Thalassas: An International Journal of Marine Sciences (2020) 36:399–404
https://doi.org/10.1007/s41208-020-00210-2

New Record and Range Extension of the Orange Scorpionfish, *Neomerinthe amplisquamiceps* (Scorpaenidae), in the Coastal Waters of Visakhapatnam, India

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Received: 31 January 2020 / Revised: 23 April 2020 / Published online: 11 May 2020

Abstract
In this paper, we report finding of 74 specimens of *Neomerinthe amplisquamiceps* (Scorpaendiae) and field observations of this species from the Indian coast. Specimens of *N. amplisquamiceps* were captured between 150 and 300 m depth with a 38 m high speed demersal trawl (crustacean version, codend, mesh size 40 mm) and 46 m Expo model demersal trawl (mesh size 30 mm). This rare, poorly known species is the only member of the genus *Neomerinthe* in the Indian ichthyofauna. The new records improve the current knowledge on *N. amplisquamiceps*, and refine the limits of its geographical distribution and habitat preference. Analyses of morphometric and meristic characters confirmed the identity of the specimens and are described, compared and summarized.

Keywords Scorpaenidae · New distributional record · *Neomerinthe amplisquamiceps* · India

Introduction

The scorpionfishes (Scorpaenidae, Scorpaeniformes) are a diverse group consisting of over 230 valid species (Nelson et al. 2016; Fricke et al. 2019). They are robust, moderately compressed fishes, with large spiny heads, occurring mostly in tropical or temperate waters (Poss 1999). They are benthic, mostly rocky reef dwellers, being usually found from near the sea shores to a depth of 800 m (Poss 1999; Poss and Eschmeyer 2003; Fricke et al. 2018; Naranji et al. 2018). The genus *Neomerinthe* is a small, poorly known group comprising 13 valid species distributed in the Indo-West Pacific and the Atlantic: *Neomerinthe amplisquamiceps* (Fowler 1938) from the eastern Indian Ocean and western Pacific (Fowler 1938); *N. bauchotae* (Poss and Duhamel 1991) from Saint Paul Island, southern Indian Ocean (Poss and Duhamel 1991); *N. beanorum* (Evermann and Marsh 1900) from the western Atlantic (Evermann and Marsh 1900); *N. bucephalus* (Alcock 1896) from India (Alcock 1896); *N. erostris* (Alcock 1896) from the Indo-West Pacific (Alcock 1896); *N. folgori* (Postel and Roux 1964) from the eastern Atlantic (Postel and Roux 1964); *N. hemingwayi* Fowler 1935 from the western Atlantic (Fowler 1935); *N. kaufmani* (Herre 1952) from the western Pacific (Herre 1952); *N. megalepis* (Fowler 1938) from the western Pacific (Fowler 1938); *N. naevosa* (Motomura et al. 2011) from the South Pacific (Motomura et al. 2011); *Neomernthe pallidimacula* (Fowler 1938) from the Indo-West Pacific (Fowler 1938); *N. procurva* (Chen 1981) from the Indo-West Pacific (Chen 1981); *N. rufescens* (Gilbert 1905) from the central Pacific.

Until now, three species were previously reported to Indian waters, *N. bucephalus* (Alcock 1896) from the Malabar and Coromandel coasts (Alcock 1896), *N. megalepis* by Ray and Mohapatra (2015) from West Bengal, and *Neomerinthe rotunda* (syn. *N. erostris* sensus Motomura et al. 2015) from Visakhapatnam by Naranji et al. (2018) and Mohapatra et al. (2016). The present paper reports the presence of an additional species *Neomerinthe amplisquamiceps*, from coastal waters of Visakhapatnam, India.

Materials and Methods

Specimens were collected fortnightly between December 2010 and December 2016 from commercial trawlers at Visakhapatnam fish landing centre (fishing area 16.98°N–

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20.20°N, 82.19°E–86.53°E) (Fig. 1). Individuals were captured between 150 and 300 m depth with a 38 m high speed demersal trawl (crustacean version, codend, mesh size 40 mm) and 46 m Expo model demersal trawl (mesh size 30 mm). Collected fish specimens were iced, packed in labelled nylon bags and transported to the laboratory, where all specimens were identified following the methods of Poss (1999) and Motomura et al. (2011). The morphometric measuremtns, meristic counts and terminology follow (Motomura et al. 2005a, b). The morphometric and meristic characters, with 0.1 mm, TL accuracy and total body weight with 0.01 g accuracy, were measured using a digital Vernier caliper and electronic weighing balance respectively. The selected morphometric measurements were expressed in percentage of standard length (SL) and head length (HL). Skeletons for counting the number of vertebrae were prepared by boiling fresh specimens and defleshing them. The specimens were preserved in 8% formalin for further studies and deposited in the department of Marine Living Resources Museum collection (DMLRAU).

Results

Family Scorpaenidae

Neomerinthe amplisquamiceps (Fowler 1938)

Common name: orange scorpionfish

Figure 2; Tables 1 and 2.

Material Examined DMLRAU 128/2016, 45–86 mm SL (74 specimens) off Visakhapatnam coast, Andhra Pradesh, India 16.98°N–20°0.2 N, 82.19°–86.53°E). 150–300 m depth, commercial bottom trawl, 19 December 2010 to 22 December 2016.

Diagnosis *Neomerinthe amplisquamiceps* is distinguished from congeners by the following characters: 9 (rarely 8 or 10) dorsal-fin soft rays; usually 19 pectoral-fin rays; 33–40 scales in longitudinal series; 21–24 perforated lateral-line scales; 4–7 scale series above lateral line series, 11–13 below; 12–19 gill rakers; body and snout relatively slender; median ridge on lateral surface of maxilla absent; lateral lacrimal spine present; anterior and posterior lacrimal spines simple, directed posteroventrally; 4 suborbital spines, in line with ridges of succeeding spines; 4 preopercular spines; upper posttemporal spine present; posterior margin of maxilla extending beyond posterior margin of pupil; a slit behind fourth gill arch present; swimbladder absent; no blotch above first and second pored lateral-line scales.

Description

Body oblong, moderately compressed; both dorsal and ventral profiles convex; dorsal profile of head slightly sloping, occipital area with shallow depression; snout concave anterior to eyes. Mouth terminal, oblique, large; lower jaw slightly projecting, bearing a symphyseal knob fitting into toothless upper jaw concavity; maxilla reaching below posterior border of eye. Teeth villiform, arranged in series on both jaws, vomer, and tooth patches on pharynx. Tongue small, smooth, with free apex. Interorbital space wide, concave, with welldeveloped, strongly elevated coronal ridges, ending in tympanic spines; eyes moderately large. Snout profile blunt; nostrils closely

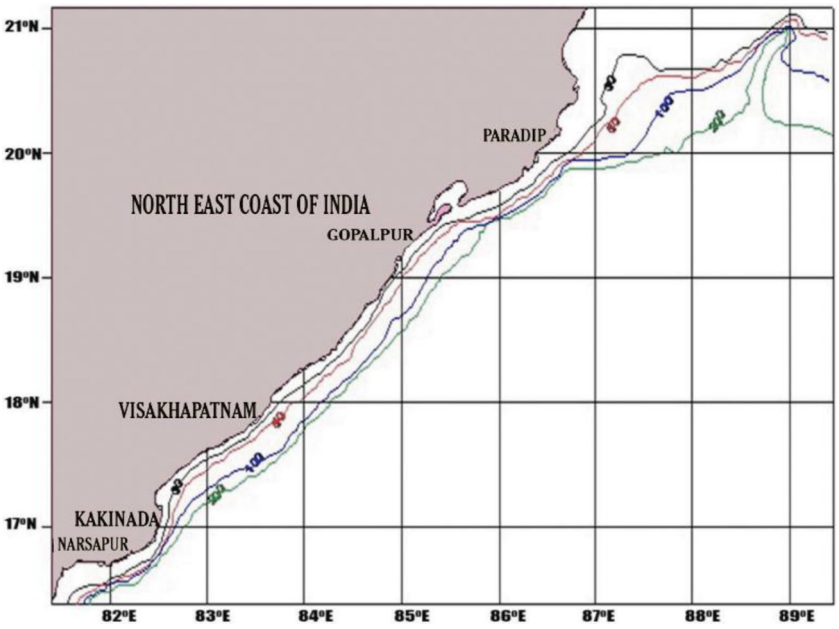

Fig. 1 Map of northeastern coast of India where *Neomerinthe amplisquamiceps* were sampled between 50 and 100 m deep near the coast of Visakhapatnam

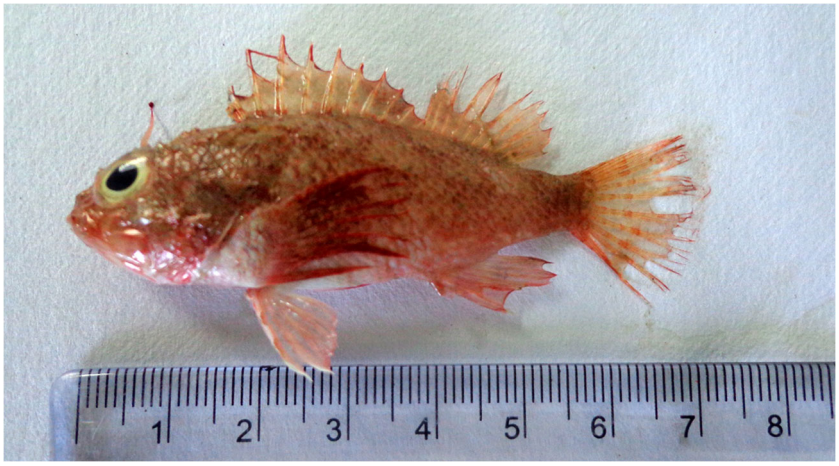

Fig. 2 Fresh specimen of *Neomerinthe amplisquamiceps*, DMLRAU, 128/2016, 78 mm TL, off Visakhapatnam coast, Andhra Pradesh, India

positioned; anterior nostril slightly tubular, posterior edge with fringed tentacle; posterior nostril round, entirely situated at base of supraocular spine. Pseudobranchiae present; slit behind fourth gill arch present. Gill rakers on middle of arch normal, reduced to spiny knobs at either end. Preopercle slightly rounded, opercular flap pointed, extending to near the base of the fourth dorsal spine. Eye upper rim bearing tentacles.

Dorsal fin continuous, notched after penultimate spine. Dorsal-fin origin at vertical through middle of opercle; Dorsal- and pelvic-fin origins slightly anterior to vertical through pectoral-fin origin; spines increasing in length posteriorly,succeeding rays to penultimate spine gradually decreasing in length; fourth spine longest, length equal to snout and or half eye diameter or slightly longer. Longest soft dorsal-fin ray as long as longest spine.Pectoral fin reaching beyond anus; two to nine pectorals branched, the lower rays simple. Anal-fin origin below second dorsal-fin soft ray, interspinous membrane distinctly notched; rays divided, soft dorsal slightly rounded. First anal spine shortest, second spine stout and longest and its length equal to anal-fin ray length; rays divided. Caudal-fin slightly rounded.

Spines on head well developed; lacrimal with two outward pointing spines, the second one slightly longer, oriented posteroventrally; suborbital ridge with four spines, all pointing backwards; preopercle with four spines, uppermost longest, second spine pointed, third and fourth denticulated; supplemental preopercular spine blunt; cleithral spine blunt; postorbital with small spine; two widely-set opercular spines present, uppermost spine larger; a broad, strong, flat scapular spine present; supracleithral, upper posttemporal, lower posttemporal, nuchal, parietal, pterotic, tympanic, sphenotic, postocular, supraocular, preocular and nasal spines present.

Head with tentacles; two slender on preorbital area, extending over lower jaw, four on preopercle, a long tentacle present, posterior to supraocular spine. Numerous tiny tentacles on head, including dorsal margin of eye; very short tentacle posterior to supraocular spine. Supraorbital tentacle simple.Few, small tentacles associated with lateral line pored scales, remaining portion of flanks lacking tentacles. Pectoral-fin axil without skin flap.

Body fully scaled, all ctenoid. Occipital region, postorbital part of head and sides of head, below supraorbital, and opercle scaled; scales reaching on posterior part of head anteriorly to interorbital space; small scales present on pectoral-fin base and flanks.

Colour

Body reddish brown, with gray spots; dorsal side of body reddish brown, and lower side of belly pale pinkish. Pectorals pinkish red, anal dark pink, with transverse oblique bands red brown in clour; reddish brown ocellated blotches with small reddish streaks on dorsal fin; pelvic fins rosy, tips becoming pinkish red; dorsal, caudal and pectoral fins reddish; opercle and preopercle dark pink. Dorsal- and anal-fin bases yellow; supraocular tentacles reddish.

Discussion

Neomerinthe amplisquamiceps was first described by Fowler (1938) from the Timor Sea, Street Solor, Philippines. The species has been reported by deBeaufort and Briggs (1962) from the Laccadive archipelago on the western coast of India. This study documents the first confirmed occurrence of specimens from Visakhapatnam, along the eastern coast of India. Among the 19 species of Scorpionfishes that occur along the Indian Coast (Naranji et al. 2018), *Neomerinthe amplisquamicpes* is represented mainly in trawl by-catches, being rare in shore seine catches. It occurs in deeper waters at depths of about 120 m along with species of Tetrarogidae and Synanciidae.

Morphometric data of the specimens of *N. amplisquamiceps* are compared in Tables 1 and 2. Although meristic data (i.e.

Table 1 Morphometric parameters of *Neomerinthe amplisquamiceps*. Body proportions are expressed as a percentage of standard length and head length

Species	*Neomerinthe amplisquamiceps*	
Authors	Present specimens	
Locality	Visakhapatnam, India	
No. of specimens examined (*n*)	74	
Standard length range (SL) mm	45–86	
Weight (Min-Max) in grams	4–32	
Morphometric characters	Min-Max	($X \pm$ Std. dev)
In % Standard length		
Total length;	124.24-134.14	128.61 ± 2.77
Body depth	30.55–42.10	35.09–2.72
Head Length	42.80–52.90	48.40 ± 2.70
Pre dorsal length	33.33–45.61	40.81 ± 2.81
Pre pectoral fin length	38.70-49.25	45.60 ± 2.84
Pre pelic fin length;	36.11–46.55	43.28 ± 2.89
Pre anal length;	66.66–77.19	73.38 ± 2.89
Dorsal fin base length	51.35–65.51	59.18 ± 2.67
Pectoral base length	10.81–20.33	15.66 ± 1.94
anal base length	12.16–21.05	16.48 ± 2.11
3rd Dorsal spine length	16.66–28.81	23.47 ± 2.61
Longest soft dorsal-fin ray length	16.21–26.22	21.82 ± 2.67
Pectoral-fin length;	26.08–36.48	31.90 ± 2.71
Pelvic spine length;	12.80–23.70	17.40 ± 2.40
Pelvic-fin length	21.62–31.70	26.96 ± 2.49
2nd Anal spine length	17.64–27.41	21.81 ± 2.56
Longest anal-fin ray length	17.14–26.74	22.30 ± 2.74
In (%) Head length		
Head Depth	45.71–56.25	51.75 ± 2.54
Head Width	41.37–52.77	46.85 ± 3.00
Eye Diameter	25.71–35.71	29.72 ± 2.62
Pre Orbital Length	09.67–22.58	19.34 ± 2.75
Post Orbital Length	47.36–58.62	53.04 ± 2.75
Inter orbital distance	09.67–19.35	15.76 ± 2.35
upper jaw length	45.23–55.55	51.48 ± 2.66
lower jaw length	44.44–53.57	48.84 ± 2.88
maxilla width	11.42–21.42	16.76 ± 2.89
snout length	17.24–29.16	22.16 ± 2.70
caudal peduncle depth	07.84–16.66	19.93 ± 1.99

lateral line scales, gill rakers and pectoral-fin rays) reported by different authors vary from the data obtained herein, information available in the literature (Poss 1999; Motomura et al. 2016; Motomura et al. 2015) associated with the present data were useful to unambiguously identify the specimens sampled in the area. Meristic characters also allowed to distinguish representatives of *N. amplisquamiceps* from other genera closely resembling species of *Neomerinthe*, as is the case of some species of *Pontinus* (Poey 1860) and *Sebastapistes* (Gill 1877). According to Eschmeyer and Randall (1975), Chen (1981), Poss (1999) and Zajonz and Lausewitz (2002) *Neomerinthe* contains species holding a high similarity to species of *Pontinus* but unlike representatives of that genus, *Neomerinthe* species have branched pectoral rays, whereas representatives of *Pontinus*, in turn, have all pectoral-fin rays simple. The distinction between *Neomerinthe* and *Sebastapistes*, on the other hand, is more complex considering both genera have been traditionally distinguished by two overlapping characters (Poss 1999). The first one is the form of the occipital area, which is considered to be convex in *Sebastapistes* and flat or nearly so in *Neomerinthe*.

Table 2 Comparison of meristic characters of *Neomerinthe amplisquamiceps*

Author	Locality	Dorsal (D)	Anal (A)	Pectoral fin rays (P)	Ll pores (LLP)	Lateral line Scales (LLS)	Gill rakers (GR)	Vertebrae	Length range
Fowler, 1933:55	Philippines	XII,9	III,5	2 + 3–7 + 11	22–23 + 1	33–37 + 2–3	-	-	152 mm
Herre 1951:393	Philippines	XII,9	III,5	2 + 7 − 3 + 11	-	33–37	5 + 10 = 15	-	152 mm
deBeaufort and Briggs 1962:27	Timor Sea, Street Solor, Philippines, India	XII, 9–10	III,5	2 + 7–9 + 9–10	-	33–40	$4–5^{1/2}/1/9–10$	-	162 mm
Present data*	Visakhapatnam, India	XII 9–10	III, 5	2 + 8–10	22–24	33–40	4–6 + 1 + 7–12 = 12–19	24	45–86 mm SL

The second involves the number of soft dorsal-fin rays: eight to ten in *Sebastapistes versus* nine to eleven in *Neomerinthe* (Poss 1999). The usefulness of this character is highly limited, considering the ranges in both genera completely overlap, considering the number of soft dorsal-fin rays is also 8–9 in *N. erostris* (Motomura et al. 2015). In addition to the fact that scorpionfishes are not usually explored as a fisheries resource, the similarity between *N. amplisquamiceps* with other scorpionfish species may have caused historical confusion in distinguishing representatives of those genera in the past, in the Visakhapatnam Coast, therefore, the present register of *N. amplisquamiceps* to the area may aid accurate identification and distinction between those species in future fisheries statistics and conservation strategies.

Acknowledgements The authors extend gratitude to the authorities of Marine Living Resources, College of Science and Technology, Andhra University for providing the necessary facilities and to the University grants Commission, Govt. of India, New Delhi for financial support through UGC-Rajiv Gandhi National Fellow Research Awardee (No. F.14-2-1/2010(SA-II) dated 18/5/2011).We would especially like to thank Prof Donald Charles Taphorn, Ichthyology Laboratory, Royal Ontario Museum, Toronto, Canada, for his valuable suggestions and help in improving the English in this manuscript. We also thank all the anonymous referees for their comments and suggestions.

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