



First Record of the Deep Pugnose Ponyfish *Secutor ruconius* (Hamilton, 1822) (Perciformes: Leiognathidae) from the Persian Gulf and the Gulf of Oman

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Abstract: The pugnose ponyfish *Secutor ruconius* is recorded for the first time from the Persian Gulf and the Gulf of Oman. The identification was confirmed based on morphological characteristics and 668 bp sequence of COI mtDNA. The species record is a new addition to the ichthyofauna of this area, resulting from specimens being collected from the Northern Qeshm Island (N 26°57', E 55°45'E) in the Persian Gulf and in the Chabahar Bay (N 25°18', E 60°37') in the Northern Oman Gulf.

Key words: Slipmouths, DNA barcoding, Iran

Introduction

The family Leiognathidae, commonly named as slimys, slipmouths or ponyfishes, are distributed in the coastal waters of the Indo-West Pacific Ocean with one species in the Mediterranean Sea. The genus *Secutor* Gistel, 1848 contains seven species, all with small size and non-commercial. One of the widespread species of this genus is the pugnose ponyfish *S. ruconius* (Hamilton, 1822), which has been recorded in many places in the Indo-West Pacific region, including India, Sri Lanka, Taiwan, China, Somalia and Madagascar, along the eastern coast of Africa and Australia (SOMMER et al. 1996, NI & KWOK 1999, KAPOOR et al. 2002, ALLEN & ERDMANN 2012). In this study, we report the presence of *S. ruconius* in the Persian Gulf and the Gulf of Oman for the first time, as evidenced through both morphological and genetic examinations.

Materials and Methods

In October 2014 and November 2018, 20 specimens were collected in Northern Qeshm Island

near Laft City beach (N26°57', E55°45') in the Persian Gulf using a weir net and two specimens from the Chabahar Bay (N25°18', E60°37'), Northern Oman Gulf, using a small mesh cast net (Fig. 1). The collected specimens were preserved in 96% ethanol and catalogued in the Aquatic Animal Collection of the Tarbiat Modares University (TAC1004F for Qeshm Island; TAC1184 for Chabahar Bay). The morphometric and meristic characters were compared with previously reported data from Sri Lanka and the west coast of India (CHAKRABARTY et al. 2008, ABRAHAM et al. 2011). Morphometric characters were measured point to point with an accuracy of 0.1 mm and meristic characters counted using a stereomicroscope according to ALAVI-YEGANEH & BAHMANI (2018). The confirmation of morphological identification was done through sequencing the partial mitochondrial gene (COI: 668 bp) amplified on fin tissue DNA using FishF1 and Fish Primers (WARD et al. 2005). Amplified fragments were sequenced and aligned with COI sequence of *S. ruconius* from India and Sri Lanka and congeneric species, including *S. insidiator*, *S. megalolepis* and *S. indicus*

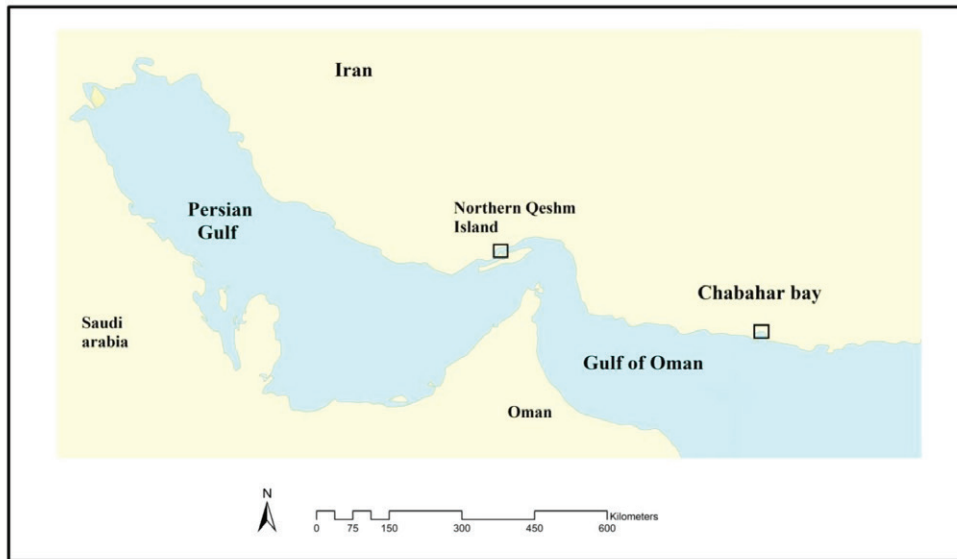


Fig. 1. Distribution map of *Secutor ruconius* recorded from the Persian Gulf and the Gulf of Oman. Open square corresponds to the new record locality of the deep pugnose ponyfish *S. ruconius* from the Northern Qeshm Island, Persian Gulf (N 26°57', E 55°45') and from the Chabahar Bay, Northern Gulf of Oman (N 25°18', E 60°37').

from NCBI GenBank. Three haplotypes of COI generated in the course of the present study were submitted to the NCBI GenBank, accession nos. MK355218, MK355219 and MK355220. A phylogenetic tree of the COI sequences was constructed with the Bayesian and Maximum Likelihood (BL and ML) methods (ALAVI-YEGANEH & DEYRESTANI 2016). The best-fit models of the DNA substitution (GTR+I+G) was chosen based on the Akaike Information Criterion (AIC) approach in Modeltest v. 3.7 (POSADA & CRANDALL 1998).

Results

The comparison of 14 morphometric and seven meristic characters of specimens (Fig. 2) from the Persian and Oman Gulfs with those of previous reports (ABRAHAM et al. 2011, CHAKRABARTY et al. 2008) revealed concordant results (Table 1). The COI sequences of three haplotypes from our specimens (668 bp) revealed 0.1 % mean distance in comparison with haplotypes of *S. ruconius* from India and Sri Lanka, while the intra-specific distance appeared in the range of 7.3–16.3 % and within-species genetic distance ranged from 0.19 to 1.9 %. In the phylogenetic tree, the haplotypes sequenced in this study grouped with the COI haplotypes of *S. ruconius* from previous studies from coasts of India and Sri Lanka (Fig. 3). All morphological and genetic evidences confirmed the identity as the deep pugnose ponyfish *S. ruconius*.



Fig. 2. Specimen of *Secutor ruconius* from the Chabahar Bay (TAC1181F, SL:47.7).

Discussion

We provide the first confirmed report of *S. ruconius* from the Persian Gulf and the Gulf of Oman. Another congeneric species, *S. insidiator*, has already been reported from this area (ASSADI & DEGHANI 1997). *Secutor ruconius* is easily distinguished from *S. insidiator* by the greater body depth (BD/SL: more than 50% in *S. ruconius* vs less than 40% in *S. insidiator*), existence of about ten black and grey vertical bands on the back (vs. 14 to 17 thin columns of spots in *S. insidiator*) and longer ventral fin in *S. insidiator*, which reaches halfway to the anal fin base (ABRAHAM et al. 2011). When morphological characters of *S. ruconius* are compared with other congeners, we noticed that *S. hanedai*, *S. mazavaaoka*, *S. megalolepis* and *S. interruptus* have thoracic scales;

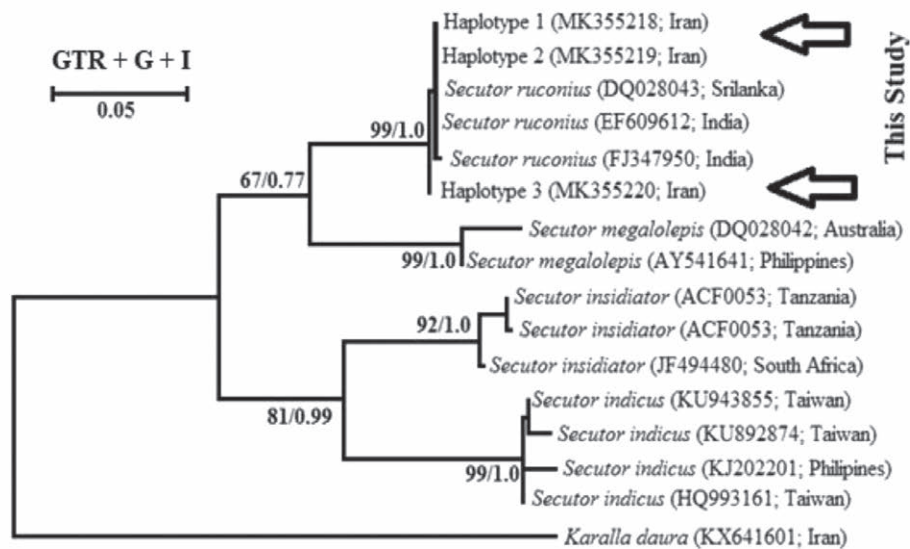


Fig. 3. Bayesian and maximum likelihood estimates of phylogenetic relationships of *Secutor ruconius* with its congeneric taxa using COI sequences (668 bp). Nodes are labelled with bootstrap support/posterior probability.

Table 1. Morphometric and meristic characters of the deep pugnose ponyfish from the Persian Gulf and the Gulf of Oman in comparison with published data.

Morphological Characters	Sampling area		
	Persian Gulf This study	Oman Sea JAWAD et al. (2012)	Sri Lanka CHAKRABARTY et al. (2008)
	This study (n=20)	This study (n=2)	(n=3)
Morphometric characters			
Standard length (SL, mm)	38-49.6(43.32)	47.5-47.7 (47.6)	47.2 – 61
Percentage of SL			
Body depth	55-60 (57)	53.6-55.2 (54.4)	57.0-59.7 (58.6)
Head length (HL)	26-30 (27)	27.2-28.6 (27.9)	26.5-30.5 (27.9)
Predorsal fin length	39-51 (41)	40.3-44.3 (42.3)	38.1-44.6 (41.5)
Prepelvic length	45-57 (48)	50.7-50.8 (50.7)	48.3-53.7 (50.7)
Pelvic-fin length	5-9 (7)	7.9-8.3 (8.1)	5.4-7.4 (6.5)
Pectoral fin length	17-27 (21)	19.7-20.1 (19.9)	19.7-21.2 (20.5)
Preanal fin length	56-68 (58)	58.9-62.4 (60.7)	60.7-63.7(62.2)
Head width (max.)	11.7-13(12.9)	11.1-11.5 (11.3)	12.5-14.0 (13.2)
Caudal peduncle width	2-3 (2)	2.8-3 (2.9)	2.6-4.2 (3.5)
Caudal peduncle depth	5-6 (5)	5.4-5.5 (5.4)	5.1-6.8 (6.1)
Percentage of HL			
Lower jaw length	55-65 (60)	52.7-57.1 (54.9)	62.3-69.9 (67.0)
Interorbital width %	31-40 (37)	35.9-36.4 (36.2)	43.2-45.2 (44.1)
Orbit diameter	37-45 (41)	33.4-40.1 (36.7)	35.2-43.8 (39.1)
Snout length	25-32 (30)	26.5-28.3 (27.4)	24.3 – 30.9 (28.2)
Meristic characters			India ABRAHAM et al. (2011)
Dorsal fin spines	8	8	8
Dorsal fin rays	16-17	15-16	16
Pectoral fin rays	17	17	17-18
Pelvic fin spines	1	1	1
Pelvic fin rays	5	5	5
Anal fin spines	3	3	3
Anal fin rays	14	14	14-15

S. indicus, similarly to *S. insidiator*, has smaller body depth (BD/SL 40.5-48.3%) and *S. interruptus* has 52-60 scales on the lateral line. None of these characters correspond with those of *S. ruconius* (CHAKRABARTY et al. 2008, BALDWIN & SPARKS 2011, MIKI et al. 2017, present study). The genetic distance obtained from the COI sequences as well as the constructed phylogenetic tree confirmed our identification.

Regardless of the comprehensive sampling from many stations along the Northern Persian Gulf and the Gulf of Oman for four years, we captured the present specimens from just two localities. Therefore, it is hard to consider this species as well-established in the area.

For marine fish species, temperature is a primary climate stressor that affects their distribution (BARROS et al. 2014). Climate changes are considered to have a large impact on marine biodiversity in the Persian Gulf (WABNITZ et al. 2018). Moreover, a long-term increasing trend in the temperature of the Gulf of Oman has been well documented (JAWAD et al. 2011, PIONTKOVSKI & CHIFFINGS 2014). Warmer water masses could cause an expansion in the distributing range of *S. ruconius* from its native distribution range in the south of the Arab Sea northwards along the northern coast of the Persian Gulf and the Gulf of Oman. The reason for finding our specimens at just two localities may be related to their calm and sheltered habitat in the Chabahar Bay or Northern Qeshm Island waters, which are far from massive currents and adjacent to mangrove forest. Hence, the present study adds a new fish species to the fish fauna of the Persian Gulf and the Gulf of Oman.

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