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ORIGINAL ARTICLE

Confirmed record of Bluespotted dottyback, *Pseudochromis persicus* (Murry, 1887) from Iranian coast of the Persian Gulf

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Abstract
This study confirms the presence of Bluespotted dottyback, *Pseudochromis persicus* in the Iranian coast of the Persian Gulf. One specimen was collected with the fishing hock line in February 2022 from the coastal water of Hormuz Island. Detailed information on the morphometric and meristic characters and sequence of COI gene is used to support identification. Genetic results revealed a 0.09-0.23 (p-distance) distance with other congener species in the area, while identified haplotypes were at 0.002 distance with conspecific haplotypes. The phylogenetic tree revealed that the identified haplotype is in a monophyletic clade with other haplotypes of *P. persicus* from the Gene bank. The result could be suitable for a better understanding of the fish fauna in the Persian Gulf.

Keywords: DNA Barcoding, Hormuz Island, Pseudochromidae.

INTRODUCTION

The Pseudochromidae, (Dottybacks) contain 24 genera and 155 species which inhabit mostly marine waters with a few species found in brackish waters (Fricke et al. 2024; Froese & Pauly 2024). Members of this family are small size (less than 11cm TL) and reef-associated (Parenti 2019). The 72 species of Genus *Pseudochromis* are diagnosed from other genus members by following characters including 15-41 tubular scales on anterior portion of lateral line, forked caudal fin and 10-34 sub orbital pores. Bluespotted dottyback (*Pseudochromis persicus*) is among biggest species of the genus and known for variable body coloration. Although blue spots on body is a diagnostic character for all specimen of this species (Lubbock 1975). *P. persicus*) distinguished from other congener by blue-edged black ocellus on upper preoperculum, 46-53 tubular scales in anterior portion of lateral line, bright blue spots scattered on body, operculum, caudal fin and in a row along the dorsal and anal-fin base (Carpenter et al. 1997). Mostly found on near- shore coral and rocky reefs in depths of 8-25m, in the Persian Gulf and the Oman Gulf (Gill 2017). Two congener species including *Pseudochromis dutoiti* and *Pseudochromis linda* were already recorded from coast of the Faror, Hendorabi and Kish Islands, in the Prsian Gulf (Carpenter et al. 1997; Hosseinzadeh Sahafi & Kamali 2003). Here for the first time the presence of *P. persicus*is confirmed in the iranian coast of the Persian Gulf (Hormuz Island) by using morphological characters and a molecular evidence (COI gene sequence).

MATERIAL AND METHODS

One specimen of *P. persicus* captured by fishing hook line from the coast of Hormuz Island (56°28' N 27°04'), the Persian Gulf in winter 2023 (Figs. 1 and 2). Collected specimens photographed and fixed in formalin 4%. Nine morphometric characters were measured by a clipper (0.02 mm accuracy) and eight meristic characters were counted under stereomicroscope (Gill et al. 2012; Alavi-Yeganeh & Bozorgchenani 2023; Khandan Barani et al. 2023).

DNA was extracted using phenol/chloroform protocol and COI gene fragment was amplified by using universal primers Fish F1 and Fish R1 (Ward et al. 2005; Alavi-Yeganeh et al. 2015). Identified haplotype submitted in gene bank with accession number PP101443. Genetic distance among identified haplotype of *P. persicus* from the Persian Gulf and other previous identified haplotypes and conger species from the Persian Gulf and the Oman Sea were calculated by MEGA11 (Tamura et al. 2021). The cladogram for phylogenetic relationships of identified

Fig.1. Collection site of *Pseudochromis persicus* from coastal water of Hormuz Island, Persian Gulf.

Fig.2. Collected specimen of *Pseudochromis persicus* from coastal water of Hormuz Island, Persian Gulf.

haplotypes from *P. persicus* and some other congener species in the Persian Gulf and the Oman Sea was constructed by Maximum Likelihood (ML), raxmlGUI Ver. 2.0 (Elder et al. 2020).

RESULTS

The total length of the collected specimen was 157 mm and some of the relative morphometric characters were calculated as follows: Head length/SL: 25.8%, Predorsal length/SL: 32.6%, Pectoral fin length/SL: 15.5%; Anal fin length/SL: 19.3%; Snout length/Head length: 22.72%; Dorsal fin base length/SL: 66.1% and Anal fin base length/SL: 32.4%. A clear, blue-edged black ocellus appeared on the upper preoperculum and blue spots were distributed on the body, operculum and caudal fin, as well as in a row on the dorsal and anal fins. Counted meristic characters revealed 30 rays in the dorsal fin, 18 rays for the anal fin, 16 rays in the caudal fin, 46 tubular scales in the anterior portion of the lateral line and eight circumpedauncular scales.

The identified COI haplotype was submitted to the gene bank with accession number PP101443 (480 bp). Blast analysis revealed 99.8 percent identity with COI haplotypes of *P. persicus* from the United Arab Emirates marine waters (MT076808-11). Genetic distances (p-distances) within and among species are presented in Table 1. Distances among pairs of the seven *Pseudochromis* spp. from the Persian Gulf and the Oman Sea ranged 0.09-0.23, while within-species distance was 0.00-0.06. The genetic distance of the identified haplotype (PP101443) with haplotypes of *P. persicus* from the UAE was 0.00, and it was placed

Table 1. Genetic distances (p-distance) between and within haplotypes of seven Dottybacks species and obtained haplotype from *Pseudochromis persicus* in this study (PP101443).

	Species	1	2	3	4	5	6	7	8
1	***Pseudochromis persicus*** (This study)	n/c							
2	*Pseudochromis bitaeniatus*	0.17	0.06						
3	*Pseudochromis dutoiti*	0.23	0.22	0.01					
4	*Pseudochromis flavivertex*	0.18	0.19	0.23	0.00				
5	*Pseudochromis kristinae*	0.15	0.18	0.21	0.17	0.01			
6	*Pseudochromis natalensis*	0.09	0.18	0.23	0.21	0.19	0.00		
7	*Pseudochromis olivaceus*	0.21	0.19	0.19	0.18	0.19	0.22	0.01	
8	*Pseudochromis persicus*	0.00	0.17	0.23	0.18	0.15	0.09	0.21	0.00

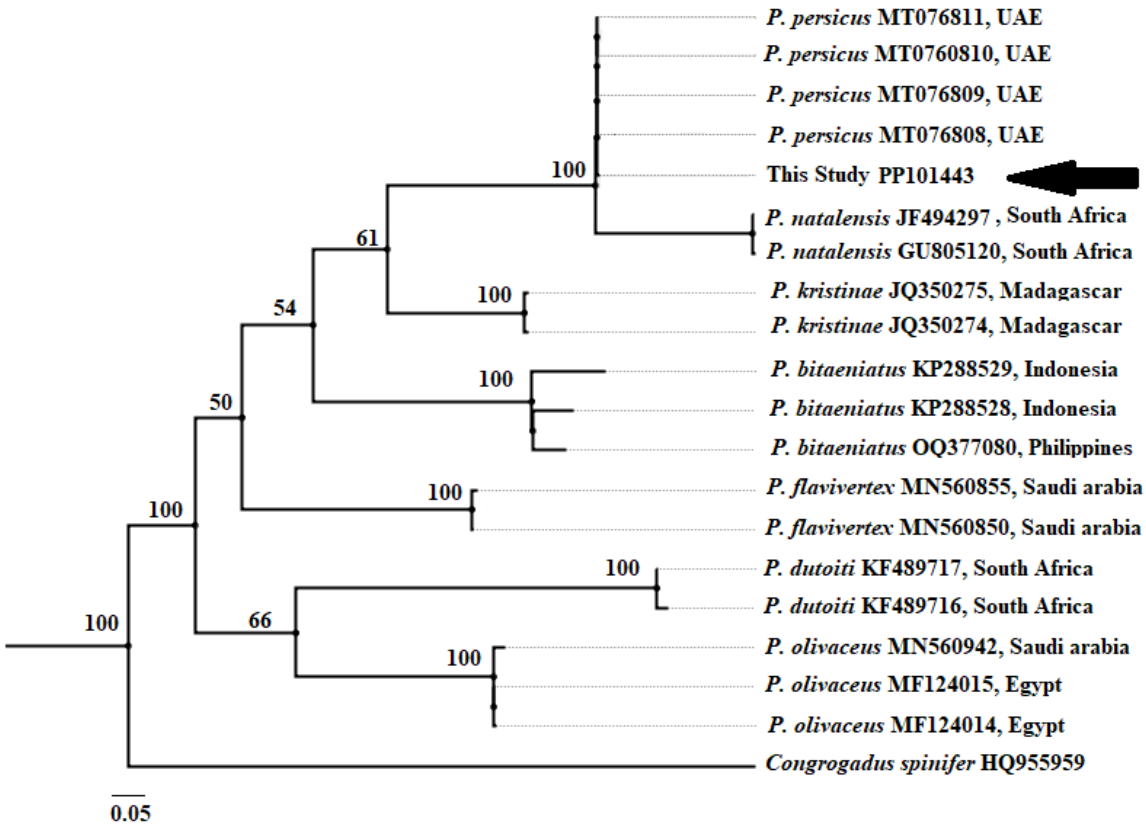

Fig.3. Maximum likelihood analysis based on the mitochondrial cytochrome c oxidase subunit I (COI) sequences of *Pseudochromis* spp. species in the Persian Gulf and the Oman Sea area. All reference sequences were obtained from GenBank with their accession numbers and collection area indicated within the parentheses. The arrow is in front of identified haplotype (PP101443) from the Persian Gulf in this study.

in a monophyletic clade beside those haplotypes (Fig. 3).

DISCUSSION

The main reason for the lack of studies about Bluespotted dottyback could be related to difficult sampling as a reef-associated species. Also, because of morphological similarity among congener species, their identification is not easy. For example, diagnostic characters in comparison with *P. caudalis* are just related to details of coloration and the number of tubular scales in the anterior portion of the lateral line (Lubbock 1975). In another case, all the meristic characters of *P. persicus* are similar to those of *P. omanensis*, and there are blue spots on its body that disappear after fixation (Randall 1995). Lack of studies and record data as a result of difficult sampling in the Persian Gulf and the Oman Sea have been reported as a possible reason for other fish species (Alavi-Yeganeh et al. 2015; Sharifiniya et al. 2021).

Molecular identification is not impacted by the environment and provides more reliable phylogenic information. Here, for the first time, we confirmed the identification of *P. persicus* in the Iranian coast of the Persian Gulf by using the COI gene sequence. The provided data could be useful for better understanding and management of fish biodiversity in the area.

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مقاله کامل

حضور تأیید شده گونه *Pseudochromis persicus* (Murry, 1887)، از سواحل ایران در خلیج فارس

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چکیده: این مطالعه حضور گونه Bluespotted dottyback با نام علمی *Pseudochromis persicus* را در سواحل ایرانی خلیج فارس تأیید می‌کند. یک نمونه توسط قلاب ماهیگیری از آب‌های ساحلی جزیره هرمز در بهمن ماه ۱۴۰۱ صید شد. اطلاعات صفات شمارشی و اندازشی و توالی ژن CO1 برای تأیید شناسایی مورد استفاده قرار گرفت. فاصله ژنتیکی (p-distance) بین گونه‌های همجنس در منطقه ۰/۰۹الی ۰/۲۳ محاسبه شد، در حالی که فاصله هاپلوتایپ شناسایی شده با هاپلوتایپ‌های گونه *P. persicus*، ۰/۰۰۲ محاسبه شد. در درخت تبارشناسی نیز هاپلوتایپ شناسایی شده همراه با سایر هاپلوتایپ¬های ثبت شده از این گونه در بانک ژن، در شاخه‌ای هم‌تبار قرار گرفت. نتایج این تحقیق می‌تواند در شناخت بهتر فون ماهیان خلیج فارس مفید باشد.

کلمات‌کلیدی: خط شناسه DNA، جزیره هرمز، Pseudochromidae.