



Redescription of Japanese *tsunogashria Ostracoberyx dorygenys* Fowler, 1934 (Pisces: Ostracoberycidae) with notes on osteology from Indian waters

*S. Ramachandran, D. M. Ali and Benjamin C. Varghese

Fishery Survey of India, Kochangadi, Kochi - 682005

*E-mail: marine_ramc@yahoo.co.in

Abstract

Slope dwelling teleost *Ostracoberyx dorygenys* from southwest coast of India has been reported for the first time from the Indian waters. Three specimens *O. dorygenys* were caught during demersal fishery resources survey conducted at 350-400 m depth in the area between 9°13.4' N; 76°44.6'E and 8°55.6'N 75°45.2'E during the period from April to December 2009. The cranial and postcranial osteology of *O. dorygenys* is described based on two specimens.

Keywords: *Ostracoberyx dorygenys*, new record, redescription, osteology

Introduction

The fish of the genus *Ostracoberyx* was described by Fowler (1934) and brought under Berycoidei. Later, it was placed in Beryciformes (Berg, 1940). Following the work of Norman (1939), it was brought under the order Perciformes, and family Serranidae (Norman, 1939; Katayama, 1960; Lindberg, 1971). Paxton *et al.* (1989) described a separate subfamily Ostracoberycinae (Katayama, 1960; Paxton *et al.*, 1989) and this genus was placed under the family Ostracoberycidae (Golvan, 1962; Masuda *et al.*, 1984). Under the genus *Ostracoberyx*, three species namely, *O. dorygenys* Fowler, 1934; *O. paxtoni* Paxton, 1939; and *O. fowleri* Matsubara, 1939 have been described. Norman (1939) described the holotype of *O. dorygenys* and paratype was described from the Philippines waters by Fowler (1934). Quero and Ozouf-Costaz (1991) reviewed several specimens of *O. dorygenys* from various parts of the world and opined that this species exhibited significant difference in morphology and meristic characters with age. In the demersal fishery survey along the slope of the southwest coast of India, three specimens of *O. dorygenys* was recorded and redescribed from the Indian waters. Morphometry and salient features of the skeletal structure of this

species have been described with a comparison of data on the species reported by earlier workers.

Material and Methods

Ostracoberyx dorygenys were collected from bottom trawl catches of M. F.V. *Matsya Varshini* (36.5 m overall length) of Fishery Survey of India during the period from April to December 2009 at 350 - 400 m depth in the area between 9° 13.4'N; 76° 44.6' E and 8° 55.6 N; 75° 45.2' N (southwest coast of India). Shrimp trawl with 30 mm cod end mesh size was used. *O. dorygenys* were sorted out from the catch and preserved at -40°C for further analysis. Meristic counts and measurements were taken at 1 mm and 0.5 g accuracy. Conventional and perhaps most widely understood nomenclature for the bones are used following Cannon (1987) and Ramachandran and Philip (2009).

The abbreviations for anatomical terms used in this manuscript are as follows:

ACT = actinosts; AR = articular; AS = anal spine; ASP = alisphenoid; B = basipterigium; BH = basihyal; BOC = basioccipital; BR = branchiostegal ray; C = cleithrum; CC = Coracoid; CH = ceratohyal; CV = caudal vertebrae; D = dentary; DHH = dorsal hypohyal; E = ethmoidal; ECT = ectopterygoid; EH

= epihyal; EP = epiotic; EPP = epural; EXO = exoccipital; H = hyomandibular; HP = hypural (H1-H5); HS = haemal spine; I = interhyal; IO = interopercle; L = lacrymal; LE = lateralethmoid; M = maxilla; MES = mesopterygoid; MET = metapterygoid; O = opercle; P = parasphenoid; PC = postcleithrum; PCF = principal caudal fin rays; PF = prefrontal; PG = pectoralgirdle; PH = parahypural; PL = palatine; PM = premaxilla; PO = preopercle; PR = prootic; ProCF = procurrent caudal fin rays; PS = pelvicspine; PTT = post-temporal; PTG = pterygiophore; Q = quadrate; R = rib; S = scapula; SC = supracleithrum; SOB = suborbital; SOC = supraoccipital; SOP = subopercle; SY = symplectic; UH = urohyal; UN = uroneural; US = Urostyle; VHH = ventral hypohyal; VO = vomer.

Results and Discussion

Type species: *Ostracoberyx dorygenys* Fowler, 1934, (monotype); holotype (175 mm TL) USNM 093,143; Para types: *Ostracoberyx dorygenys*: Norman, 1939: 58 (Zanzibar, 640 m, 1: 230 mm; Maldives, 494 m, 3: 125-150 mm).

Synonyms: *Ostracoberyx tricornis* Matsubara, 1939. *Ostracoberyx tricornis*: Kamohara, 1951. Key of the *Ostracoberyx* sp.

- 1) Operculum with three thorns on the posterior edge... *Ostracoberyx fowleri*
- 2) Operculum without thorns..... (3)
- 3.a) 9-13 gillrakers on lower branch of first gill arc... *Ostracoberyx paxtoni*
- 3.b) 15-17 gillrakers on lower branch of first gill arch... *Ostracoberyx dorygenys*

The present two specimens had 15 and 16 gill rakers on the lower branch of the first gill arch and body depth was 41-43% of SL. According to Matsubara (1939), *O. tricornis* differed from *O. dorygenys* by the flat interorbitale space (concave in *O. dorygenys*). The holotype of *O. dorygenys* and other large specimens have a concave interorbital space. However, the interorbital space of paratypes of *O. dorygenys* was flat to convex (Quero and Ozouf-Costaz 1991). Quero and Ozouf-Costaz (1991) stated that *O. tricornis* is a junior synonym of *O. dorygenys*, *O. fowleri* is known only by its

holotype which is not available now. According to the description and drawing given by Matsubara (1939), the posterior edge of *O. fowleri* operculum has three strong spines.

Color: Blackish silvery, black pigments are dispersed throughout the body. There is a distinct bluish black triangular shade starting beneath the operculum (widen) and extends up to posterior end to the pectoral fin margin (narrower) of the viscera (Fig. 1). Dorsal fin and anal fin are colourless; black pigments are dispersed on the fins intensively at the base. Interspinous membrane of dorsal fin is black. The posterior margin of the scales of the body is silvery white. Most of the bones of the cephalic region are exposed and covered by thin membrane consisting of evenly distributed black pigments.

Meristic characters: Dorsal fin spine IX, 9 rays; pectoral fin rays 13-14; pelvic fin spine I, 4 rays; anal fin spine III, 7 rays. Lateral line scale 48-50, scales in lateral line series 53-55; VS 7/23-25 (Table 1). There are 4 to 5 gill rakers in upper limb / 15-16 in lower limb. There are 7 scales in a diagonal row between the origin of dorsal fin and lateral line.



Fig. 1. *Ostracoberyx dorygenys* 90.5 mm and midlateral scale

Table 1. Morphometry (cm) and meristic characters of *Ostracoberyx dorygenys*

Characters	Min.	Max.	Mean	SD
Total length	8.49	9.05	8.77	0.40
Standard length	7.25	7.90	7.58	0.46
Eye diameter	1.00	1.30	1.15	0.21
Interorbital width	0.83	0.95	0.89	0.08
Preorbital	0.90	0.95	0.93	0.04
Postorbital	1.40	1.45	1.43	0.04
Anal spine length	0.45	0.65	0.55	0.14
I st dorsal fin height	0.58	0.65	0.62	0.05
II nd dorsal fin height	1.05	1.15	1.10	0.07
III rd dorsal fin height	1.20	1.35	1.28	0.11
IV th dorsal fin height	0.95	1.05	1.00	0.07
V th dorsal fin height	0.70	0.75	0.73	0.04
VI th dorsal fin height	0.40	0.55	0.48	0.11
Pelvic fin length	1.20	1.25	1.23	0.04
Pectoral fin length	1.80	1.95	1.88	0.11
Height of caudal peduncle	0.78	0.90	0.84	0.08
Caudal peduncle length	1.60	1.90	1.75	0.21
Anal fin length	1.10	1.15	1.13	0.04
body depth	3.12	3.25	3.19	0.09
Anal length	5.15	5.45	5.30	0.21
Branchiostgeal ray	7	7	7.00	-
Weight (g)	12.5	13.5	13.00	0.71
Gill rakers	19	21	20.00	1.41
Lateral line scale	48	50	49.00	1.41
Lateral line series	53	55	54.00	1.41
Lateral line transverse series	7 +23	7+25		

Scales are ctenoid, the midlateral scales are broadly pointed apical field with spines along the posterior margin and the anterior margin had 4 to 5 interradial projections (Fig. 1). The number of apical spine of the midlateral scales was 10 - 15. Caudal fin had 17 principal caudal fin rays. Vertebrae 24 (9 + 15). Three spines at the edge of the preopercle. Intraspinous membrane of dorsal fin occupy $\frac{1}{3}$ of the first 3 spines and $\frac{1}{2}$ and above the length of remaining spines. A strong thorn on supraoccipitale project upward that would disappear in the adult (Quero and Ozouf-Costaz, 1991).

The comparison of morphometric characters of *O. dorygenys* with *O. paxtoni* revealed that the later species had greater body depth (43-51% in SL), than the former (39-42% in SL) (Table 2). The interorbital space in *O. paxtoni* was 21-27% of head length whereas it was 11-13% in *O. dorygenys*. There are very clear differences in meristic counts among these species (Table 3). The lateral line scales in *O.*

dorygenys are 48-50 but 55-58 in *O. paxtoni*. Matsubara (1939) who proposed that the interorbital space of *O. tricornis* is flat (concave in *O. dorygenys*) and it is the distinct character to discriminate these two species. However, Quero and Ozouf-Costaz (1991), from their review, opined that the profile of interorbital space is unstable during growth of *O. dorygenys* (some specimens of *O. dorygenys* had flat to concave structure). The present observation based on only 3 specimens showed wide variation, which supports previous reports on polymorphism. This species has been earlier reported from Maldives waters by Norman (1939). The present report shows distribution in the northern latitudes in the Indian Ocean.

Osteology: Most of the bones sheltered in the cephalic region are exposed and covered with thin membranous skin with black pigments. Frontal wide posteriorly tapering to a point anteriorly and interdigitating with prefrontal, posteriorly articulates

Table 2. Percentage of morphometry of some body parts in standard length and head length (n = 3)

Characters	Mean (% in HL)	SD (% in HL)	Mean (% in SL)	SD (% in SL)
Eye diameter	14.34	2.01	14.34	2.01
Interorbital width	11.9	1.27	11.9	1.27
Preorbital	11.97	0.52	11.97	0.52
Postorbital	18.73	1.13	18.73	1.13
Anal spine length	7.15	1.05	7.15	1.05
I st dorsal fin height	8.2	0.82	8.2	0.82
II nd dorsal fin height	14.37	0.97	14.37	0.97
III rd dorsal fin height	16.31	1.02	16.31	1.02
IV th dorsal fin height	13.06	0.92	13.06	0.92
V th dorsal fin height	9.36	0.43	9.36	0.43
VI th dorsal fin height	6.07	0.81	6.07	0.81
Pelvic fin length	15.89	0.68	15.89	0.68
Pectoral fin length	24.15	1.18	24.15	1.18
Height of caudal peduncle	10.78	0.67	10.78	0.67
Caudal peduncle length	22.86	2.26	22.86	2.26
Anal fin length	14.67	0.5	14.67	0.5
Body depth	41.44	1.87	41.44	1.87
Anal length			69.39	1.66

through cartilagenous filled tissue with supraoccipital. Small thin parietal bone was immersed in cartilagenous tissue between frontal and supraoccipital and that may disappear during growth. Palatine had anterior curved rod with a cartilagenous

tip, posterior portion expanded and longitudinally bifurcate (Fig. 2). Posteroventrally the palatine overlies the anteriodorsal end of the ectopterygoid. The ectopterygoid is a thin plate rounded posteriorly with slight interdigtation antereodorsally with

Table 3. Comparison of morphometric and meristic characters of *Ostracoberx dorygenys* and *O. paxtoni*

Characters	<i>O. paxtoni</i> *	<i>O. dorygenys</i> *	<i>O. dorygenys</i> (present specimens)
Dorsal fin	IX; 9	IX; 9	IX; 9
Pectoral fin	15-16	14-15	13-14
Pelvic fin	I; 4	I; 4	I; 4
Anal fin	III; 7	III; 7	III; 7
Caudal fin	17	17	17
Gill rakers	6-7; 9-11 (lower arch)	4-6; 15-17	4-5; 15-16
Lateral line scale	48-55	48-55	48-50
Lateral line transverse series	12 + 25	6-9 + 19-24	7 + 23-25
Ist dorsal fin in 3rd dorsal fin	3.3 times	-	1.8-2.1 times
Vertebrae	25 (10+15)	25 (10+15)	24 (9 +15)
Preorbital in SL (%)	13-14	8.2-12.8	11.4-12.3
Pectoral in SL (%)	24-27	24-29	22.7-24.8
Eye diameter in SL (%)	11.9-16	15.2-18.4	15.9-16.4
Pelvic in SL (%)	13.6-18	15.8-21	15.2-16.5
Interorbital space	concave	Flat to concave	Flat to concave
Body depth in SL (%)	43-51	37-42	39-43
Midlateral scale spine	Few numbers	-	10-15
Interorbital width in HL (%)	21-27	8.5-10.5	10.7-12.1

*Quero and Ozouf-Costaz (1991)

branchiostegal rays, first five attached on anterior ceratohyal, two on posterior epihyal. Hypohyals (dorsal and ventral) articulate with anterior part of ceratohyal by cartilage. The interhyal short columnar, cartilage filled narrow ventral and articulated with facet of postdorsal edge of epihyal.

Sphenotic moderately produced posteriorly with a large facet ventrally to facilitate articulation of hyomandibular and posteriorly articulated with pterotic. Prootic located rear of the orbit and had extensive interdigitation with pterosphenotic. Epiotic more or less circular in shape, paired and being roof of the auditory capsule articulating with pterotic and occipitals. The middle region of the bony ridge of the epiotic crest drawn in to posteriorly directed spine. The supraoccipital broad crest bearing and projecting anteriorly between posterior extension of frontal and posteriorly very near to foramen magnum. Exoccipital has a foramen magnum. Pelvis approximately triangular comprising two vertically oriented, laterally compressed plate along anteroventral margin of cleithra and lies 45° to the axis of the body (Fig. 3).

Post-temporal bone (leaf-like) dorsally articulated with sphenotic, anteriorly with pterotic and ventrally with supracleithrum. The post-temporal and supracleithrum had serrations on lateral margin. Post-temporal is a laminar plate rounded ventrally, located on the supraoccipital, pterotic, intercalar and sphenotic bones, ventral portion articulated with supracleithrum. Intercalar relatively short, rod like,

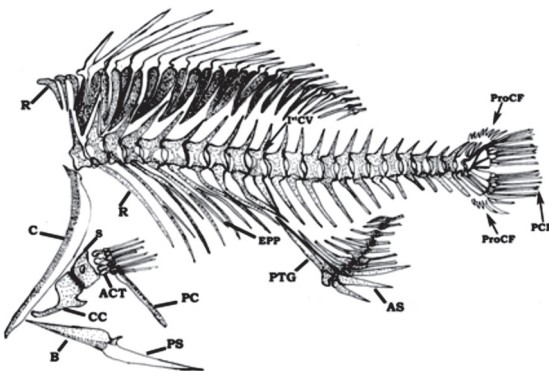


Fig. 3. A. Lateral view of postcranial osteology of *Ostracoberyx dorygenus*

expanded anteriorly, tapered posteriorly and slightly interdigitation with ventral process of post-temporal. Pectoral girdle consists of supracleithrum, dorsally articulated with post-temporal and syndesmotically bound with lateral surface of dorsal ramus of cleithrum. Scapula is a laterally compressed plate strong enough along its posterior edge where it bears short process of concave facet to facilitate the articulation of actinost (4 nos). It had a central oval scapular foramen. Coaracoid is a long laminar posteriorly tapering process, which extends from ventralmost pectoral fin origin. The rod like anteroventral ramus is expanded dorsally and articulated along its anterior margin with cleithrum. Postcleithrum is bound by tissue along the posterodorsal edge of the cleithrum. The dorsal postcleithrum is expanded into a thin rounded plate bound with dorsal edge of the cleithrum. There are 24 vertebrae consisting of 9 precaudal and 15 caudal vertebrae (Fig. 3a). The caudal fin had 5 hypurals, the fifth one articulating at its anterior apex with the urostyle centrum. Parahypurals fused to uroneural with ventral surface of urostyle centrum. The parahypurals bear a flattened horizontally oriented hypurophysis (Fig. 3b).

Acknowledgements

We gratefully acknowledge Dr. K. Vijayakumaran, Director General, Fishery Survey of India, Mumbai for encouragement. We thank Dr. E. Vivekanandan, Principal Scientist, Central Marine Fisheries Research Institute, Chennai, for critically reviewing the manuscript and offering valuable comments. We thank Mrs. Sandra J. Raredon, Smithsonian Institution, for providing the details of holotype.

References

- Cannon, D. L. 1987. *Marine Fish Osteology: A Manual for Archaeologists*. Department of Anthropology Publication No. 18. Simon Fraser University, Burnaby, British Columbia. 133 pp.
- Fowler, H. W. 1934. Description of new *Tisha obtenuus* from 1907 to 1910 in the chieoy Philippine Islands and adjacent seas. *P. Acad. Nat. Sci. Phila.*, 85: 233-367.
- Golvan, Y. J. 1962. Systematic catalog names of types of fish present in tenth edition of "Systema naturae"

- Charles Linnaeus j'année until the end of 1959. *Ann. Parasit. Hum. Comp.*, 37(6a): 127 pp.
- Katayama, M. 1960. *Fauna Japonica Serranidae (Pisces)*. Tokyo News Service, Ltd., Tokyo, VII: 189 pp.
- Lindberg, G. U. 1971. *Families of the Fishes of the World, A Checklist and a Key Leningrad, Zoological Institute, Akademii Nauk SSS R (In Russian), 1974. Fishes of the World. A Key to Families and a Checklist*. J. Wiley & Sons, New York, 472 pp.
- Masuda, H., K. Amaoka, C. Araga, T. Uyeno and T. Yoshino. 1984. *The Fishes of the Japanese Archipelago*. Vol. 1. Tokai University Press, Tokyo, Japan, 437 pp.
- Matsubara, K. 1939. Studies on the deep-sea fishes of Japan. XII. On two new berycoid fishes belonging to ostracoberycidae from Suruga Bay. *B. Jpn. Soc. Sci. Fish.*, 8(3): 121-128.
- Norman, J.R. 1939. *Fishes*. Sei. Rep. John Murray Exped., London, 7(1): 116 pp.
- Paxton, J. R., D. F. Hoes, G. R. Allen and J. E. Hanley. 1989. *Zoological Catalogue of Australia*. Vol. 7. *Pisces. Petromyzontidae to Carangidae*. Austral. Government Publ. Serv. Canberra, XII: 665 pp.
- Quero, J. C. and C. Ozouf-Costaz. 1991. *Ostracoberyx paxtoni*, nouvelle espèce des côtes est de l'Australie. Remarques sur les modifications morphologiques des *Ostracoberyx* au cours de leur croissance (Perciformes, Ostracoberycidae) (in Russian). *Cybium* 15(1): 43-54.
- Ramachandaran, S. and K. P. Philip. 2009. Redescription of Japanese Catalufa *Pristigenys nipponia* (Cuvier & Valenciennes, 1829) a new distributional record from south Indian waters. *J. Bom. Nat. Hist. Soc.*, 150(3): 99-104.

Received : 04/06/2010

Accepted : 28/03/2011

Published : 15/12/2011