

RECORDS OF SIX SPECIES OF CARANGIDS FROM THE SOUTHWEST COAST OF INDIA

P. V. SREENIVASAN

Vizhinjam Research Centre of C.M.F.R. Institute, Vizhinjam.*

ABSTRACT

The occurrence of six species of fishes of the family Carangidae, namely, *Decapterus macarellus* (Cuvier and Valenciennes), *Caranx williamsi* Smith, *Carangoides jordani* Nichols, *Carangoides gilberti* Jordan and Seale, *Carangoides uii* Wakiya and *Carangoides talamparoides* Bleeker are recorded for the first time from Indian waters. They are briefly described and their systematic positions discussed.

INTRODUCTION

Fishes of the family Carangidae are widely distributed along both the coasts of India and form about 2% of the total marine fish landings of this country. At Vizhinjam area, along the south west coast of India, there exists a prosperous fishery for carangids which form 15-16% of the total annual catch. In the fishery 40 species have been recorded of which six species, viz., *Decapterus macarellus* (Cuvier and Valenciennes), *Caranx williamsi* Smith, *Carangoides jordani* Nichols, *Carangoides gilberti* Jordan and Seale, *Carangoides uii* Wakiya and *Carangoides talamparoides* Bleeker which were hitherto not recorded from Indian seas form the basis of this account.

MATERIAL AND METHODS

Materials were collected from Vizhinjam and nearby landing centres from different units operated. The number of specimens examined differed for each species because of their varied occurrence. The morphometric measurements and meristic counts were taken according to the methods followed by Williams (1958) and Berry (1959), and the body proportions are given in hundredths of standard length (unless and otherwise mentioned).

In the case of *D. macarellus*, four females, one with immature and three with ripe gonads were encountered. Since no information on the maturity of this species is available, a brief study was also made on these material. The measuring and counting of ova were done adopting the methods followed by Antony

* Present address: Porto Novo Field Centre of C.M.F.R.I., Porto Novo 608502.

Raja (1967 and 1972). 600 ova (100 each from anterior, middle and posterior regions of right and left lobes) from each ovary were measured using a micrometer in which one microdivision equals 0.0196 mm. For further analysis ova above 7 m.d. only were considered.

DESCRIPTION OF SPECIES

1. *Decapterus macarellus* (Cuvier and Valenciennes) (Fig. 1)
Caranx macarellus Cuvier and Valenciennes, 1833. *Hist. nat. Poiss.*, 9: 30 (4).
 Type locality: Martinique.
Decapterus macarellus Berry, 1968. *Contr. Tropic Atl. Fish. Lab.*, 78: 162.

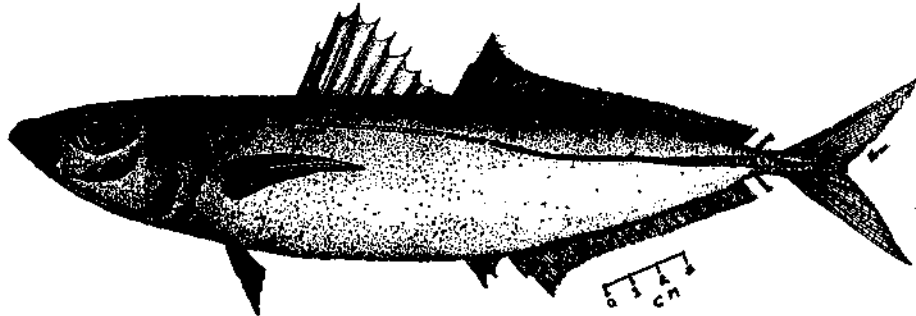


FIG. 1. *Decapterus macarellus*.

Material: 10 specimens of size range from 297 mm to 379 mm in total length (259 mm to 320 mm in standard length and 293 mm to 342 mm in fork length). Two specimens were collected on 31-12-1970 and eight specimens on 18-2-1974 all from drift net landings.

DI VIII; D2 I 31-35; A II + I 26-29; P I 22-23;
 L.I. scales|scutes 90-104|24-29 (total 116-129);
 Gillrakers 10-12 + 35-41 (total 47-53).

Head 25.35-27.19; eye 5.86-6.38; snout 8.61-9.41; postorbital 10.91-12.07; maxillary 7.62-8.11; interorbital 6.82-7.38; pectoral fin 15.59-18.88; pelvic fin 9.42-12.08; maximum height of first dorsal fin 11.59-13.44; height of second dorsal 8.51-10.32; height of anal 7.46-8.21; height of head 12.32-13.42; depth at pelvic 18.97-20.28; depth at first anal spine 20.00-22.07; lateral line straight 31.46-37.75 and lateral line curved 39.01-49.42.

Body elongate, more or less roundish; head pointed; eye less than interorbital; maxillary terminates before front border of eye; posterior margin of maxillary bone descending in a forward angle; supramaxillary bone posteriorly becoming narrow; teeth wanting on both the jaws, on vomer and palatines; a narrow band of teeth on tongue; posterior straight part of lateral line with about 55-56 scales of which posterior 25-29 scutes.

Colour: In fresh condition, dark greenish above, silvery below; vertical fins silvery with dusky edges; pelvics and pectoral silvery; a dark opercular spot present. In preservation, body dark above, pale below; fins pale, opercular spot present.

Distribution: Warm waters of Atlantic, Pacific and Indian Oceans.

Remarks

Rao (1966), who reviewed the works on the different species of the genus *Decapterus* Bleeker recorded in India, established that *Decapterus dayi* Wakiya (= *Decapterus kiliche* (Cuvier and Valenciennes)) is the only species occurring in the Indian waters. It is of interest to note that two more species, *Decapterus macarellus* (C. & V.) and *Decapterus lajang* Bleeker (whose occurrence was earlier observed by Shri S. Reuben along Andhra coast, Personal Communication) also occur at Vizhinjam. Among these three species *D. dayi* forms a regular fishery, while stray numbers of *D. lajang* and rarely *D. macarellus* occur at this landing centre.

Notes on the ovaries

The maturing ovary (Stage III) was flat and yellow in colour, occupying $\frac{1}{4}$ of the body cavity and containing two types of eggs, transparent ova with visible nuclei and yellow-yolked opaque ova. The size of ova ranged from 1-25 m.d. with two modes one at 7-8 m.d. and second at 19-20 m.d. (Fig. 2) representing the immature and maturing stock respectively. The ripe ovary (Stage VI) was occupying the entire body cavity, more or less cylindrical whitish yellow in colour due to pale translucent eggs visible through the thin ovary wall. Besides

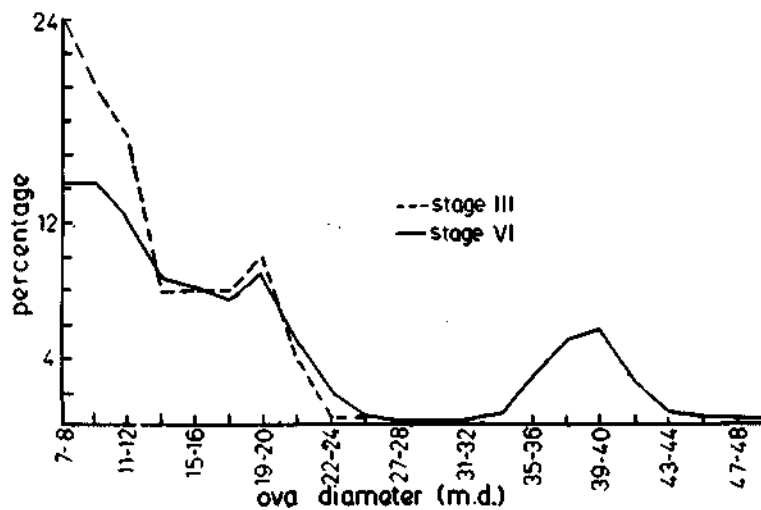


FIG. 2. Ova-diameter-frequency polygon at stage III and stage VI of *D. macarellus*.

the two types of ova found in stage III, another set of large translucent eggs with bright yellow oil-globule of size ranging 8-11 m.d. were observed. The total size of the ova was found to be ranging from 1 to 50 m.d. with three modes at 7-8 m.d., 19-20 m.d. and 39-40 m.d. (Fig. 2), the last mode representing the spawning stock and in this batch of ova the total number of them ranging from 59,500 to 90,000 in fish of total length 322-330 mm.

2. *Caranx williamsi* Smith** (Fig. 3)

Caranx (*Caranx*) *sansun* (*non* Forskal) Williams, 1956. *Fish. Publ. London*, 6: 28 Pls. 6 & 7. Type locality: Kenya.

Caranx williamsi Smith, 1968. *Occ. Pap., Rhodes Univ. Dept. Ichthyol.*, 15: 173-184. Pl. 38 A & B. Type locality: Durban.

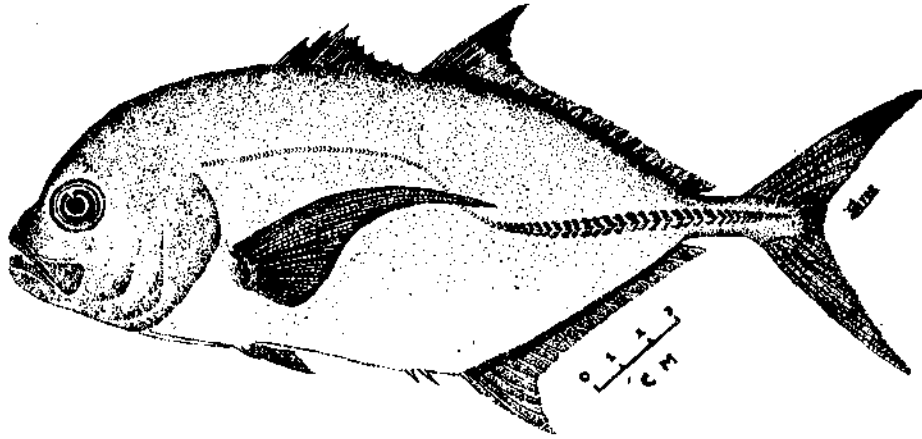


FIG. 3. *Caranx williamsi*.

Material: Numerous specimens ranging from 78 mm to 591 mm in total length (62 mm to 490 mm in standard length) (9 specimens measured in detail) from boat seine, shore seine and drift net catches. Off Vizhinjam and Colachel.

D1 VIII; D2 I 20-21; A II + I 16; P I 19-20; L.I. scutes 35-38; Gillrakers 7 + 18-19 (total 25-26).

Head 26.80-33.87; eye 5.36-11.39; snout 7.83-9.67; postorbital 14.52-15.05; interorbital 8.45-9.67; suborbital 3.92-4.03; maxillary 11.54-13.71; height of first dorsal fin 9.48-14.52; second dorsal fin 14.02-19.35; height of anal 13.81-17.74; pectoral fin 33.40-34.65; pelvic fin 11.54-15.32; caudal fin 23.50-29.03; lateral line curved 31.95-32.26; lateral line straight 44.53-45.16; depth at posterior part of orbit 25.34-32.26; depth at second dorsal 29.69-40.32; and caudal peduncle width 3.30-4.03.

** The species were subsequently collected from Porto Novo by Shri K. Venkataramani.

Head slightly longer than high; eye longer than snout in young, shortens with growth; cleft of mouth at level of lower margin of eye in young, but well below in larger specimens; maxillary extends to middle of eye in young, and reaches posterior edge with age; villiform teeth in upper jaw in band with outer enlarged row of conical teeth; in lower jaw in single series; teeth also present on vomer, palatines and tongue; soft dorsal lobe 1.7 to 1.9 in head; scales present on pre-operculum and upper portion of operculum on head; ventral thoracic region naked except for a patch of scales before pelvics, shape of naked area and that of patch of scales variable; curved part of lateral line 1.3 in straight part; about 110 scales present on lateral line of which 35-38 are well developed scutes on entire straight part.

Colour: In fresh condition, body bright yellow above and yellowish green below; first dorsal dusky; distal third of second dorsal and upper caudal lobe black, rest of fins yellow. In formalin-preserved specimens: body pale, dorsal, anal and caudal dusky, pectoral and pelvic pale; tips of dorsal and upper caudal lobe dark.

Remarks

Smith (1968) while establishing the identity of *Caranx sansun* (Forsk.) maintained that this name should be considered a *nomen dubium* since the type specimen described by Forskal is no longer available and the original description is of little diagnostic value. He further emphasized that 'no worker who has applied the name *C. sansun* Forskal to any fish has been able to justify the use of that name, which can in effect be no more than pure guess work'. For this statement he cites as examples the *C. sansun* of Ruppell (1828) and Day (1878) which was described to have completely scaled breast and *C. sansun* of Klunzinger (1871), Wakiya (1924), Weber and de Beaufort (1931), Munro (1955) and Williams (1956) which was to have ventrally naked breast. Besides clarifying the identity of various species hitherto confused under the name *C. sansun*, he described two new species, which also have been referred previously to the same species. These two species, *Caranx williamsi* and *C. celetus* have ventrally naked breasts, but they differ in their fin formulae, gillraker counts and in the height of soft dorsal lobe (*C. williamsi*: D2 rays 20-21; A II + I 16; G.R. 7 + 18-19 and lobe of soft dorsal 1.7-1.8 in head; vs *C. celetus*: D2 rays 22-23; A II + I 18-19; G.R. 8-9 + 18-20 and lobe of soft dorsal 1.3-1.4 in head).

From Indian seas, two different types of *C. sansun* were described first type by Day (1878) with scaly breast and the second by Munro (1955) with ventrally naked breast. Smith (1968) considers the former species to be conspecific with *Caranx forsteri* (Cuvier and Valenciennes) and the latter with *C. celetus* Smith. Thus the third species *C. williamsi* has not been reported from the seas around India. According to Smith, *C. williamsi* is 'apparently rather rare'

and 'so far known certainly only from the Western Indian Ocean'. Large specimens of this species locally known as 'Velavu Parah' are at times caught in huge shoals in shore seines along south west coast of India.

Distribution: East and South Africa and Arabian sea.

3. *Carangoides jordani* Nichols (Fig. 4)

Carangoides jordani Nichols, 1922. *Amer. Mus. Nov.*, 50: 2. Type locality: Hawaiian Islands.

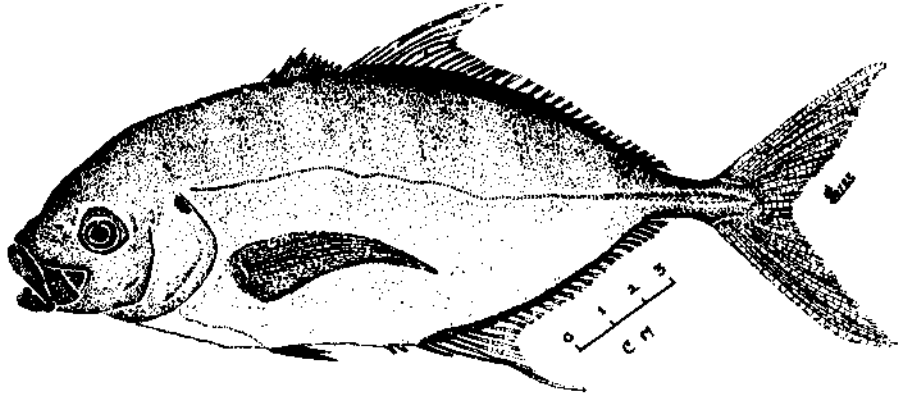


FIG. 4. *Carangoides jordani*.

Material: One specimen measuring 178 mm in standard length (228 mm in total length) from Vizhinjam from hooks and line, collected on 8-5-1972.

Dl VIII; D2 I 31; A II + I 24; P I 23.

L.l. scutes 29; Gillrakers 9 + 22 (total 31).

Head 29.78; eye 7.87; snout 10.11; interorbital 9.55; postorbital 12.92; suborbital 3.37; maxillary 12.36; height of first dorsal fin 6.74; height of second dorsal fin 26.97; height of anal fin 26.40; pelvic fin 13.48; pectoral fin 31.46; caudal fin 32.02; lateral line curved 42.57; lateral line straight 41.01; depth at posterior part of orbit 24.16; depth at first dorsal 37.05; depth at second dorsal 39.33; and least depth of caudal peduncle 4.49.

Head as long as high; eye situated mainly in anterior part of head; cleft of mouth commences at level of lower edge of eye; villiform teeth in bands on jaws, the outer row slightly enlarged; minute teeth also on vomer, palatines and tongue; scaleless area of thoracic region reaches to about upper third of distance between ventral profile and base of pectoral, also extends up to pelvic base; head naked except for a patch of scales on cheek and postorbital part; anterior part of lateral line flatly arched; of 152 scales on lateral line, 29 are scutes present on posterior part of straight portion.

Colour: In preserved condition, upper crest of head black; body greyish dark above, pale below; spinous dorsal black; elevated lobes of dorsal and anal black, rest of fins pale; dusky opercular spot present.

Remarks

C. jordani and the following species, *Carangoides gilberti* Jordan and Seale were synonymised with *Carangoides ferdau* (Forsk.) by Fowler (1928) and this synonymy was followed by later authors like Weber and de Beaufort (1931) and Williams (1958). But Woods (1953) found some of the synonyms of *C. ferdau* given by Fowler can be of separate species and considered *C. gilberti* and also *Carangoides laticaudis* Alleyne and Macleay as distinct species while for *C. jordani* he gave subspecific rank under *C. ferdau*. But recently *C. jordani* was given full specific rank by Smith, M. M. (1972). A comparison of characters of *C. jordani*, *C. gilberti*, *C. ferdau* and other related species as given in Table 1, shows that they can be of separate species, distinct from one another. From Indian seas, Day (1878) reported *C. ferdau*, which agree well with that of Forskal, while the species described by Munro (1955) as *C. ferdau* resembles *C. laticaudis*. Therefore, *C. jordani* and *C. gilberti* are reported here as new records to this area. It is also of interest to note that in the case of *C. jordani*, this species retains same characters in spite of its occurrence in widely separated localities in the Pacific and Indian Oceans.

TABLE 1. *Distinguishing characters of Carangoides jordani Nichols and C. gilberti Jordan and Seale from other related species.*

Characters	<i>C. ferdau</i> (Forsk.) after Day, 1878	<i>C. laticaudis</i> Alleyne & Macleay (after Munro, 1955)	<i>C. nitidus</i> Smith (after Smith, M.M. 1972)	<i>C. jordani</i> Nichols (Vizhinjam specimen)	<i>C. gilberti</i> Jordan and Seale (Vizhinjam specimens)
Dorsal rays	24-28	29-30	30	31	30-33
Anal rays	22	22-26	25	25	24-26
Gillrakers	* 7-8 + 18-19 total 25-27	18 on lower limb	8-9 + 22-23 total 31	9 + 22 total 31	7-8 + 17-19 total 25-27
Depth in total length	3.67-4.25	3.25	..	4.75	2.87-3.06
Soft dorsal lobe	strongly falcate.	not falcate.	strongly falcate.	strongly falcate.	strongly falcate.
Patch of scales before pelvic fin	absent.	absent.	present	absent.	absent

* (after Smith, M.M., 1972).

Distribution: Hawaiian Islands, Pacific Ocean and Arabian Sea.

4. *Carangoides gilberti* Jordan and Seale (Fig. 5)

Caranx gilberti Jordan and Seale, 1905. *Bull. U.S. Bur. Fisheries*, 25: 234.
Fig. 29. Type locality: Pago Pago, Tutuila, Samoa Island.

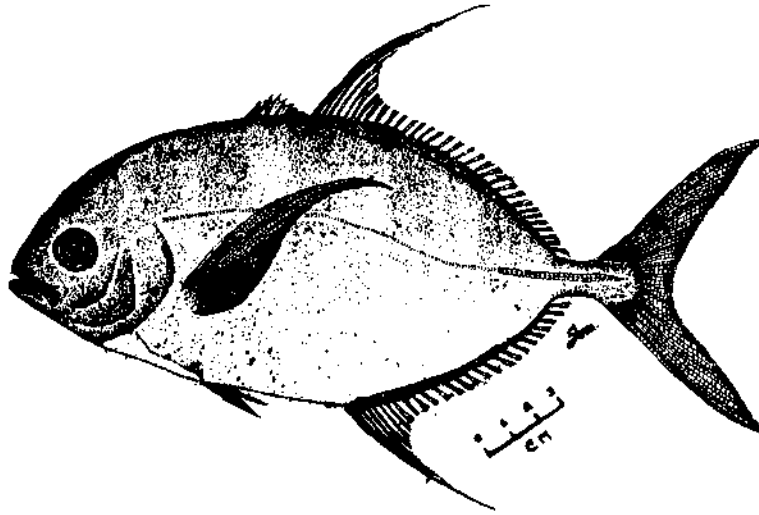


FIG. 5. *Carangoides gilberti*.

Material: 12 specimens ranging in size from 142 mm to 345 mm in standard length (188 mm to 431 mm in total length) collected from drift net catches. Off Vizhinjam and Poonthura.

DI VII; D2 I 30-33; A II + I 24-26; L.l. scutes 25-28; P I 23-24;

Gillrakers 7-8 + 17-19 (total 25-27).

Head 26.38-31.69; eye 6.67-9.16; snout 9.25-10.56; postorbital 12.75-14.08; preorbital 6.38-7.04; interorbital 9.86-10.00; suborbital 3.52-6.52; maxillary 10.72-13.03; third dorsal spine 4.06-4.93; second dorsal lobe 21.45-34.51; anal lobe 18.84-34.51; pectoral fin 33.80-38.26; pelvic fin 11.30-15.49; caudal fin 33.04-36.62; depth at occiput 25.51-32.16; depth at first dorsal origin 37.42-39.86; depth at second dorsal 40.94-46.15; lateral line curved 48.99-52.81 and lateral line straight 27.46-27.83.

Cleft of mouth well below eye level; jaws subequal, maxillary extending below the front border of pupil; villiform teeth in bands on both the jaws, the outer slightly larger than inner; teeth also present on vomer, palatines and tongue; thoracic region not scaled; the upper margin of this scaleless region extends

much less than half way to pectoral base; its posterior end is above the ventral profile curving sharply to the pelvic base; lateral line scarcely arched straightening below 21st to 22nd dorsal ray.

Colour: Body silvery, upper crest dark; first dorsal dusky; tip of second dorsal lobe black; dorsal, and anal grayish with slightly paler margins; pectoral, pelvic and caudal pale; five to six vertical faint dark bands present in the smaller specimens but absent in larger specimens. A small narrow opercular spot present. Few yellow spots present above and below the lateral line in fresh condition but disappear on preservation.

Distribution: Pacific and Indian Oceans.

5. *Carangoides uii* Wakiya (Fig. 6)

Caranx (Citula) uii Wakiya, 1924. *Ann. Carnegie Mus.*, 15: 172. Type locality: Japan.

Carangoides uii Smith, M. M. 1972. *Occ. Pap., The J.L.B. Smith Institute of Ichthyology*, 18: 233.

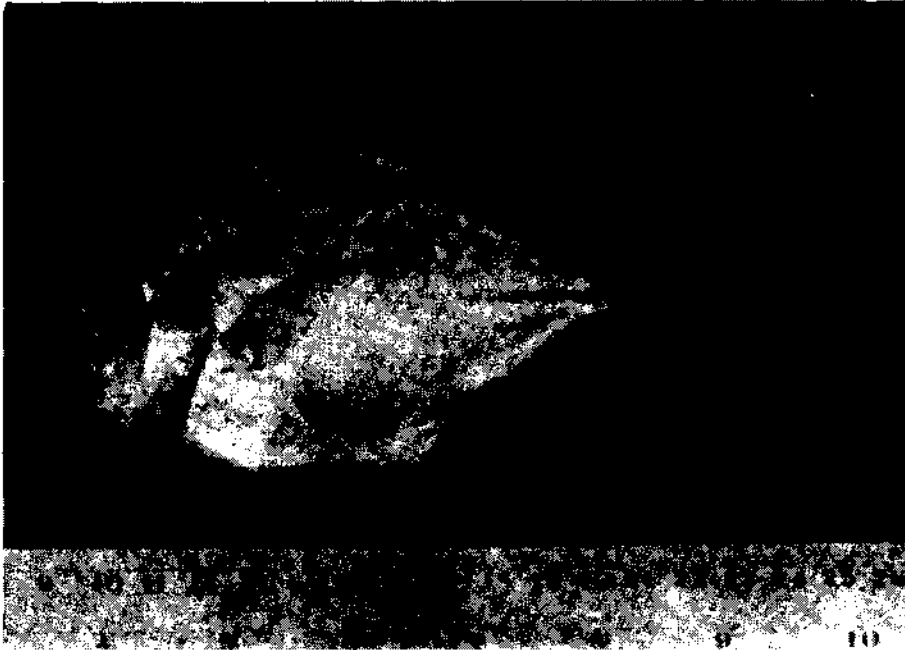


FIG. 6. *Carangoides uii*.

Material: Numerous specimens ranging from 61 mm to 154 mm in standard length (72 mm to 200 mm in total length) (7 specimens measured in detail) from Vizhinjam and Colachel, from boat seine, shore seine and hooks and line.

D1 VIII; D2 I 20-22; A II + I 17-18; P I 20;
L.I. scutes 19-25; Gillrakers 8 + 15-16 total 23-25.

Head 30.52-32.82; eye 10.49-11.04; snout 9.16-10.40; postorbital 12.21-12.59; interorbital 9.09-10.15; suborbital 4.30-4.90; maxillary 12.97-14.06; height of first dorsal fin 13.64-14.06; height of second dorsal fin 53.14-58.51; height of anal fin 27.34-29.37; pectoral fin 37.01-39.68; pelvic fin 11.89-14.06; caudal fin 32.47-33.59; depth at posterior part of orbit 38.46-40.26; depth at first dorsal 50.00-50.38; depth at second dorsal 51.95-53.15; lateral line curved 42.57-47.40; and lateral line straight 30.72-34.73.

Head higher than long; eye diameter greater than snout and interorbital; cleft of mouth just below level of eye; teeth minute, in narrow villiform bands on jaws, vomer, palatines and on tongue; scaleless area of breast constricted close below pectoral base, hind-margin area with a forward arch extending up to a little behind base of pelvic; head naked, except for a triangular patch of scales on pre-operculum and uppermost region of operculum; anterior curved part of lateral line straightens below 13th to 14th dorsal ray; totally about 110 scales present on lateral line inclusive of 19-25 feeble scutes which occur in posterior part of straight lateral line; anterior rays of dorsal and anal fins strongly elevated and produced; pectoral falcate; pelvic reaches anal fin in smaller specimens but only up to vent in older forms.

Colour: In fresh condition, body bluish green above, silvery below; six vertical bands on body, conspicuous in young, obscure in older forms; first dorsal dark, produced dorsal rays black, rest of dorsal yellow; pectoral and anal silvery; pelvic blackish in young, silvery in adult; caudal yellowish green, dusky

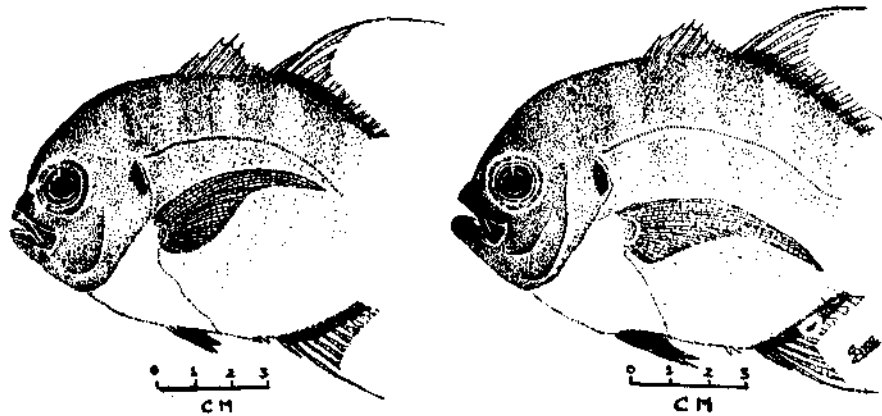


FIG. 7. Shape of the naked thoracic region of (left) *C. uli* and (right) *C. ciliaris*.

at tip; pectoral axil black; a black opercular spot present. In formalin preserved state: body dark above, pale below; vertical bands fade; first dorsal and produced dorsal rays dark and rest of fins pale; opercular spot persistent.

Remarks

This species shows very close similarity to *Carangoides ciliaris* Ruppell (formerly known as *Carangoides armatus* Forskal, vide Smith, M. M. 1973), but they differ in number of gillrakers, fin counts and in the shape of scaleless area of the thoracic region, viz., D2 rays 20-22; A rays 17-18; Gillrakers 8 + 15-16 totally 23-25; and the upper margin of scaleless area with a forward arch below pectoral runs to behind pelvic base (Fig. 7) in *C. uii*; vs D2 rays 19-21; A rays 16-17; Gillrakers 12 + 22-23 totally 34-36; and the upper margin of scaleless area without a forward arch runs straight to behind pelvic base (Fig. 7) in *C. ciliaris*. Both the species more or less equally found in stray numbers in the fish catches of Vizhinjam area.

6. *Carangoides talamparoides* Bleeker (Fig. 8)

Carangoides talamparoides Bleeker, 1852. *Makrellacht. Visschen. Verh. Batav. Gen.*, 24: 92. Type Locality: East Indies.

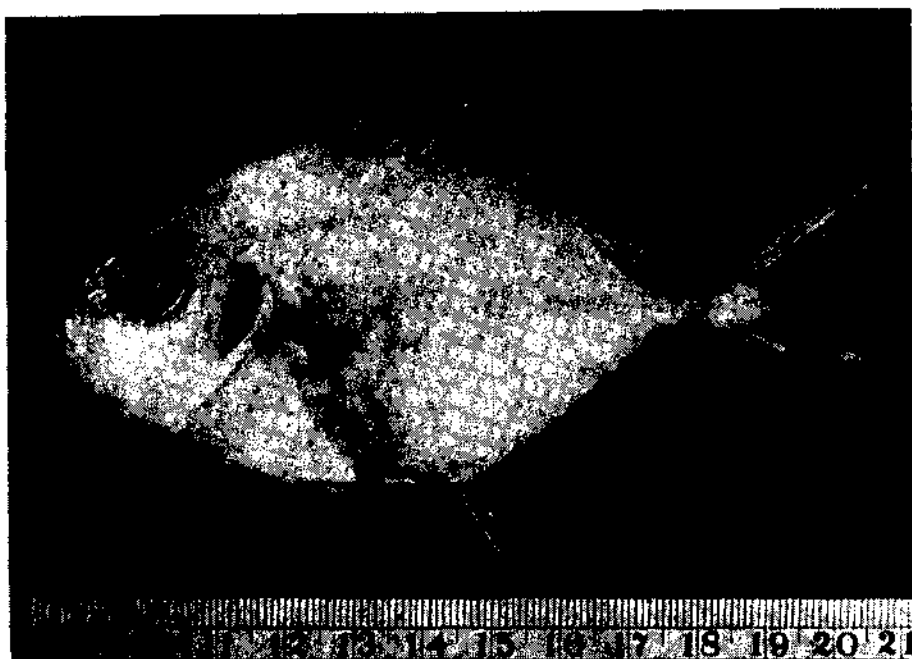


FIG. 8. *Carangoides talamparoides* (the breast area is inked to show the extension of scaleless area).

Material: Two specimens of size 96 mm in total length (84 mm in fork length and 75 mm in standard length) and 126 mm in total length (108 mm in fork length and 98 mm in standard length) collected on 10-6-1973 and 30-7-1973, respectively, from boatseine at Vizhinjam.

DI VIII; D2 22; A II + I 17-18; P I 19; L.l. scales|scutes 82-85|22-24; Gillrakers 8 + 21-22 (total 29-30).

Head 35.72-36.00; eye 11.22-12.00; snout 12.00-13.26; postorbital 13.26-13.33; interorbital 9.18-9.33; suborbital 5.33-6.12; maxillary 15.31-17.33; height of first dorsal fin 13.33-14.28; height of second dorsal fin 25.33-33.30; height of anal fin 22.67-26.53; pectoral fin 36.00-36.73; pelvic fin 14.26-16.00; lateral line straight 26.67-28.75; height of head 38.77-42.67; depth at pelvic fin 52.04-53.33; and height at first anal spine 54.08-56.00.

Head higher than long; eye equal to snout in smaller specimen but slightly smaller in larger specimen; villiform teeth in bands in each jaw, on vomer, palatines and on tongue; entire thoracic region naked across from pectoral base to inner pelvic ray when the fin depressed; the area front and above pectoral base not naked in larger individual while a triangular area above pectoral naked in the smaller; the hinder margin of the naked area from pectoral base runs behind without any anterior forward curve to the middle of depressed pelvic fin and again from vent a narrow strip naked up to anal; lateral line straightens below 15th dorsal ray; posterior part 1.3-1.4 in head; feeble scutes difficult to demarcate cover about three fourth of the straight part.

Colour: Body in fresh condition silvery, five to six vertical black bands present on the body; first dorsal dusky, rest of the fins silvery; black opercular spot present; in preserved condition in formalin, body turns pale yellowish, vertical bands disappear; fins pale; opercular spot distinct.

Remarks

In discussing the identity of *Carangoides malabaricus* (Bloch and Schneider), Smith (1967) made the following statement regarding *Carangoides talamparoides* Bleeker, a species found in the synonymy of *C. malabaricus*. '..... Bleeker (1852 : 91) described *C. talamparoides*, which like **C. talamparah* has been almost unanimously relegated to the synonymy of ***C. malabaricus*'. *C. talamparoides* Bleeker may be a valid species. Its chief distinction from *C. talamparah* rests at present on gillraker count, which if established as the sole basis indicates subspecific rank. Unfortunately the type of *C. talamparoides* is almost in a state of disintegration, so that no details of scaling can be determined, nor can any certain information on that character be got from the longpreserved small (105 mm) specimen No. 6098. If this is a valid species (or subspecies)

* *C. talamparah*: a junior synonym of *C. malabaricus* (Bloch and Schneider).

** *C. malabaricus*: misidentified name of *C. coeruleopinnatus* (Ruppel).

it possibly does not occur west of the East Indies. We found no comparable specimens in the western Indian Ocean, nor can any certain confirmatory data be traced in the literature of the Indian Ocean (though that is far from decisive). A full diagnosis of and the validity of *C. talamparoides* can be pronounced only when specimens in good condition become available for examination'. The material collected at Vizhinjam shows that *C. talamparoides* closely resembles *C. coeruleopinnatus* in having equal body depth, strongly falcate dorsal and anal lobes, elevated nape and in not having naked area above pectoral at least in the specimen of 126 mm. On the other hand, it also resembles *C. malabaricus* in having naked area extending up to anal fin, but with a gap from base of inner pelvic ray to vent in both the specimens and above pectoral also in the 96 mm specimen. In the characters like total number of gillrakers and the shape of naked area of

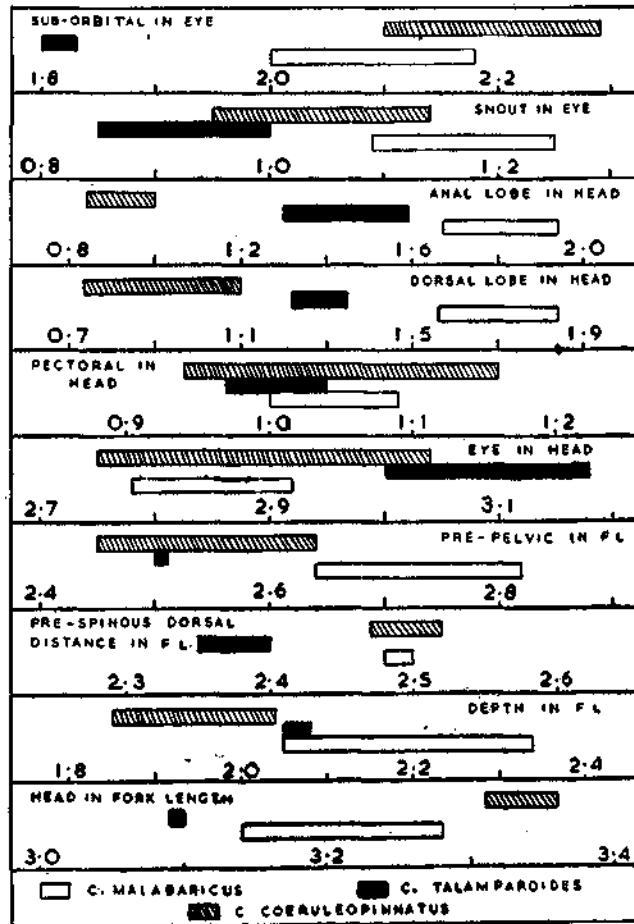


FIG. 9. Ranges in some morphometric characters of *C. talamparoides*, *C. malabaricus* and *C. coeruleopinnatus*.

breast, this species occupies an intermediate position between the above two species. Therefore, Dr William F. Smith-Vaniz suggests in a personal communication that these two specimens may be hybrids of *C. malabaricus* and *C. coeruleopinnatus*. But since there is absence of overlap between the ranges of many characters between the present two specimens and specimens of the same size belonging to the other two species as given in Fig. 9 and in Table 2, they are

TABLE 2. Some meristic counts to distinguish *Carangoides talamparoides*, *C. malabaricus* and *C. coeruleopinnatus*.

Characters	<i>C. talamparoides</i>		<i>C. malabaricus</i>	<i>C. coeruleopinnatus</i>
Fork length (of the specimens examined)	84 mm and 108 mm		82 mm to 110 mm	74 mm to 106 mm
Dorsal rays	22	22	21 — 22	22 — 23
Anal rays	18	17	17 — 18	18 — 19
Pectoral rays	I 19	I 19	I 18 — 19	I 20
L.I. straight scales/scutes	12 22	12 24	7-8 25 — 26	17 — 20 16 — 18
Gillrakers	8+21	8+22	10 — 11+24 — 25	6 — 8+16 — 18
	total 29 — 30		total 34 — 36	total 22 — 26

considered here as separate species. Moreover, the characters which distinguish *C. coeruleopinnatus* and *C. malabaricus*, viz., the shape of nape, the length of dorsal and anal lobes, extension of scaleless area of thoracic region and number of gillrakers are also found to separate *C. talamparoides* from them, giving further evidence for its distinct identity. It also differs from them in having slightly long and pointed head, broader suborbital, longer snout, comparatively longer pectoral and in slightly longer distance from snout to the origins of spinous dorsal and pelvic fin (Fig. 10).

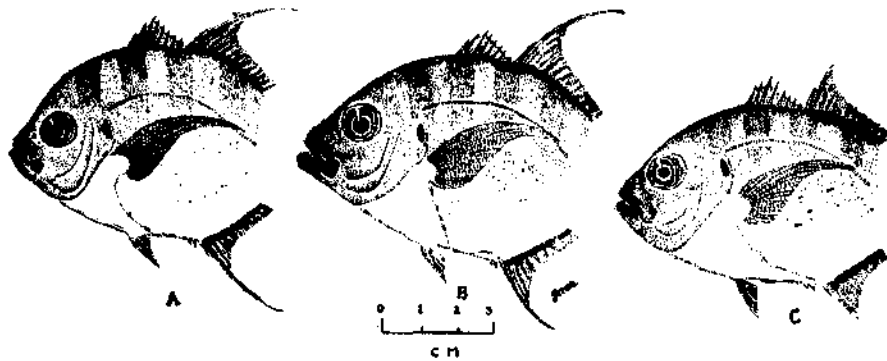


FIG. 10. Shape of head, dorsal and anal fins and scaleless area of (A) *C. coeruleopinnatus* (B) *C. talamparoides* (C) *C. malabaricus*.

Distribution: East Indies and south west coast of India.

ACKNOWLEDGEMENT

I am thankful to Dr E. G. Silas, Director, Central Marine Fisheries Research Institute, Cochin and to Dr S. Z. Qasim and Dr R. V. Nair, former Directors for their encouragement. I am also thankful to Dr K. V. Sekharan, Senior Fishery Scientist of this Institute for his corrections in the manuscript. My thanks are also due to Dr M. D. K. Kuthalingam, Officer-in-charge of this Substation for his guidance. I also thank Mrs. Margaret M. Smith, Director, J.L.B. Smith Institute of Ichthyology, Mr. William F. Smith-Vaniz of Philadelphia Academy of Sciences and Shri S. Reuben of this Institute for their kind help in identifying the specimens.

REFERENCES

- ANTONY RAJA, B. T. 1967. Some aspects of spawning biology of Indian oil sardine, *Sardinella longiceps* Val. *Indian J. Fish.*, (1964) 11(A) (1): 45-120.
- ANTONY RAJA, B. T. 1972. Fecundity fluctuations in Indian oil-sardine *Sardinella longiceps* Valenciennes. *Indian J. Fish.*, 18 (1 & 2): 84-89.
- BERRY, H. FREDERICK. 1959. Young jack-crevalles (*Caranx* species) of the South Eastern Atlantic coast of United States. *U.S. Fish and Wildl. Serv. Fish. Bull.*, 59 (152): 417-535.
- DAY, F. 1878. *The Fishes of India*, William Dawsons & Ltd., London. 1958. 1 & 2. 778 pp. 198 Pls.
- FOWLER, H. W. 1928. The fishes of Oceania. *Mem. B.P. Bishop Mus.*, 10: 150.
- *KLUNZINGER, C. 1871. *Verh. Zool. bot. Ges. Wien.*, 21: 441-668.
- MUNRO, S. R. IAN, 1955. *The Marine and Freshwater Fishes of Ceylon*, Canberra. 351 pp. 56 Pls.
- RAO, K. SRINIVASA. 1966. The occurrence of *Decapterus dayi* Wakiya in the Arabian Sea off Bombay, with a taxonomic note. *J. mar. biol. Ass. India*, 8 (2): 350-353.
- *RUPPELL, W. P. 1828. *Atlas Reise Nordl. Afrika. Fische der rothen Meeres.*, 141 p. Frankfurt-am-Main.
- SMITH, J. L. B. 1967. The identity of *Scomber malabaricus* Bloch-Schneider, 1801. *Occ. Pap. Rhodes Univ. Dept. Ichthyol.*, 13: 143-155.
- SMITH, J. L. B. 1968. Studies in Carangid fishes No. 4. The identity of *Scomber sansun* Forsskal, 1775. *Occ. Pap., Rhodes Univ. Dept. Ichthyol.*, 15: 173-184.
- SMITH, M. MARGARET. 1972. Key to the Western Indian Ocean species of the genus *Carangoides* Bleeker 1851 with a description of *Carangoides nitidus* Smith. *Occ. Pap., The J.L.B. Smith Institute of Ichthyology, Grahamstown*, 18: 229-239.
- SMITH, M. MARGARET. 1973. Identity of *Caranx armatus* (Pisces: Carangidae). *Copeia*, 2: 352-355.

* Not referred to in original.

- *WAKIYA, Y. 1924. The Carangoid fishes of Japan. *Ann. Carnegie Mus.*, **15** (2 & 3): 139-244. Pls. 15-38.
- WEBER, MAX AND L. F. DE BEAUFORT. 1931. *The Fishes of the Indo-Australian Archipelago*, E. J. Brill Ltd., Leiden, 6. 448 pp. 81 figs.
- WILLIAMS, F. 1956. Preliminary survey of the pelagic fishes of East Africa. *Fish. Publ. London*, **8**: 68 pp. 15 Pls.
- WILLIAMS, F. 1958. Fishes of the family Carangidae in the British East African waters. *Ann. Mag. nat. Hist.*, (13) **1**: 369-430, pls. 6-16.
- WOODS, P. LOREN. 1953. Family: Carangidae: Jacks. (*in Fishes of Marshall and Marianas Islands ed Schultz et al.*) *U.S. nat. Mus. Bull.*, **202**: 519-520.