1. Last dorsal spine longer than I dorsal spine; body height more than 44.00% in SL; soft dorsal and anal high and angular2

Last dorsal spine shorter than I dorsal spine; body height 36.00-41.50% in SL; soft dorsal and anal arched3

2. Head blunt; no distinct notch on the occiput, maxillary position far below the level of orbit; last dorsal spine 1.75 times in length of I dorsal spine; 21-23 rows of scales between lateral line and median dorsal spine; spots completely absent in body, 15 longitudinal golden yellow bands; preopercle golden yellow..... *Siganus lineatus* (Cuvier and Valenciennes)

Head slightly pointed; a distinct notch on the occiput; maxillary position opposite

the lower border of orbit; last dorsal spine 1.25 times in length of I dorsal spine; 30–35 rows of scales between lateral line and median dorsal spines; white oval spots on dorsal profile and head; longitudinal brown bands on belly *Siganus javus* (Linnaeus)

3. No distinct notch on occiput; 21–25 rows of scales between lateral line and median dorsal spines; maxillary position opposite the lower border of orbit; black shoulder spot; five black cross bars on the caudal fin *Siganus canaliculatus* (Park)

1. *Siganus lineatus* (Cuvier and Valenciennes 1835) Fig. 1.

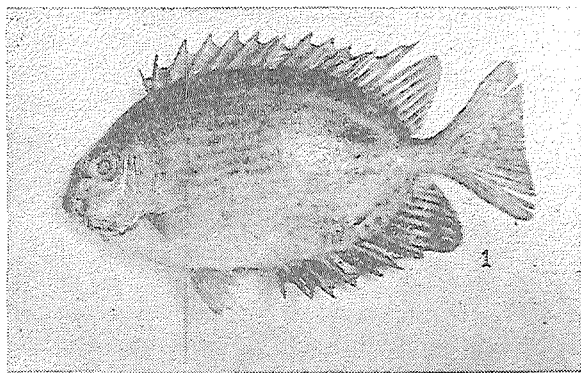


Fig. 1 *Siganus lineatus* (Cuv & Val) 120 mm SL.

Description: Based on 2 specimens, 120.0 and 134.0mm SL (142.0–165.5 mm TL).

Fin formula: D. I XIII, 10; A. VII. 9; p.14; v.I, 31; c.22.

Body very oval and well compressed, slight concavity on the occiput and so a gradual ascent to dorsal fin origin. Inteorbital space convex. Head blunt, snout tip humped. Maxillary position far below the level of orbit. Perpendicular lower angle denticulated. Anterior nostril is having a very small flap. Gill rakers on first arch (anterior) $6 + (18-19) = 24-25$. In both upper and lower jaws a single row of incissor like teeth (26). The teeth in upper jaw is having a median cusp, bicusped teeth in lower jaw. Palatine and vomerine teeth absent. Last dorsal spine 1.75 in times of first dorsal

spine. Soft dorsal and anal high and angular caudal fin truncate.

Scales: Lateral line scales 148–154; in transverse series 102–106. Scale rows between lateral line and 4th dorsal spine 21–23. Cheek covered with visible scales; 11–12 rows below mid-orbit. Scales present all over the body.

Colour: Spots and blotches are totally absent. Upper profile slightly greenish, lower profile dull white. Fifteen parallel longitudinal golden yellow bands in the body, not extending into the head. Interspace between the bands are greater than width of the band. Head dark brown, snout tip black. Preopercle yellowish; dorsal, caudal and ventral fins blackish; anal fin very black. A black strip just behind dorsal base. Golden yellow behind the end of soft dorsal.

Occurrence and abundance: During the period of investigation the occurrence of *S. lineatus* was noticed only twice from the harbour area of the lake. It was collected in the pre-monsoon season (April–May) when almost marine habitat prevailed. High salinity (32–33–33.70‰) and temperature (32.2–33.0°C) were recorded from the stations (Fig. 4).

Remarks: The colour in life of this species is not yet fully described. Gunther (1861) described that in *T. lineata* the ten longitudinal streaks are anastomosing with one another but in the present specimens all the fifteen bands are parallel and not forming into any net work. Beaufort & Chapman (1951) considered *S. lineatus* as the

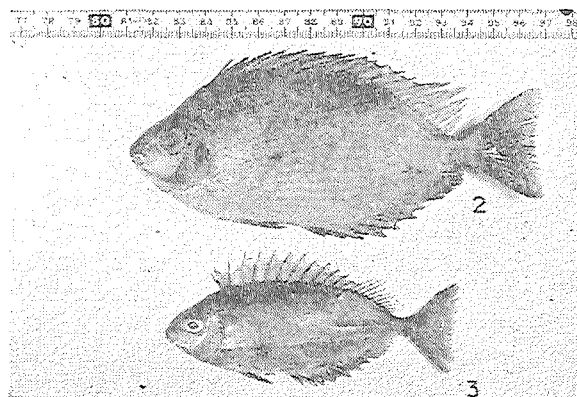


Fig. 2 *Siganus javus* (Linnaeus)

Fig. 3 *Siganus canaliculatus* (Park).

synonym of *S. guttatus* (Bloch), but the present specimens do not agree with their description. 2. *Siganus javus* (Linnaeus, 1766) Fig. 2.

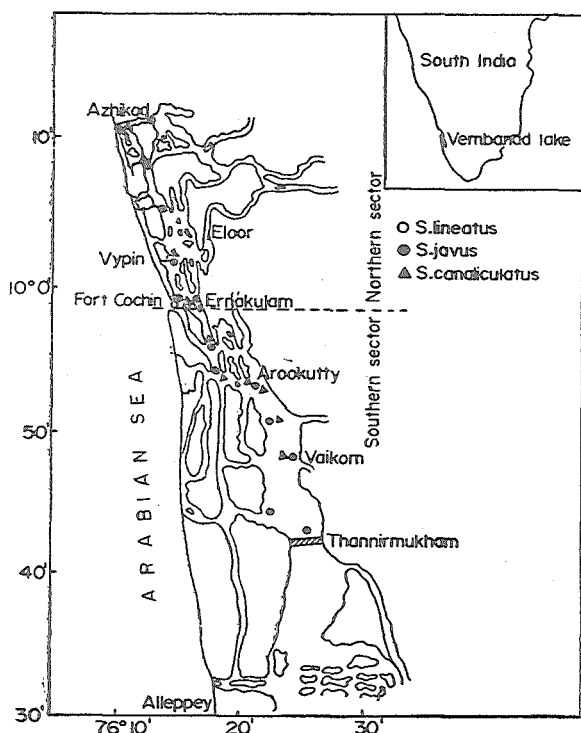


Fig. 4 Geographic distribution of rabbit fishes in Vembanad Lake (Personal examination).

Occurrence and abundance: The appearance of *S. javus* in the harbour area is noticed by the end of February when relatively high salinity (26.01‰) and temperature (30.4°C) were prevailed in these region. During March, this species was collected from further interior parts of the lake both in northern (Cherai, Pallipport, Azheekode) and southern (Vypeen, Thevara, Arookutty) sectors. During March–May few specimens were collected even upto Thannirmukkom in the southern sector ($S‰ = 31.31–5.96$, $T = 32–33.8^{\circ}\text{C}$) and nearly from all stations in northern sector ($S‰ = 23.85–33.59$, $T = 31.0–33.8^{\circ}\text{C}$) except from Eloor–Vaduthala regions. After the middle of June, it's occurrence was not noticed in any of the gears. Eventhough its scarce occurrence was noticed from all saline stations of the lake (Fig. 3), it maintains only a very low level of population and does not contribute much to the fishery of the Vembanad Lake.

3. *Siganus canaliculatus* (Park, 1797) Fig. 3

The occurrence of *S. canaliculatus* in the lake was noticed only during the pre-monsoon season (December–May). Its appearance in the catches from the proximity of the Cochin Harbour area and the Azeekode regions of the lake was noticed by the middle of December ($S‰ = 22.63–23.03$) ($T = 30.2–31.0^{\circ}\text{C}$). The penetration of this species was noticed from the interior regions of the lake along with the gradually increasing salinity gradient. *S. canaliculatus* occurred regularly in the catches from the estuarine mouth of Cochin and Azeekode during January to May when relatively high salinity (26.28–33.59‰) and temperature (30.4–33.8°C) prevailed in these regions. During the peak pre-monsoon season (March–April) its sporadic availability was noticed upto Vaikom ($S‰ = 25.74–33.59$, $T = 31.6–33.8^{\circ}\text{C}$) in the northern sector (Cochin–Thuruthippuram) except in Vaduthala and Eloor (Fig. 4). Generally small size groups (42.0–70.0 mm SL) were represented in the catches and the fishes ranging in size 71.0–111.0 mm SL group were only sporadically represented since the late March.

Remarks: Beaufort & Chapman (1951) described *S. oramin* (Bloch & Schneider) and *S. canaliculatus* as two separate species. In the recent works *S. oramin* is considered as the synonym of *S. canaliculatus* (Fischer & Whitehead, 1974). According to Woodland (1973) the name *canaliculatus* (Park) 1797 has priority over *oramin* (Lam. 1974). Lam (1974) described the two forms of *S. canaliculatus*, one with 5–6 rows of pin-head sized spots above lateral line and other form with 3 rows of match-head sized spots above lateral line and other from with 3 rows of match-head sized spots above lateral line.

Discussion

Vembanad lake is the largest estuarine system of the south west coast of India. The rabbit fishes do not constitute an important fishery in the lake. The authors noticed the occurrence of 3 species in the lake, of which the availability of *S. lineatus* from this area is of particular interest as it extends its known geographic distribution to the south west coast of India. Shetty (1965) listed only two species of rabbit fishes from Vembanad of which *S. sutor* Gunther was not

observed so far by the present authors from the lake.

The study on the distribution and availability of rabbit fishes showed that they show different patterns of distribution. The lake is permanently connected with the Arabian Sea so that there is a regular ingress and egress of marine fishes into and from the lake. The occurrence of *S. lineatus* was noticed only very sporadically from the stations near the estuarine mouth of Cochin and is predominantly a marine species which migrates accidentally into the high saline areas of the lake during March–April. *S. canaliculatus* appeared early in the catches from the estuarine mouth but its penetration into the interior parts of the lake is very gradual, mainly along with the gradually increasing salinity gradient. But *S. javus* appeared in different sectors of the lake soon after its entry inside the lake even though it was late and its distribution was irrespective of the high saline areas of the lake. Moreover *S. canaliculatus* leaves the lake at the onset of monsoon but *S. javus* was found even in the month of June. Based on the differential distribution pattern it may be inferred that *S. canaliculatus* is very sensitive to changes in the habitat and can thrive only in high saline parts of the lake. But *S. javus* is highly euryhaline and so it can inhabit nearly all the zones of the lake except the oligohaline and limnetic. The late appearance of *S. javus* in the lake may be due to its late occurrence in the inshore areas of Cochin. Siganid fishes were not found beyond the Thannirmukkom bund even in pre-monsoon season where nearly fresh water habitat was prevalent. The oligohaline habitat (S 10.5–5‰) in the above region is only due to the closure of Thannirmukkom bund, which prevents not only the penetration of salt water but also migration of marine fishes beyond Thannirmukkom. This may probably affect adversely the fishery resources of those parts of the lake beyond the Thannirmukkom barrage.

S. canaliculatus and *S. javus* constitute only a very low level of population at the barmouth of Cochin during the pre-monsoon period and their occurrence in other parts of the lake were very sparse and sporadic. It can be inferred that these two species are marine migratory species

and do not contribute to the stock of permanent lake fishery resources. It was observed that none of them had oozing or fully matured gonad and the lakeward migration of these species may be for feeding. The relationship between the distribution of separate species and temperature is very strong (Nickolsky, 1963). The fluctuation in temperature from monsoon to pre-monsoon periods (24.6–34.5°C) may also have some effect on the seasonal distribution and abundance of siganus fish fauna in Vembanad lake.

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References

- Beaufort de, L. F. & Chapman, L. M. (1951) *The fishes of the Indo-Australian Archipelago* (Brill. Leiden) vol. 9 484 pp.
- Fischer, W. & Whitehead, P. J. P. (1974) (eds; *FAO Species Identification Sheets for Fisheries Purposes, Eastern Indian Ocean (fishing area 57) and Western Central Pacific (fishing area 71)* 4, FAO, Rome
- Gawel, M. & Woodland, P. J. (1974) *Copeia*, 855
- Gunther, A (1861) *Catalogue of Fishes of the British Museum*, London. 588 p p.
- Kurup, B. M. & Samuel, C. T. (1983) *Rec. Zool. Surv. India*, 80, 387
- Lam, T. J. (1974) *Aquaculture*, 3, 324
- Nickolsky, G. V. (1963) *The Ecology of Fishes*. Academic Press, London and New York (Translated from Russian) 325 pp.
- Nielson, J. G. & Kalsewitz, W. (1968) *Bull. Zool. Nomencl.* 255, 26
- Shetty, H. P. C. (1965) *Proc. Nat. Acad. Sci. India*, 35, 115
- Taylor, W. R. (1970) *Bull. Zool. Nomencl.* 26, 178
- Woodland, D. J. (1972) *Bull. Zool. Nomencl.* 29, 190
- Woodland, D. J. (1973) *Bull. Zool. Nomencl.* 30, 6
- Woodland, D. J. & Randall, E. (1979) *Copeia*, 3, 390