

Research Article

First documentation of an uncommon goby genus and species, *Palutrus scapulopunctatus* (de Beaufort, 1912) from the Persian Gulf (Teleostei: Gobiidae)

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Abstract: A 23.6mm SL specimen of the scapular goby, *Palutrus scapulopunctatus* was collected from a shallow rocky reef interspersed with sandy coastline of the Qeshm Island during a fish survey in May 2018. This report documents a significant range extension of *P. scapulopunctatus* into the most western parts of Indo-Pacific regions, in the Iranian intertidal coast of Persian Gulf. The morphological description of collected individual is given and discussed.

Keywords: Taxonomy, Gobiiformes, Fish diversity, Morphology, Indo-Pacific region.

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Introduction

As currently understood, Gobiiformes with about 2,228 valid species comprise the most species-rich group of teleost fishes (Fricke et al. 2019) and show a spectacular variety in morphology, biology, ecology and behavior (Patzner et al. 2012; Sadeghi et al. 2019a) with taxonomic complexity. The most diverse group of gobiiforms is the family Gobiidae with about 1,907 species with worldwide distribution in the marine, brackish and inland waters of the tropical and subtropical regions (Gill 1993; Patzner et al. 2012; Nelson et al. 2016; Schliewen et al. 2018). Due to their small size and sampling difficulties, the knowledge about the distribution of many gobies is rather scarce (Bogorodsky et al. 2010a, b) and some of them have been misidentified especially in the studies conducted in the Persian Gulf and Gulf of Oman/Makran (Sadeghi et al. 2017). During 2006-2019, 14 species of gobiids have been reported from the Iranian coast of the Persian Gulf and Oman Sea (Rahimian & Pehpouri 2006; Ghanbarifardi & Malek 2007; Zare et al. 2012; Yeganeh et al. 2015; Sadeghi

et al. 2017, 2019a, b; Sadeghi & Esmaeili 2019), but no record of the genus *Palutrus* Smith, 1959 is available from the Persian Gulf.

According to Larson & Murdy (2001), the genus *Palutrus* can be recognized by terminal mouth, no depressed head, blunt to rounded/truncate tongue, presence of pelvic frenum, usually mottled, spotted, and barred with brown coloration. Gobies of the genus *Palutrus* resemble small *Bathygobius* Bleeker, 1878 but tips of upper pectoral-fin rays not free. There are currently four valid species in the genus *Palutrus* Smith, 1959: the Meteor goby, *P. meteori* (Klausewitz & Zander, 1967); the Pruinosa goby, *P. pruinosa* (Jordan & Seale, 1906); the reticulated goby, *P. reticularis* Smith, 1959 and the Scapular goby, *P. scapulopunctatus* (de Beaufort, 1912). Till date, only one species, *P. meteori* has been reported by Randall (1995) based on one specimen from southern Oman in the collection of the Royal Ontario Museum (ROM).

Palutrus scapulopunctatus (de Beaufort, 1912) commonly referred to as a “scapular goby” is known



Fig.1. *Palutrus scapulopunctatus*, female, 23.64mm SL from the coast of Qeshm Island, Messen. (A) Lateral and (B) dorsal views.

from the Red Sea and the Indo-West Pacific: Indonesia east to Fiji (Bogorodsky et al. 2010a; Fricke et al. 2019). However, there is no record of this species from the Persian Gulf (Rahimian & Pehpouri 2006; Ghanbarifardi & Malek 2007; Sadeghi et al. 2017, 2019a, b; Sadeghi & Esmaeili 2019). Therefore, the purpose of this study is (i) to report *P. scapulopunctatus* based on collected specimen from the coast of Qeshm Island in the Persian Gulf and (ii) to provide its detailed morphology.

Materials and Methods

One female specimen of the scapular goby, *P. scapulopunctatus* with total length (TL) of 28.5mm and standard length (SL) of 23.6mm (Fig. 1) was collected at low tide from a shallow rocky

coastline with sand and rubble of the Messen village, Qeshm Island, Hormozgan Province, Iran, 26°44'N, 56°00'E, during a fish survey in May 2018 using a hand net with mesh size of 1.30mm (Figs. 2, 3).

After photography, the specimen was preserved in 96% ethanol and catalogued/deposited in the Zoological Museum of Shiraz University, Collection of Biology Department, Shiraz (ZM-CBSU). Measurements were made point-to-point with calipers under stereomicroscope to the nearest 0.01mm. All fish lengths were expressed as % standard length (SL) and head length (HL). Morphometric method followed Miller (1988) and meristic method followed Randall (1994). Meristic abbreviations are as follow: D1 = First dorsal fin; D2 = Second dorsal fin; V = Ventral fin; A = Anal fin; P = Pectoral fin; PSD = Predorsal scales; LSS=

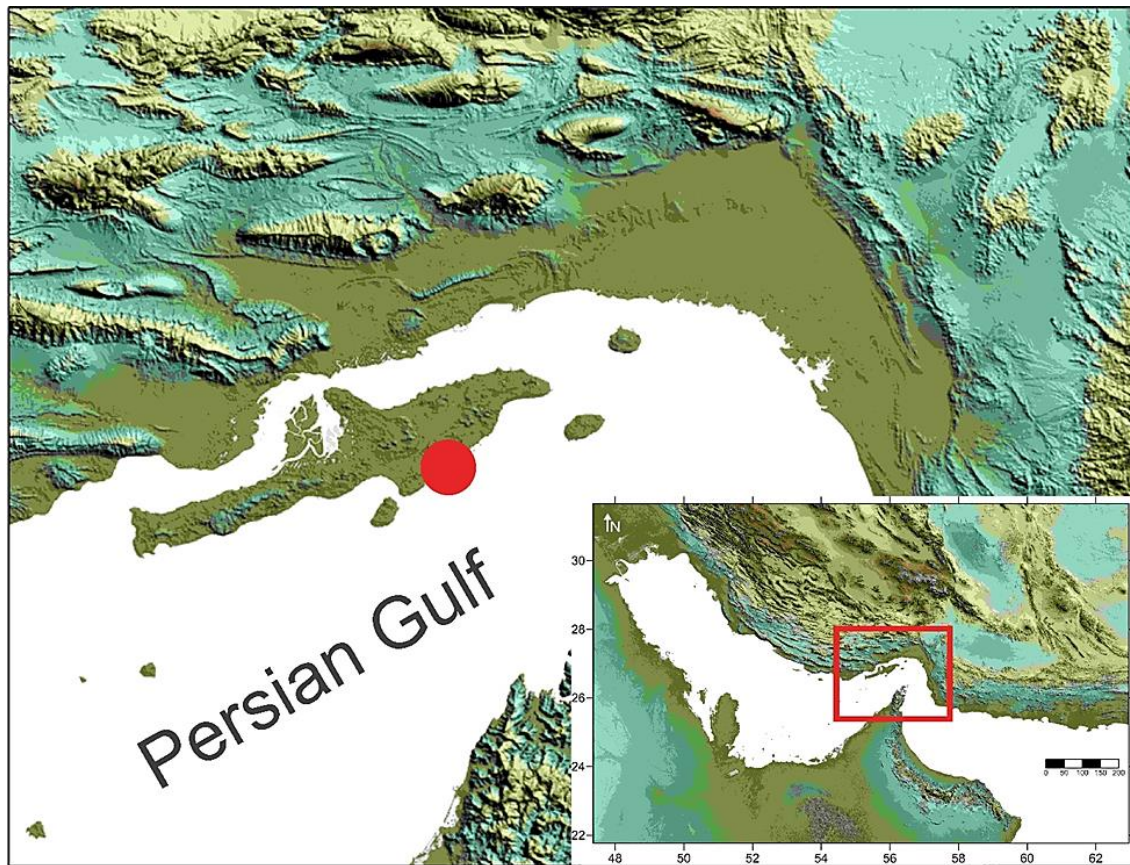


Fig.2. Map of the Persian Gulf and Makran Sea showing the sampling site of *Palutrus scapulopunctatus*, the solid red circle is the new record locality.

Longitudinal scales series; TSS = Transverse scales series and CS = Circumpeduncular scales. For identification, Larson & Murdy (2001) and Smith & Heemstra (1987) were followed.

Results

Systematics:

Family Gobiidae

Subfamily Gobiinae

Genus *Palutrus* Smith, 1959

Palutrus scapulopunctatus (de Beaufort, 1912)

(Fig. 1)

Specimen examined: ZM-CBSU M2194, Female, 28.5mm TL, 23.6mm (SL): Messen village, Qeshm Island, Persian Gulf, Hormozgan province, Iran, 26°44'N, 56°00'E, May 2018.

General description: Fin ray counts: D1: VI; D2: I+8; A: I+7; P: 15; PDS: 10; LSS: 25; TSS: 8; CS: 11.

See Figure 1 for general appearance;

morphometric and meristic data are given in Table 1. This new record is characterized by: Body compressed with the head slightly depressed, depth 15.6% SL, head length 22.8% SL, dorsal profile is gently sloping from the first dorsal fin to the eye, from here it bends rather abruptly down to the snout. Eyes very close together, prominent above the dorsal profile, situated in the first half of the head, orbit diameter 23.7% head length, snout short and 25.9% head length. Jaws almost equal, maxilla reaching under the front border of the eye, tongue truncated with rounded edges and the front margin slightly curved inwards. Head without scales except nape region, prepelvic and pectoral-fin upper bases area partly scaly, scales ctenoid posteriorly, becoming cycloid anteriorly, those on the fore part of the body slightly smaller than the rest.

Dorsal fins closed but not confluent each other, heights of first and second dorsal fins subequal, second spine of first dorsal fin longest, and second

Table 1. Proportional measurements of *Palutrus scapulopunctatus* collected from the coast of Qeshm island, Messen, Persian Gulf. Expressed as percentages of the standard length and head length.

Characters	One female specimen	Characters	One female specimen
Standard length (mm)	23.64	Head length (mm)	5.40
Body depth /SL	15.65	Body depth /HL	68.51
Body with /SL	21.28	Body with /HL	93.14
Head length /SL	22.83	Snout length /HL	25.92
Snout length /SL	5.92	Eye diameter /HL	23.70
Eye diameter /SL	5.41	Caudal peduncle depth /HL	52.24
Caudal peduncle depth /SL	11.93	Caudal peduncle length /HL	118.64
Caudal peduncle length /SL	27.10	Predorsal length /HL	135.12
Predorsal length /SL	30.86	Preanal length /HL	262.14
Preanal length /SL	59.88	Prepelvic length /HL	110.55
Prepelvic length /SL	25.25	First dorsal base length /HL	67.04
First dorsal base length /SL	15.31	Anal fin base length /HL	101.57
Anal base length /SL	23.20	Caudal fin length /HL	90.26
Caudal fin length /SL	20.62	Pectoral fin length /HL	103.74
Pectoral fin length /SL	23.70	Pelvic fin length /HL	93.34
Pelvic fin length	21.32		

**Fig.3.** Collecting site of *Palutrus scapulopunctatus*, Qeshm Island, Messen, Persian Gulf.

dorsal fin beginning above the anus. Pectorals fins as long as head, tips of upper pectoral-fin rays not free. Pelvic fin short, not reaching anus. Caudal fin rounded, almost equal to head length. Caudal peduncle length 118.6% head length, and caudal peduncle depth 52.2% head length.

Color: Body brownish to fawn with black spot on body side in middle row, no large black spot behind eye (large black spot behind eye), four saddle-like brown blotches on dorsal; first blotch around first

dorsal fin, the second and third under the second dorsal and fourth on the tail, ventrally these blotches reach to the middle of the sides of the body, a longitudinal row of somewhat darker brown blotches along middle of side, a dark brown elongate patch under the eye and an indistinct stripe running forward from the eye to the mouth, brown patches on the sides and on the under surface of the head on opercle and preopercle, three small dark spots above pectoral fin base, a dark spot at upper base of caudal fin, two

indistinct oblique brown bands on first dorsal, a yellow oblique band on tip of first dorsal fin, rays of second dorsal and anal fin with brown spotting, forming dark bands on the fins.

Distribution: Red Sea and Indo-West Pacific: Indonesia east to Fiji and now from the Persian Gulf.

Discussion

Due to their small size and often cryptic ecologies and behavior, the full extent of gobiid diversity often goes unnoticed, making evolutionary and taxonomic studies of the group hindered (Thacker & Roje 2011). This situation is more obvious in not well-exploited regions such as the Persian Gulf and Strait of Hormuz with new recent gobiid faunal records such as *Bathygobius cocosensis* (Bleeker, 1854), *Coryogalops tessellatus* Randall, 1994, *Cryptocentrus cyanotaenia* (Bleeker, 1853) and *Favonigobius reichei* (Bleeker, 1854) (see Sadeghi et al. 2017, 2019a, b; Sadeghi & Esmaeili 2019). It is more complicated in the case of morphologically similar fishes with taxonomic complexity (e.g. members of the genus *Palutrus*). The genus *Palutrus*, was originally described by Smith (1959) for *P. reticulatus* Smith, 1959. According to Shibukawa et al. (2010), *Palutrus* is not a well-defined genus, having: VI-I, 7–8 dorsal-fin rays; I, 6–7 anal-fin rays; 14–16 pectoral-fin rays; 23–25 longitudinal scales; 12 circumpeduncular scales; 10+16–17=26–27 vertebrae; P-V 3/II II I I 0/9; no free rays on pectoral fin; a depressed head; distinctive single-lobed mental frenum; anterior margin of tongue nearly truncate or weakly emarginated; cephalic sensory canals with pores B, C (unpaired), D (unpaired), E, F, G, H, K, L, M, N and O; reduced longitudinal pattern of sensory papillae rows on cheek; row a relatively short, not extending, or barely extending, anteriorly to a vertical through middle of pupil; row b short, not reaching to a vertical through middle of eye; row c comprising sparsely-arranged papillae, long, extending posteriorly around a vertical through end of row b; and a pair of sensory papillae just behind chin (row f), [(none of these features is unique within

the Gobiinae] (Shibukawa et al. 2010). Due to morphological similarities of members of the genus revision of the genus is needed (see Shibukawa et al. 2010) using both morphological and molecular data set.

In the studied area, gobies of the genus *Palutrus* resemble to small *Bathygobius* but tips of upper pectoral-fin rays are not free. Meristically, *P. scapulopunctatus* is most similar to other three *Palutrus* species but it is readily separated from other species by color patterns. This species unlike other species has four saddle-like brown blotches on dorsal. This species has previously been recorded from Malaysia, Indonesia and Fiji. However, this species in this study was taken from a bottom of rock with sand, rubble and gravel of the intertidal zone at depths of about 5-10cm. This new record is the first documented occurrence of *P. scapulopunctatus* in the Persian Gulf and it is a new addition to the marine fish species list of this ecoregion.

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مقاله پژوهشی

اولین گزارش از یک جنس و گونه گاوماهی غیر معمول *Palutrus scapulopunctatus* (de Beaufort, 1912) از سواحل ایرانی خلیج فارس (Teleostei: Gobiidae)

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آزمایشگاه تحقیقاتی ماهی‌شناسی و سیستماتیک مولکولی، بخش جانورشناسی، گروه زیست‌شناسی، دانشکده علوم پایه، دانشگاه شیراز، شیراز، ایران.

چکیده: یک نمونه گاو ماهی از گونه‌ی *Palutrus scapulopunctatus* با طول استاندارد ۲۳/۶ میلی‌متر از نواحی صخره‌ای ساحلی کم عمق جزیره قشم در طی نمونه‌برداری در خرداد ۱۳۸۷ جمع‌آوری شد. این گزارش استناد جدیدی از دامنه پراکنش *P. scapulopunctatus* در سواحل بین جزر و مدی ایرانی خلیج فارس واقع در غربی‌ترین بخش اقیانوس هندی-آرامی می‌باشد. شرح ریخت‌شناسی نمونه جمع‌آوری شده ذکر گردیده و مورد بحث قرار گرفته است.

کلمات کلیدی: رده‌بندی، گاوماهی شکلان، تنوع ماهی، ریخت‌شناسی، منطقه اقیانوس هند-آرام.