Indian Journal of Geo Marine Sciences
Vol. 53 (06), June 2024, pp. 443-449
DOI: 10.56042/ijms.v53i06.8501

Research Article

Taxonomic review of the genus *Dactyloptena* Jordan & Richardson, 1908 (Syngnathiformes: Dactylopteridae) from the east coast of India with four new records from West Bengal state

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Received 2 Febryary 2024; revised 9 May 2024

Four rare marine fish species of flying gurnards of the family Dactylopteridae are hereby reported for the first time from the West Bengal coast, India. The species *viz*. *Dactyloptena macracantha* (Bleeker, 1855), *D. orientalis* (Cuvier, 1829), *D. peterseni* (Nystrom, 1887) and *D. papilio* Ogilby, 1910 were collected from Petuaghat fishing harbour, Purba Medinipur district. This paper reports these four species as new distributional records from the coastal waters of West Bengal, along with their diagnostic characteristics and morphometric data. The study also confirms the report of *D. papilio*, from Indian waters. Comments on the records of *Dactyloptena* species from Indian waters are also presented.

[**Keywords**: Flying gurnard, India, New records, West Bengal]

Introduction

The systematic position and phylogenetic relationship of the family Dactylopteridae (flying gurnards) have remained controversial for quite a long time. This family was previously included in the order Scorpaeniformes[1]. Some authors could not find a relationship with Scorpaeniformes, and so, the flying gurnards were placed in a separate order, Dactylopteriformes[2]. However, based on the molecular study, the family Dactylopteridae is now included in the order Syngnathiformes[3-5]. The family is represented by seven species under two genera, the genus *Dactylopterus* Lacépède, 1801 represented by a single species *Dactylopterus volitans* (Linnaeus, 1758), distributed in the Atlantic Ocean only and six species belonging to the genus *Dactyloptena* Jordan & Richardson, 1908, inhabiting Indo-Pacific region[6]. In the genus *Dactyloptena*, the first one or two spines of dorsal-fin are well-separated from the remaining spinous dorsal fin, contrary to the genus *Dactylopterus* where anterior spines are not separated[7].

During a survey on ornamental fauna of the East coast of India, the authors collected 66 specimens of the genus *Dactyloptena* and subsequently identified them as *Dactyloptena macracantha* (Bleeker, 1855); *D. orientalis* (Cuvier, 1829); *D. papilio* Ogilby, 1910 and *D. peterseni* (Nyström, 1887) following relevant literatures[7,8]. All four species were previously recorded from Indian coastal waters[9-12]. Thus, this study provides an account of the species composition of the genus *Dactyloptena* present along the northern Bay of Bengal, including the first description of *Dactyloptena papilio* and the first occurrence records of the other three species of the genus.

Materials and Methods

During the research programme for the period of 2018–2021 on "Study of Ornamental Fauna along the East Coast of India" the authors collected 66 specimens of the genus *Dactyloptena* from different sites along the east coast of India [Petuaghat fishing harbour of West Bengal coast (21°47'43.85" N, 87°52'48.91" E); Chandanipal fish landing centre (20°47'30.36" N, 86°57'35.52" E), Paradip fish landing centre (20°17'18.81" N, 86°42'17.67" E) and Gopalpur fish landing centres of Odisha coast (19°15'36.48" N, 84°54'47.02" E); Kakinada fishing harbour (16°57'26.27" N, 82°16'10.26" E) and Visakhapatnam fish landing centre (17°41'46.76" N, 83°18'2.35" E) of Andhra Pradesh and Kolavam fishing harbour (12°47'26.79" N, 80°15'5.78" E) of Tamil Nadu coast. The species were subsequently identified following

Eschmeyer[7] and Poss & Eschmeyer[8]. All the specimens were deposited in the National Repository at Marine Fish Section, Zoological Survey of India (ZSI), Kolkata; Marine Aquarium and Regional Centre, ZSI, Digha and Estuarine Biology Regional Centre, ZSI, Gopalpur-on-Sea. All measurements and counts were conducted in accordance with the methodology of Eschmeyer[7]. Standard Length (SL) and Head Length (HL) are used as abbreviated forms throughout the article. Freshly collected specimens were photographed and measured prior to being preserved in a 10 % formaldehyde solution. The details of morphometric measurements were taken in mm by dial calliper up to 0.01 mm accuracy. An effort was also made to dissect out the specimens to study the structure of otoliths and swim bladders of different species. Table 1 represents a comparison of morphometric measurements of four species of the genus *Dactyloptena viz.*, *Dactyloptena macracantha*, *D. orientalis*, *D. peterseni* and *D. papilio*. Fresh photographs of the four species are presented in Figure 1. Figure 2 shows the structure of the intertemporal space of the cranium of the four different species.

Results

A brief description of the four species of the genus *Dactyloptena* under consideration are provided below.

***Dactyloptena papilio* Ogilby, 1910** (Butterfly flying-gurnard) (Fig. 1a)

Dactyloptena papilio Ogilby, 1910: 127 (Type locality: Queensland, Australia, 133.5 m).

Material examined: 49 ex (SL: 69–130 mm): ZSI/F12336/2 (Petuaghat, West Bengal; 20 ex), MARC/ZSI/F2955 (Paradip, Odisha; 3 ex), MARC/ZSI/F3185 (Visakhapatnam, Andhra Pradesh; 1 ex), MARC/ZSI/F3276 (Visakhapatnam, Andhra

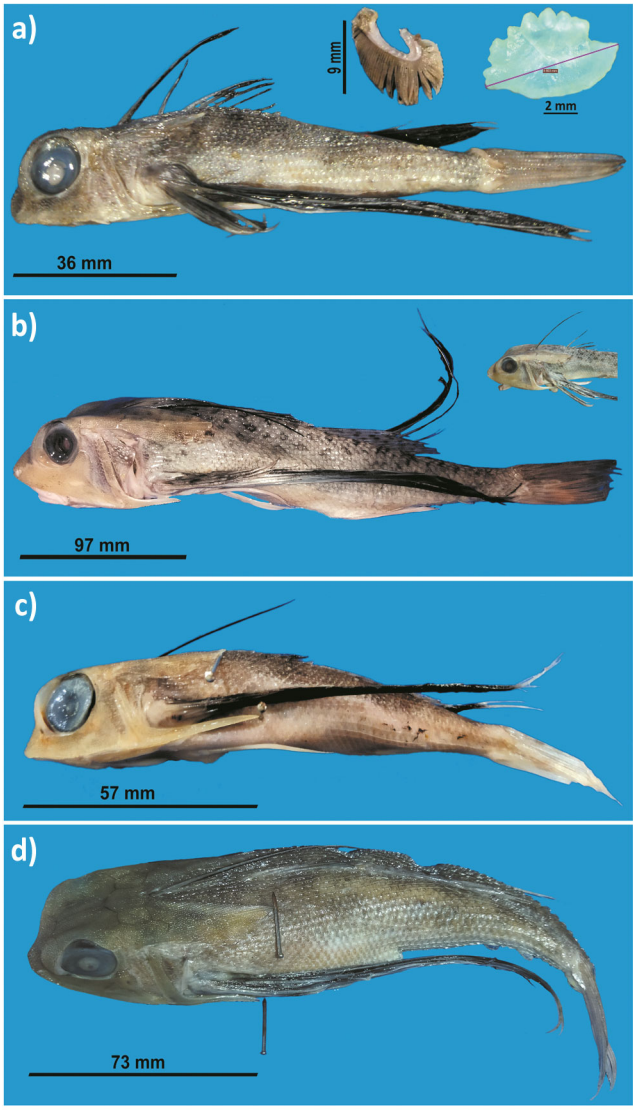

Fig. 1 — Dorso-lateral comparison with dorsal spines of different species of genus *Dactyloptena*: (a) *D. papilio*; (b) *D. peterseni*; (c) *D. macracantha*; and (d) *D. orientalis*

Table 1 — Comparison of morphometric measurements of four species of family Dactylopteridae: *Dactyloptena papilio* Ogilby, 1910; *D. peterseni* (Nyström, 1887); *D. macracantha* (Bleeker, 1855) and *D. orientalis* (Cuvier, 1829)

Characters	***D. papilio***	***D. peterseni***	***D. macracantha***	***D. orientalis***
Free dorsal spines	2	1	2	2
Snout structure	Blunt	Blunt	Pointed	Pointed
Dorsal spines	VIII	VII	VIII	VIII
Dorsal soft rays	8	8	8–9	8
Anal rays	6	6	6	6
Pectoral rays	30–32	32–34	31–34	32–35
Ventral rays	I+4	I+4	I+4	I+4
Vertebrae	21–22	22	22	22
Interorbital width % of SL	16–20	13–14	12–15	13–15
Interorbital width % of HL	12–16	5–7	6–8	6–11
Post-temporal spine	Elevated	Flat	Flat	Flat
Preopercular spine length to post-temporal spine	More	More	More	Less

*From Eschmeyer W. N. 1997(ref. 7)

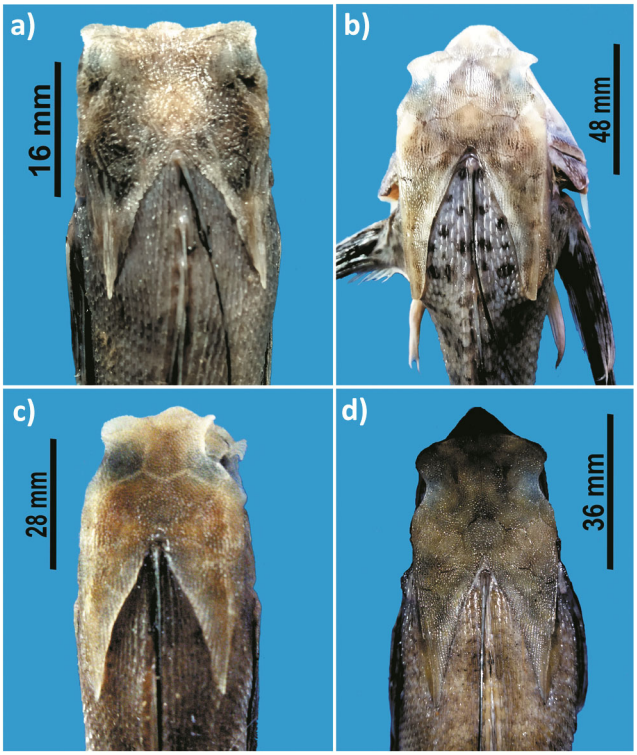

Fig. 2 — Comparison of intertemporal space of different species of genus *Dactyloptena*: (a) *D. papilio*; (b) *D. peterseni*; (c) *D. macracantha*; and (d) *D. orientalis*

Pradesh; 1 ex), EBRC/ZSI/F10487 (Kakinada, Andhra Pradesh, 1 ex), EBRC/ZSI/F12146 (Kovalam, Tamil Nadu; 2 ex), EBRC/ZSI/F12219 (Paradip, Odisha; 1 ex), EBRC/ZSI/F12314 (Petuaghat, West Bengal, 1 ex), EBRC/ZSI/F11921 (Paradip, Odisha; 5 ex), EBRC/ZSI/F12002 (Chandanipal, Odisha, 1 ex), EBRC/ZSI/F11932 (Chandanipal, Odisha, 2 ex), EBRC/ZSI/F10782 (Paradip, Odisha; 1 ex), EBRC/ZSI/F9982 (Paradip, Odisha; 1 ex), EBRC/ZSI/F12900 (Paradip, Odisha; 1 ex), EBRC/ZSI/F12901 (Paradip, Odisha; 3 ex) and EBRC/ZSI/F12915 (Petuaghat, West Bengal, 5 ex).

Diagnosis: D: I+I+V+I, 8; A: 6; P: 6+22–23; V: I+4. Body moderately elongated; interorbital space wide and concave (width 17–20 % of SL); snout with uniformly distributed granular projections; presence of two strong post-temporal spines that are elevated at the end and above the cranium (Fig. 2a); preopercular spine extends beyond base of pectoral-fin and longer than post-temporal spine. First two dorsal-fin spines are separated from the remaining of spinous dorsal-fin, the first spine is elongated and situated immediately posterior to the intertemporal region of the cranium, while the second spine is short and

Table 2 — Morphometric measurements and meristic characters of *Dactyloptena papilio* Ogilby, 1910 (49 specimen examined)

Morphometric measurements	**In mm**
Standard length	79.2–121.0
% of SL	
Head length	27.66–30.10
Interorbital space	20.66–22.87
Eye diameter	9.70–11.4
Snout length	5.33–7.3
Snout to 'V' of cranium distance	23.30–24.31
Snout to tip of preopercle spine	48.05–49.46
Snout to tip of temporal spine	41.32–45.46
Pectoral fin length	78.64–86.81
% of HL	
Interorbital space	75.00–78.85
Eye diameter	35.09–38.46
Snout length	19.30–21.15
Snout to 'V' of cranium distance	80.36–84.62
Meristematic characteristics	***Numbers***
Dorsal spines	I+I+V
Dorsal soft ray	I, 8–10
Pectoral fin rays	6+19–20
Pelvic fin rays	I, 4
Anal fin rays	6
Caudal fin rays	10

located slightly closer to the remaining dorsal-fin than 1st dorsal spine; scales ctenoid; caudal-fin slightly emarginated with a longer upper lobe. Gill opening restricted, gill arches four pairs with gill rakers rudimentary, 6+3–4 present on first gill arch. The otolith exhibited a kidney-shaped morphology, featuring seven petal-like extensions, similar to the descriptions provided in earlier literatures[13,14]. Morphometric measurements of *D. papilio* Ogilby, 1910 are represented in Table 2.

Colour: In fresh condition, the body is dusky red with brown spots situated dorsally, ventral surface pinkish white. Pectoral-fin with numerous dark spots, basal part darker than distal part, with pelvic-fin and caudal-fin whitish. In preserved condition, body dark brownish and the ventral part whitish; pectoral fin brown with dark spots.

Distribution: *Dactyloptena papilio* Ogilby, 1910 was earlier reported from the southern Indo-Pacific region and the Southern hemisphere around the Arafura Sea, north-western Australia up to Papua New Guinea[6,7,15]. However, from Indian coastal waters, this species was only recently reported, but without material evidence[9,11]. This study confirms the presence of this species along the Bay of Bengal with specimen verification.

Remarks: *Dactyloptena papilio* differs from *D. tiltoni* and *D. peterseni*, in having two free dorsal fin spines (*vs.*

only a single free dorsal fin spine in the other two species). Interorbital space extremely wide, nearly 16–20 % of SL in the case of *D. papilio* (*vs.* interorbital medium, 12–16 % of SL in *D. macracantha* and *D. orientalis*). It closely resembles *D. gilberti*, but differs in having a stronger post-temporal spine with its distal part more elevated above the plane of the cranium (*vs*. post-temporal spine remains flat on the cranium in *D. gilberti*). In *D. papilio* the head is covered uniformly with small indentations (*vs.* indentations arranged in specific rows in *D. gilberti*). The interorbital space is 16–20 % of SL in *D. papilio* (*vs*. 18–23 % of SL in *D. gilberti*). Moreover, in this species, snout is more pointed (*vs.* rounded and wider in *D. gilberti*)[8].

***Dactyloptena peterseni* (Nystrom, 1887)** (Starry flying gurnard) (Fig. 1b)

Dactylopterus peterseni Nystrom 1887: 24 (Type locality Nagasaki, Japan).

Material examined: Three ex. (SL: 222–297 mm): ZSI/F14335/2 (Petuaghat, West Bengal, ex: 2) and EBRC/ZSI/F12912 (Petuaghat, West Bengal, ex: 1)

Diagnosis: D: I+0+VII, 8; A: 6; P: 6+25; V: I+4. Body elongated, with large bony head. Snout rounded. Preopercular spine smaller than post-temporal spine. First dorsal fin spine elongated, located just behind the intertemporal space of cranium and free; second spine absent, a wide gap present between 1st dorsal spine and remainder of the dorsal fin; pectoral fins elongated and cross the caudal fin base; caudal fin long, emarginated type. Gill opening restricted, gill arches four pairs, 6+3 rudimentary gill rakers.

Colour: In fresh, dorsal part of body reddish with dark spots, ventral part pinkish white. Pectoral fin with a large black spot, all fins whitish in colour. In preserved condition, the body dark brownish, ventral part whitish.

Distribution: Indo-West Pacific: Red Sea; East Africa, Madagascar and Réunion, Philippines, Japan, Ogasawara Islands, Taiwan, Bay of Bengal, Russia and south to northern Australia[7,15]. It is also reported from the northern Arabian Sea (Pakistan)[16]. From Indian coast, this species was reported from the Andaman and Nicobar Island[17], Maharashtra[18], Kerala[19], and Tamil Nadu[10,20]. Present study reports this species for the first time from the West Bengal coast.

Remarks: This species clearly differs from other species on the basis of the absence of second dorsal spine. Body also comparatively more elongated than the other four species studied in this paper. The species is similar to *D. tiltoni* Eschmeyer, 1997 in dorsal fin structure, both without 2nd dorsal spine, but differs from *D. tiltoni* by having a rounded snout and scales on side with a single transverse knife-like ridge (*vs.* snout pointed, scales on side with multiple transverse knife-like ridges in *D. tiltoni*)[7].

***Dactyloptena macracantha* (Bleeker, 1855)** (Spotwing flying gurnard) (Fig. 1c)

Dactylopterus macracanthus Bleeker, 1855, *Natuurk. Tijdschr. Ned. Indië*, 7 (3): 449 (Type locality: Makassar [Ujung Pandang], Indonesia).

Material examined: 12 ex. (SL: 92–125 mm): EBRC/ZSI/F9983 (Paradip, Odisha, ex: 2), EBRC/ZSI/F10488 (Kakinada, Andhra Pradesh, ex: 1), EBRC/ZSI/F12916 (Petua Ghat, West Bengal, ex: 6) and EBRC/ZSI/F13081 (Petuaghat, West Bengal, ex: 3).

Diagnosis: D: I+I+V+I, 8; A: 6; P: 6+25–26; V: I+4. Body moderately elongated with a pointed snout; interorbital space not very wide and weakly concave (Fig. 2c). Preopercular spine extending further posteriorly than post-temporal spine. First 2 dorsal-fin spines separated from remainder of spinous dorsal fin, the first spine is elongated, located posterior to intertemporal space of cranium, the second spine is very short and located just midway between 1st dorsal spine and the remainder of dorsal fin; pectoral fins elongated and almost reach caudal fin base. Gill rakers rudimentary, 6+3.

Colour: In fresh, upper part of body dusky violet and pinkish white below. Pectoral fin dusky with a large black spot in the middle. Pelvic and caudal fin whitish. In preserved condition, body dark brownish, ventral part whitish; pectoral and caudal fins white in colour.

Distribution: India, Sri Lanka, Myanmar, Philippines, Sumatra, Java, Papua New Guinea, Japan and Australia[7,15]. From Indian coastal water, this species is reported from Odisha[21], Andhra Pradesh[22], Tamil Nadu[23,24], Kerala[19], Karnataka[25], and Lakshadweep[26]. This paper reports this species for the first time from the West Bengal coast; thus, this species is distributed all along the east coast of India.

Remarks: *Dactyloptena macracantha* differs from *D. tiltoni and D. peterseni* in having first two dorsal spines free from the rest (*vs.* only one free spine in the latter species). It differs from *D. papilio* and *D. gilberti* in having a moderate interorbital space, 12–16 % of SL (*vs.* a wide concave interorbital space, 16–13 % of SL, in the latter two species). Moreover, the species has a shorter second dorsal spine length than *D. papilio*. The species is similar to *D. orientalis*

in having a moderately narrow interorbital space, but in *D. macracantha*, the preopercular spine typically extends farther back than the post-temporal spine (*vs.* preopercular spine never crosses the post-temporal spine in *D. orientalis*). The species has an oblong black patch over the midsection of the pectoral fin (*vs.* numerous dusky, golden spots on the pectoral fin in *D. orientalis*)[7,8].

***Dactyloptena orientalis* (Cuvier, 1829)** (Oriental flying gurnard) (Fig. 1d)

Dactylopterus orientalis Cuvier, 1829, *Le Règne Animal* (Ed. 2), 2: 162 (Type locality: Coromandel coast, India, based on 'Mooree Godoo' of Russell, 1803).

Material examined: 02 ex. (SL: 156–191 mm): EBRC/ZSI/F12914, Petuaghat, West Bengal.

Diagnosis: D: I+I+V+I, 8; A: 6; P: 6+25; V: I+4. Body elongated with a pointed snout; interorbital space narrow and weakly concave (Fig. 2d). Preopercular spine not extending farther posteriorly than post-temporal spine. Mouth small, located ventrally, inferior and protractile. First two dorsal-fin spines separated from remainder of spinous dorsal-fin, the first spine elongated and located behind intertemporal space of cranium, the second very short and located nearer to reminder of dorsal fin than 1st dorsal spine.

Colour: Dorsal part of body brownish with orange spots and ventral part pinkish white. Numerous light spots on pectoral fin, pelvic fin whitish, caudal fin whitish. In preserved condition, body dark brownish, ventral part whitish; pectoral fin and caudal fin white in colour.

Distribution: South Africa, East Africa, Madagascar, Mascarenes, Persian Gulf, Hawaiian Islands, Pitcairn Group, Japan, Ogasawara Islands, Western Australia, Australia, New Zealand, New Caledonia, Tonga and Rapa[15]. From the Indian coast except West Bengal, this species was reported from all other maritime states of India, *i.e.*, from Lakshadweep to Andaman and Nicobar Islands[12,27,28]. Present paper reports this species for the first time from the West Bengal coast.

Remarks: *Dactyloptena orientalis* differs from *D. tiltoni* and *D. peterseni* in having the first two dorsal spines free from the rest (*vs.* only one free spine in the latter species). It differs from *D. papilio* and *D. gilberti* in having a moderate interorbital space, 12–16 % of SL (*vs.* a wide concave interorbital space, 16–13 % of SL, in the latter two species). The species is similar to *D. macracantha*, but the differences are already mentioned under the previous species.

Comments on the Swim bladder

All four species reported in this study have two medially separated chambers of the swim bladder. It is located dorsally, more to the upper part of the body, just below the heart. Swim bladders are connected with bands of intrinsic drumming muscles that are firmly attached along the lateral surfaces of the swim bladder with dorsoventrally running fine striated fibres. The structure completely matches the description of Dufossé and others[29,30]. In *D. orientalis* and *D. macracantha*, the swim bladder is more elongated than the other two studied species (Fig. 3). Most of the species of Dactylopteridae have intrinsic drumming muscles firmly attached along the lateral surfaces of the swim bladder, which modify or amplify sounds by stridulation with the help of the hyomandibular bone[30,31].

Discussion

Dactylopteridae is a small family of marine fishes, comprising only seven species worldwide[15]. Members of the family Dactylopteridae are commonly known as flying gurnards or helmet gurnards due to their long, fan-shaped pectoral fins and heavily armoured body; however, they do not show actual flight for their locomotion[8]. From India, five species of the genus *Dactyloptena* have been recorded so far[9-12]. *Dactyloptena orientalis* was originally described from

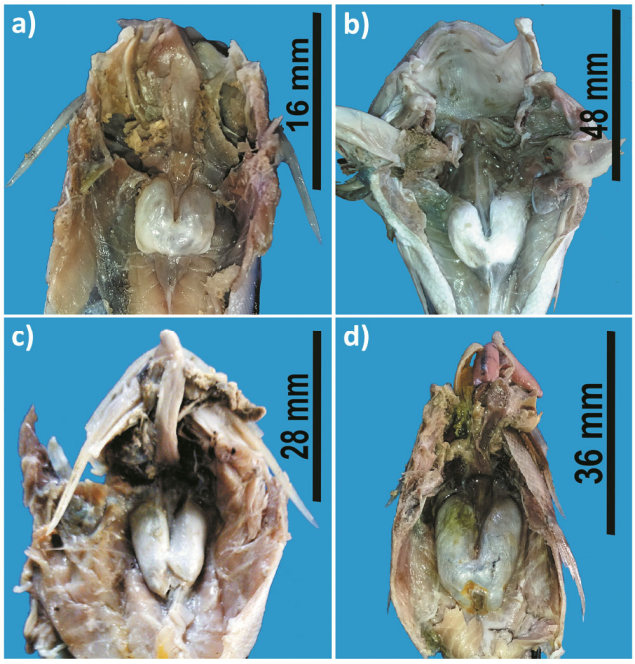

Fig. 3 — Comparison of swim bladder structures of different species of genus *Dactyloptena*: (a) *D. papilio*; (b) *D. peterseni*; (c) *D. macracantha*; and (d) *D. orientalis*

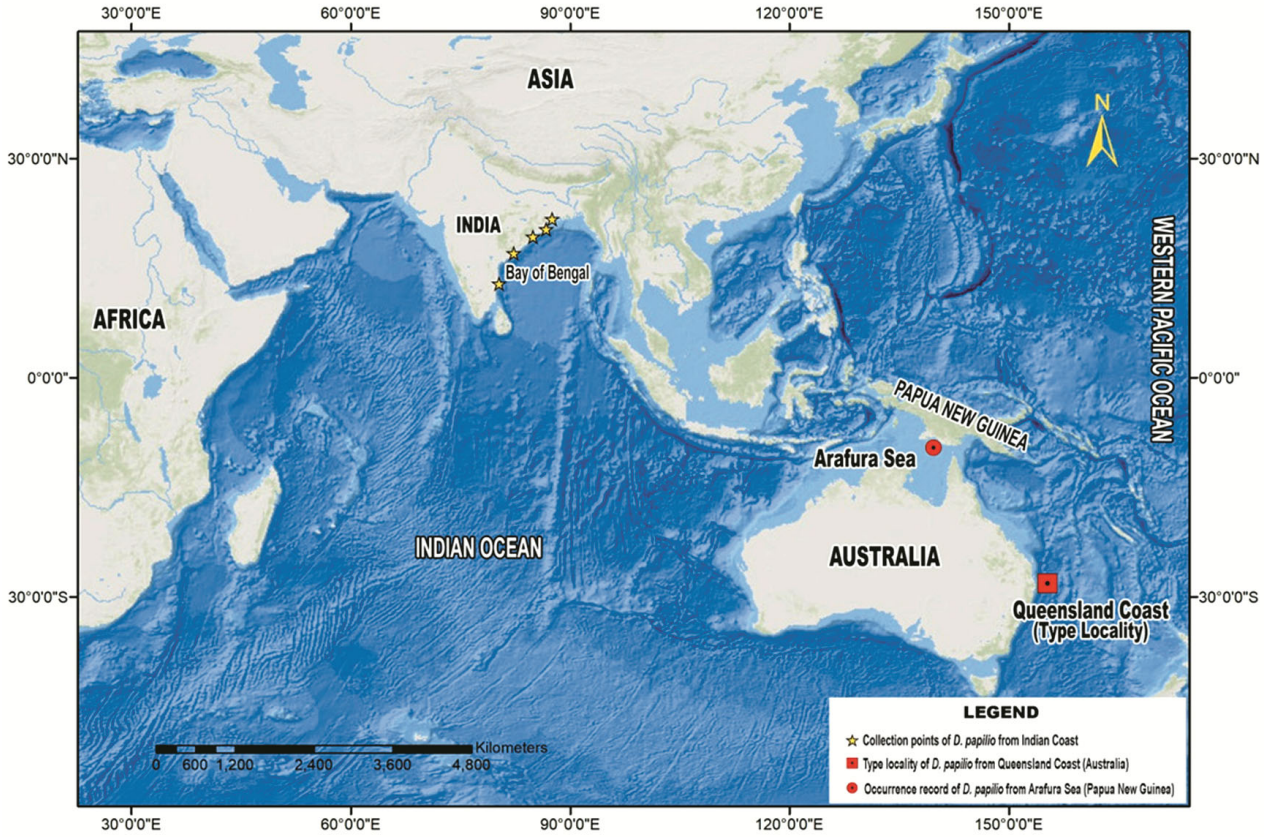

Fig. 4 — Worldwide distribution map of *Dactyloptena papilio* Ogilby, 1910

the Coromandel Coast, Bay of Bengal[32] and reported from Maharashtra[33] and other places of India[12,27,28]. *Dactyloptena peterseni* was reported from Maharashtra[18], southern coasts of India[10,19,20] and Andamans[17]; *D. gilberti* from Madras (India)[7] and *D. macracantha* being reported from Madras, Cochin, Gopalpur and the Andaman Sea and Bay of Bengal[7]. In fact, only two species, *D. orientalis* and *D. macracantha*, are widely distributed along the coasts of India, including Andamans. This paper deals with the first confirmed report of *Dactyloptena papilio* from the northernmost part of the Bay of Bengal along the east coast of India (Fig. 4), though it was known to occur at Chennai, Tamil Nadu[9,11]. Although several studies on ichthyofauna of the coastal waters of West Bengal were published earlier, this is the first time the fishes of the family Dactylopteridae are reported.

Conclusion

The present study reports the family Dactylopteridae for the first time from the West Bengal coast, India, along with the records of *D. peterseni*, *D. macracantha* and *D. orientalis*. The study also documents the first confirmed record of *Dactyloptena papilio* from the east coast of India, suggesting the northernmost range for the species in the Bay of Bengal.

Acknowledgements

We are thankful to Dr. Dhriti Banerjee, Director, Zoological Survey of India, for providing the necessary working facilities and also to the local fishermen who helped a lot during the field survey for the collection of samples.

Conflict of interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Author Contributions

DR, SR, TK, SRM & SA: Collection, preservation, identification and manuscript preparation; SSM & AM: Identification and critical analysis of the manuscript.

References

1 Nelson J S, *Fishes of the World*, 4th edn, (John Wiley & Sons, Hoboken), 2006, pp. 601.

2 Johnson G D & Patterson C, Percomorph phylogeny: A survey of Acanthomorphs and a new proposal, *Bull Mar Sci*, 52 (1993) 554–626.

3 Song H Y, Mabuchi K, Satoh T P, Moore J A, Yamanoue Y, *et al.*, Mitogenomic circumscription of a novel percomorph fish clade mainly comprising "Syngnathoidei" (Teleostei), *Gene*, 542 (2) (2014) 146–155. https://doi.org/10.1016/j.gene.2014.03.040

4 Nelson J S, Grande T C & Wilson M V H, *Fishes of the World*, 5th edn, (Wiley, Hoboken), 2016, pp. 707.

5 Betancur R, Wiley E O, Arratia G, Acero A, Bailly N, *et al.*, Phylogenetic classification of bony fishes, *BMC Evol Biol*, 17 (2017) p. 162. https://doi.org/10.1186/s12862-017-0958-3

6 Fricke R, Eschmeyer W N & Fong J D, Species of fishes by family/subfamily. Accessed online at: http://research.calacademy.org/research/ichthyology/catalog/SpeciesByFamily.asp; Accessed on February 2024.

7 Eschmeyer W N, A new species of Dactylopteridae (Pisces) from the Philippines and Australia, with a brief synopsis of the family, *Bull Mar Sci*, 60 (1997) 727–738.

8 Poss S G & Eschmeyer W N, Dactylopteridae: Flying gurnards (helmet gurnards), In: *FAO species identification guide for fishery purposes. The living marine resources of the Western Central Pacific, Vol 4: Bony fishes, Part 2: Mugilidae to Carangidae*, edited by Carpenter K E & Niem V H, (FAO, Rome,), 1999, pp. 2069–2790.

9 Kodeeswaran P, Jayakumar N, Praveenraj J, Abarna K & Moulitharan N, Diversity of the scorpion fishes (Order: Scorpaeniformes) in bycatch of trawl net fishery of Chennai coast, In: *National awareness conference on the values of biodiversity and its conservation*, 7th and 8th March, 2019, Dagac, Chennai, 2019.

10 Karuppasamy K, Davidkingston S, Jawahar P, Ranjith L, Kathirvelpandian A, *et al.*, New record of the starry flying gurnard, *Dactyloptena peterseni* (Scorpaeniformes; Dactylopteridae); from Wadge Bank, Southwest coast of India, *Natl Acad Sci Lett*, 42 (3) (2018) 209–213. https://doi.org/10.1007/s40009-018-0726-y

11 Kodeeswaran P, Jayakumar N & Ranjith L, Assessing the ichthyofaunal diversity and trophic level from trawl bycatch of Chennai Fishing Harbour, Southeast Coast of India, *Reg Stud Mar Sci*, 40 (2020) 1–44. https://doi.org/10.1016/j.rsma.2020.101530

12 Mohapatra A, Mishra S S, Bineesh K K, Rajendra S, Ray D, *et al.*, *Pisces*, In: *Faunal Diversity of Biogeographic Zones: Coasts of India*, edited by Chandra K, Raghunathan C & Mondal T, (The Director, Zool Surv India, Kolkata), 2020, pp. 655–722.

13 Mahé K, Foucher E, Elleboode R, Iglesias S P & Tetard A, First record of *Dactylopterus volitans* (Dactylopteridae) in the eastern English Channel, *Cybium*, 37 (2013) 307–308.

14 Omar A M & AMohamed S K, Comparative morphological studies on the otoliths (Ear stones or crystals) in some marine and fresh water fishes, *Int J Fish Aquat Stud*, 4 (6) (2016) 512–517.

15 Froese R & Pauly D (eds.), *Fishbase*, World Wide Web electronic publication. Accessed Online at: http://www.fishbase.org; (Accessed on February 2024).

16 Farooq S & Muhammad A A, The first report on the occurrence of *Dactyloptena peterseni* (Nyström, 1887) (Dactylopteriformes; Dactylopteridae) in the northern Arabian Sea, *Iran J Fish Sci*, 21 (2) (2022): 634–639. https://doi.org/10.22092/ijfs.2022.126709

17 Ramakrishna, Immanuel T, Sreeraj C R, Raghunathan C, Raghuraman R, *et al.*, An account of additions to the Ichthyofauna of Andaman and Nicobar Islands, *Rec Zool Surv India, Occ Paper No* 326 (2010) 1–140.

18 Salvi P S & Deshmukh V D, Landings of flying gurnard in Mumbai, *Mar Fish Infor Serv, T & E Ser*, 205 (1965) 1–20.

19 Bijukumar A, Sirajudheen T K, Mishra S S & Barman R P, *Marine and Estuarine Fish Fauna of Kerala*, Fauna of Kerala, State Fauna Series 25, Pat 1, (Zool Surv India, Kolkata), 2019, pp. 271–341.

20 Mogalekar H S, Canciyal J, Patadia D S & Sudhan C, Marine and estuarine fish fauna of Tamil Nadu, India, *Proc Int Acad*, 8 (4) (2018) 231–271.

21 Barman R P, Mishra S S, Kar S, Mukherjee P & Saren S C, Marine and estuarine fish fauna of Orissa, *Rec Zool Surv India, Occ Paper, 260* (2007) 1–186.

22 Naranji M K, Velamala G R & Netto-Ferreira A L, Length-weight relationships of 10 coastal fish species from the Visakhapatnam coast, India, *J Appl Ichthyol*, 35 (3) (2019) 815–817. https://doi.org/10.1111/jai.13854

23 Barman R P, Mishra S S, Kar S, Mukherjee P & Saren S C, *Marine and Estuarine fishes*, Fauna of Tamil Nadu (Part-2), State Fauna Series 17, (Zool Surv India, Kolkata), 2011, pp. 293–418.

24 Karuppasamy K, Ranjith L, Sureandiran B, Jawahar P & Vidhya V, First Record of Spotwing Flying Gunard, *Dactyloptena macracantha* (Bleeker, 1854) (Dactylopteriformes; Dactylopteridae) from Indian coastal waters, *Thalassas*, 38 (2022) 331–336. https://doi.org/10.1007/s41208-021-00374-5

25 Barman R P, Mishra S S, Kar S, Mukherjee P & Saren S C, *Marine and estuarine fishes*, Fauna of Karnataka, State Fauna Series 21, (Zool Surv India, Kolkata), 2013, pp. 277–388.

26 Rajan R, Rajan P T, Mishra S S, Abdul Raheem C N, Shrinivaasu S, *et al.*, Fishes of Lakshadweep archipelago: New records, review and a revised checklist, *Mar Biodivers Rec*, 14 (14) (2021) 1–13. https://doi.org/10.1186/s41200-021-00208-6

27 Menon A G K & Rama Rao K V, Notes on three rare marine fishes from Madras, *Ann Zoo*, 4 (5) (1963) 47–52.

28 Jones S, Comments on the so called rare marine fishes of the genera *Dactyloptena* Jordan and Richardson and *Lepidotrigla* Günther recently reported from Madras, *Mar Biol Assoc India*, 7 (1) (1965) 124–126.

29 Dufossé L, Recherches sur les bruits et les sons expressifs que font entendre les poissons d'Europe et sur les organes producteurs de ces phénomènes acoustiques ainsi que sur les appareils de l'audition de plusieurs de ces animaux, *Ann Sci Nat*, 5 (1874) (19) 1–53 and (20) 1–134.

30 Ladich F & Fine M L, Sound-generating mechanisms in fishes: A unique diversity in vertebrates, In: *Communication in fishes*, Vol 1, edited by Ladich F, Collin S P, Moller P & Kapoor B G , (Science Publishers, Enfield, New Hampshire), 2006, pp. 3–43.

31 Kasumyan A O, Sounds and Sound Production in Fishes, *J Ichthyol*, 48 (11) (2008) 981–1030. https://doi.org/10.1134/S0032945208110039

32 Cuvier G, Le Règne Animal, distribué d'après son organisation, pour servir de base à l'histoire naturelle des animaux et d'introduction à l'anatomie compare, Vol 2, 2nd Edn, 1829, pp. i-xv + 1-406.

33 Jadhav R R, Jadhav D R, Kazi T G, Kamble S C, Mirajkar N B, *et al.*, The First Landing of Flying Gurnard (*Dactyloptena orientalis*, Cuvier, 1829) at Ratnagiri, Maharashtra State, the Western Coast of India: An Ecological Overview (Preprint). https://doi.org/10.21203/rs.3.rs-5730597/v1