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ORIGINAL ARTICLE

DNA barcoding confirms the presence of a cryptic fish species, the floral blenny *Petroscirtes mitratus* (Teleostei: Blenniidae: Blenniinae) at Qeshm Island, Persian Gulf

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Abstract
The floral blenny, *Petroscirtes mitratus*, is a widely distributed comb-tooth blenny in the Indo-West Pacific, previously reported from the southern Persian Gulf and the Oman Sea. However, its presence in the northern Persian Gulf had remained undocumented. This study provides the first confirmed record of this species from the northern Persian Gulf, based on a specimen collected from the intertidal zone of Qeshm Island, Iran. The identification was confirmed through an integrative taxonomic approach. Detailed morphological and meristic examinations aligned with the diagnostic characteristics of the species, including the distinctive notched dorsal fin and a dark spot on the pelvic fin. DNA barcoding of the mitochondrial COI gene provided molecular validation, with the obtained sequence forming a clade (bootstrap >80%) with other conspecific sequences from across its range. The genetic analysis also revealed clear differentiation from other *Petroscirtes* species. The study underscores the utility of combining morphological and molecular tools for accurate species identification in crypto-benthic fishes and has important implications for regional biodiversity assessments and conservation planning.

Keywords: COI, Biodiversity, Blenniiformes, Conservation, Iran

INTRODUCTION

The order Blenniiformes encompasses about 1,960 species distributed across 13 families. The second-largest family in this order is Blenniidae Rafinesque, 1810, commonly known as combtooth blennies. This family comprises two subfamilies (Blenniinae and Salariinae), 59 genera, and 413 valid species (Fricke et al. 2026). Blenniids are small, benthic teleost fishes found in coastal and rocky reef habitats worldwide. They primarily inhabit shallow tropical and warm temperate marine waters, with a few species occurring in fresh or brackish environments (Lin & Hastings 2013; Tiralongo et al. 2016; Mehraban & Esmaeili 2018; Vecchioni et al. 2019). The family is defined by several morphological synapomorphies, including the presence of incisiviform teeth arranged in a single comb-like row on the dentary and premaxillary bones (Springer 1993; Patzner 2009). Although blenniids are morphologically distinct from other blenniiform families, their classification has a complex history and remains partially unresolved due to inconsistencies between morphological and molecular data (Lin & Hastings 2013). Currently, Blenniinae comprise 34 genera (including *Petroscirtes*) and at least 115 species in the Western Indian Ocean (Williams & Springer 2022).

Despite their well-defined familial traits, species-level identification within Blenniidae remains fraught with challenges. The group exhibits considerable morphological uniformity, and many genera need taxonomic revision. This often leads to inconsistency between morphological and molecular data and suggests the potential for cryptic speciation, where morphologically similar entities are in fact distinct species (Lin & Hastings 2013). These challenges underscore the necessity of integrating molecular tools, such as DNA barcoding, with traditional morphology for robust species identification and

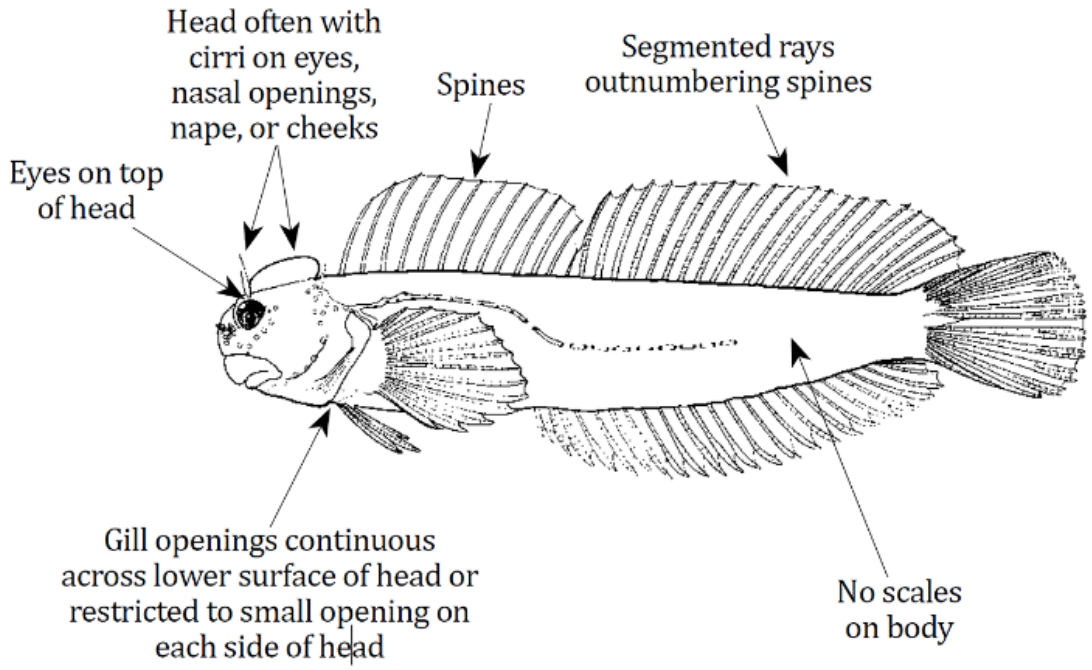

Fig.1. General morphology of a combtooth blenny, Psomadakis et al. (2015).

boundary delineation.

The genus *Petroscirtes* Rüppell, 1830, a member of the subfamily Blenniinae, is a notable example. Members of this genus are characterized by having the following morphological characters: Dorsal-fin spines may be sexually dimorphic: males sometimes with one or more anterior spines longer than those in females. Cirri presents on head (absent only in *P. marginatus* Smith-Vaniz 1976 from western Pacific); no fleshy blade-like crest on head. Gill opening restricted to area above uppermost pectoral-fin ray. Lateral line in the form of a series of bipored tubes, extending dorsoanteriorly and then laterally on body. Dorsal and anal fins attached by membrane to body at caudal-fin base. Dorsal-fin spines 10–12, dorsal-fin rays 14–21, fin not notched between spines and rays; anal-fin spines 2, anal-fin rays 14–21; pectoral-fin rays 13–16 (usually 13 or 14); pelvic-fin spine 1 (embedded, visible only in skeletal preparations), pelvic-fin rays 3; caudal-fin rays 11, all unbranched. Number of teeth generally increasing with SL (tooth counts exclude canines at rear): premaxillary teeth 20–45, plus canines at rear; dentary teeth 20–48, plus canines at rear (but not grooved and without venom gland at base). Infraorbital bones 4 (Williams & Springer 2022). They inhabit coastal lagoons, seagrass beds, and flotsam such as Sargassum seaweed, and attain a maximum size ~15 cm TL.

Based on Fricke et al. (2026), 11 species have been considered as valid: *Petroscirtes ancylodon* Rüppell, 1835; *Petroscirtes breviceps* (Valenciennes, 1836); *Petroscirtes fallax* Smith-Vaniz, 1976; *Petroscirtes lupus* (De Vis, 1885); *Petroscirtes marginatus* Smith-Vaniz, 1976; *Petroscirtes mitratus* Rüppell, 1830; *Petroscirtes pylei* Smith-Vaniz 2005; *Petroscirtes springeri* Smith-Vaniz, 1976; *Petroscirtes thepassii* Bleeker, 1853; *Petroscirtes variabilis* Cantor, 1849; *Petroscirtes xestus* Jordan & Seale, 1906. Five species are found in the Western Indian Ocean (Williams & Springer 2022). They have been recorded from Western Indian Ocean: *P. ancylodon*; *P. breviceps*; *P. mitratus*; *P. variabilis* and *P. xestus* (Williams & Springer 2022).

Till date two species of *Petroscirtes* have been reported from the Persian Gulf (Eagderi et al. 2019) and one species from the Oman Sea (Eagderi et al. 2026), of which *Petroscirtes mitratus* Rüppell, 1830 (Fig. 1) has been reported from the southern Persian Gulf including Saudi Arabia, Bahrain, Qatar and UAE by Carpenter et al. (1997) and Randall (1995) and

also from northern (Estekani et al. 2019) and southern Oman Sea (Randall 1995) but despite extensive species inventories in the region it has not been collected and documented from the northern Persian Gulf (Ghanbarifardi & Malek, 2007; Mehraban & Esmaeili 2018; Estekani et al. 2019; Sharifiniya et al. 2022; Sharifiniya et al. 2024; Pourhosseini et al. 2024). Herein, we i) document the first record of floral blenny *Petroscirtes mitratus* for northern Persian Gulf, based on a specimen collected from the Qeshm Island, ii) provide its detailed morphological description, iii) reconstruct its phylogenetic placement within the closely related blennies based on mitochondrial COI (cytochrome c oxidase subunit 1). Therefore, this will constitute a first confirmed record for a species presence in the northern Persian Gulf.

MATERIAL AND METHODS

Study area and specimen collection: During a fish survey in June 2025 while searching the intertidal area of Qeshm Island (near Ramchah village), Persian Gulf (26°53'38.4"N, 56°09'37.2"E) at low tide (Fig. 2), one specimen of the floral blenny was collected using a hand net. After taking live photographs (Fig. 3) the specimen was anesthetized using a 1% clove oil solution, fixed in 96% ethanol for molecular analysis, and was deposited in the Zoological Museum, Collection of Biology Department, Shiraz University (ZM-CBSU).

Morphological analysis: The specimen was identified based on its morphological characters, following Williams and Springer (2022). The family, genus and species classification follows Catalogue of Fishes (Fricke et al. 2026).

Molecular study

Tissue sampling: Right pectoral fin clip of one available specimen was carefully excised and preserved in 96% ethanol for molecular analysis. The corresponding voucher specimen was deposited in the Zoological Museum of Shiraz University (ZMSU), Iran, for future reference.

DNA extraction and PCR: Total genomic DNA was extracted using the Salt method (Bruford et al. 1992). The standard vertebrate DNA barcode region of the COI (cytochrome c oxidase subunit 1) was amplified using primer pairs named FishBCLF1 (5´ - TCA ACY AAT CAY AAA GAT ATY GGC AC - 3´) and FishBCHR1 (5´- ACT TCY GGG TGR CCR AAR AAT CA - 3´) (Baldwin et al. 2009). Amplification was performed on a Bioer XP Thermal Cycler (Bioer Technology Co. Ltd., Hangzhou, China), programmed as follows: 95 °C for five mins for initial denaturing, 35 cycles of 94°C for one min, 55°C for 45 sec, and 72°C for one min, followed by 72°C for 10 mins as the final extension. Purification and sequencing of the PCR products were conducted at Niagene Laboratory (Tehran, Iran) with mentioned primer pairs.

Molecular data analysis: The molecular data includes one new sequence of mtDNA COI of *Petroscirtes mitratus* from this study and 30 additional sequences retrieved from NCBI GenBank. As an appropriate outgroup to root the constructed phylogenetic hypothesis, we included the distantly related *Salaria fluviatilis* (accession number: HQ600778.1) as outgroup. Data processing and sequence assembly were done in BioEdit 7.2.5 (Hall 1999). MEGA11 (Tamura et al. 2021) was used to produce a DNA sequence alignment using the Clustal W algorithm. No indications of unexpected stop-codons or nuclear copies of mitochondrial fragments occurred in any sequence. New sequence is deposited in NCBI GenBank (www.ncbi.nlm.nih.gov) with its respective accession number (PZ059398). To construct the phylogenetic relationships of the groups, IQ-TREE v2.1.3 (Nguyen et al. 2015) was used to generate maximum likelihood phylogenetic trees. In this case, the optimal substitution model and the best partitioning scheme based on the codon information were investigated using ModelFinder (Kalyaanamoorthy et al. 2017) with the Bayesian information criterion (BIC). The K3Pu+F+G4 model was chosen as the best model for phylogenetic analysis. Branch support was assessed using ultrafast bootstrapping (UFBS) with approximation of 10000 replicates (Hoang et al. 2018). Finally, inferred phylogenies were visualized in FigTree 1.4.4 (Rambaut 2014) and Adobe Acrobat pro DC v. 2022.

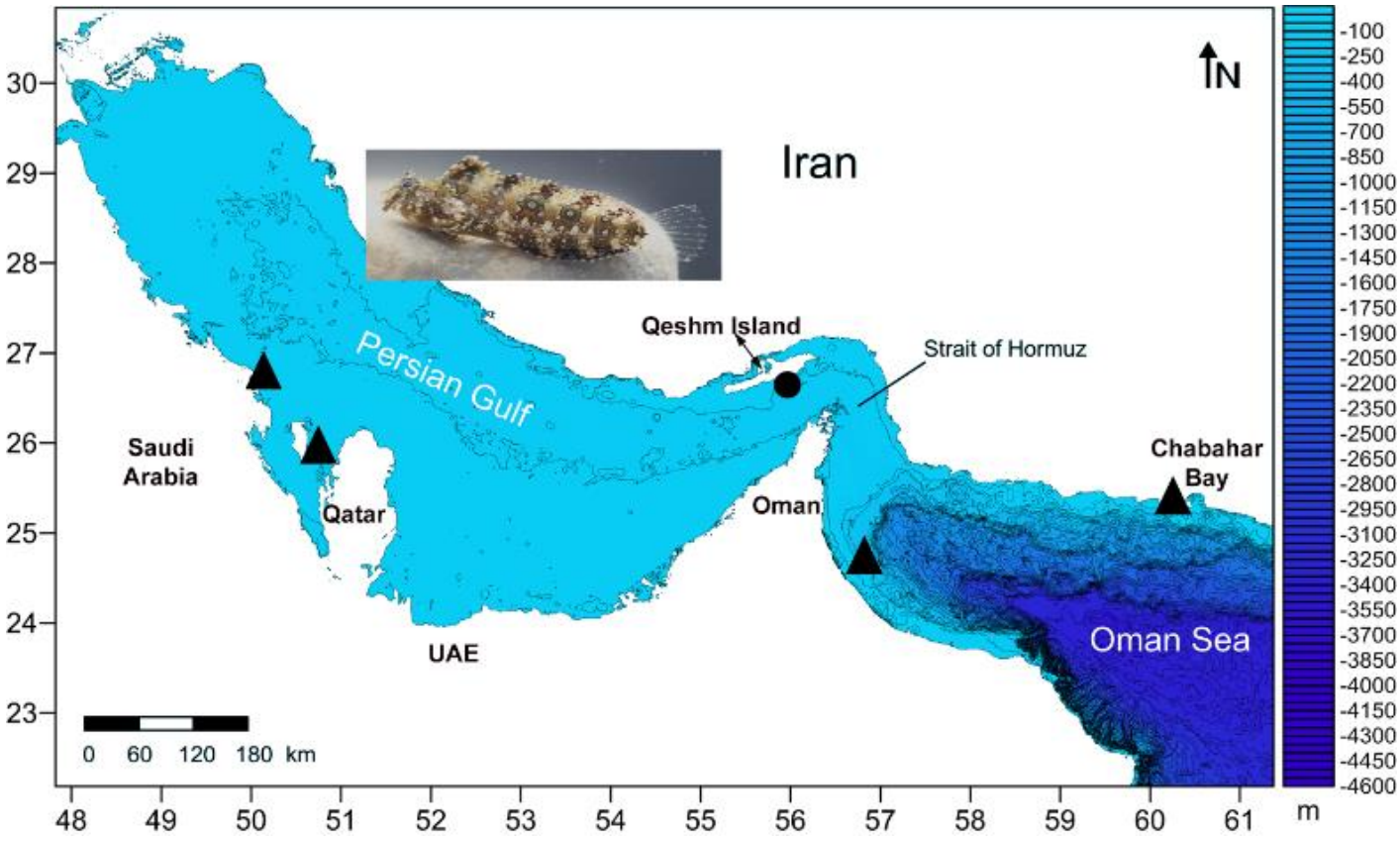

Fig.2. Map of the Persian Gulf and Oman Sea showing collection sites of *Petroscirtes mitratus*: present record (black circle) and previous records (black triangle).

Fig.3. Live specimen of *Petroscirtes mitratus* (ZM-CBSU M4044, 28.2 mm SL) collected from Qeshm Island, northern Persian Gulf.

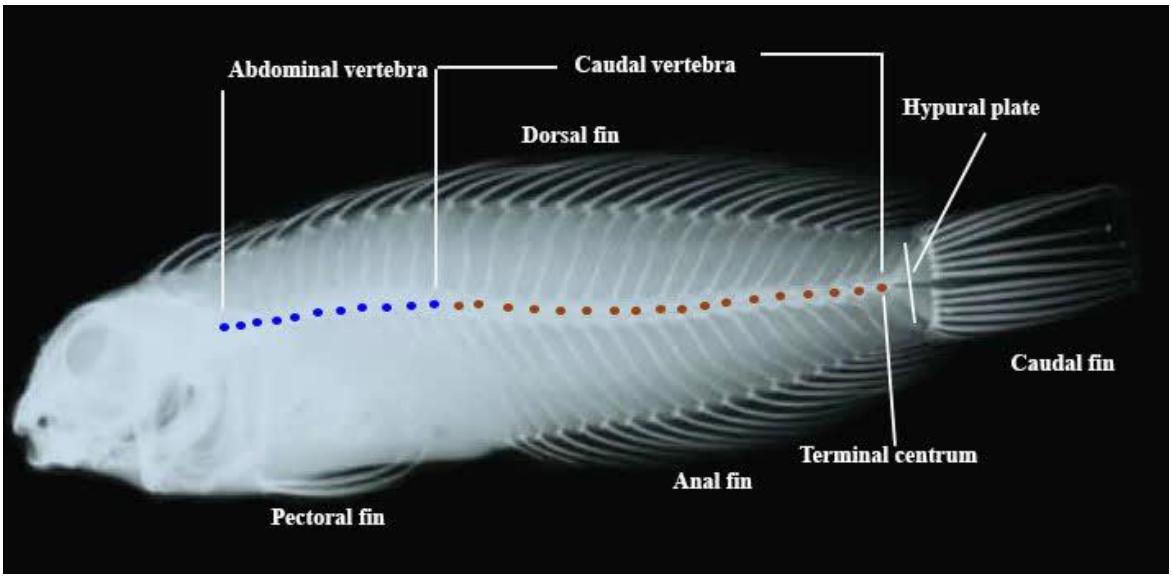

Fig.4. X-ray radiograph of *Petroscirtes mitratus* (fishbase.ir).

RESULTS

Taxonomy:

***Petroscirtes mitratus* Rüppell, 1830** (Figs. 3-5)

Floral Blenny

Other names

Crested Sabretooth Blenny, Floral Fangblenny, Helmeted Blenny, Highfin Fangblenny, Highfinned Blenny, High-finned Blenny, Miter Blenny (Bray 2022).

The specific name is from the Latin *mitratus* (= to wear a mitre - ceremonial head dress of a bishop), in reference to the large orbital cirri of this species.

Material examined: *Petroscirtes mitratus* ZM-CBSU M4044, 1 specimen, 35.4 mm TL, 28.2 mm SL, head length (HL) 8.3; head depth (HD) 6.1mm: predorsal length 6.8mm; length of dorsal-fin base (LD) 20.2mm; Iran: Qeshm Island, Persian Gulf, Hormuzgan province, 26°53'38.4"N 56°09'37.2"E, June 2025, Esmaeili, H.R., Sholeh, V., Aghajani, F., Pourhosseini, M., Kargar, M., Farmani, M., SMF 1858 (type: Senckenberg Forschungsinstitut und Naturmuseum), Jubal Island, Egypt, Red Sea.

Morphology: Dorsal-fin spines 10–12 (1st spine elongate, subequal to the 2nd spine, and distinctly longer than 4th spine, giving fin a notched appearance), dorsal-fin rays 14–16 (dorsal-fin spines and rays 10 and 15 respectively in ZM-CBSU M4044); anal-fin spines 2, anal-fin rays14–16 (anal-fin spines and rays 2 and 14 respectively in ZM-CBSU M4044; pectoral-fins rays 13–16; caudal-fin rays 15 in ZM-CBSU M4044. Adults with a pair of flap-like cirri on chin, other cirri on posterior nostril, upper part of eye, posterior interorbital (next to eye), on nape (near dorsal-fin origin), and post temporal (at anterior end of lateral line). Premaxillary teeth 20–33; dentary teeth 20–36. Symphysial dentary cirrus simple and broad. Supratemporal pores 3–5 (usually 5). Posterior nostril with well-developed flap on front rim. Head, body and median fins mottled brownish with white speckles; ~5 or 6 dark bands or blotches on sides, the centre of each usually with whitish and dark-bordered ocelli; pelvic fins with dark spot near base of outer rays. Attains ~85 mm TL (Randall 1995; Williams & Springer 2022).

Osteology: The radiograph reveals a fully ossified skeleton typical of teleost fishes in the family Blenniidae, characterized by an elongate, laterally compressed body plan and adaptations for benthic, cryptobenthic life (Fig. 4).

The vertebral column is composed of two distinct regions including i) abdominal vertebrae: Anterior vertebrae bearing pleural ribs. The first few abdominal vertebrae appear robust, with well-developed neural spines projecting dorsally, and ii) caudal vertebrae: Posterior to the abdominal cavity, these vertebrae lack pleural ribs and are associated with the haemal arches

Fig.5. SMF 1858 (type: Senckenberg Forschungsinstitut und Naturmuseum), Jubal Island, Egypt, Red Sea. Upper (lateral), middle (dorsal) and lower (ventral) views. Photos by J. Steppler (Natural History Museum, Frankfurt).

and spines that form the ventral structural support for the caudal peduncle. The transition between abdominal and caudal vertebrae is marked by the anterior placement of the anal fin pterygiophores. The posterior-most element of the vertebral column is the terminal centrum (urostyle), which is fused with the hypural plate to form the structural base for the caudal fin rays. Caudal skeleton is composed of two parts including i) hypural plate: A prominent, fan-shaped, compound bony plate is visible at the caudal end, formed by the fusion of hypural bones. This plate provides the primary support for the principal caudal fin rays. Its morphology is characteristic of percomorph fishes, offering a large, rigid attachment surface, and ii) caudal fin rays: Numerous segmented and branched lepidotrichia (soft fin rays) articulate with the hypural plate and the parhypural. The fin appears homocercal, with dorsal and ventral lobes of

Fig.6. Natural habitat of *Petroscirtes mitratus*, Qeshm Island, northern Persian Gulf.

approximately equal size.

Distribution: Red Sea; Indo-West Pacific: South Africa, East Africa, southern Persian Gulf, Seychelles, Comoros, Madagascar and Mascarenes (La Réunion, Mauritius, Rodrigues) east to Samoa and Tonga, north to Kagoshima Prefecture (southern Japan), south to Rottnest Island (Western Australia), One Tree Island (Queensland, Australia), and New Caledonia (Frick et al. 2026). Here we report it for the first time from the intertidal region of Qeshm Island, northern Persian Gulf.

Habitat: It is found in estuaries and on coastal reefs, to ~10 m deep, and on lagoon reefs to ~15 m deep; often shelters and nests inside abandoned worm tubes or discarded bottles (see Randall 1995; Williams & Springer 2022). The intertidal habitat at Qeshm Island, Persian Gulf (Fig. 6) consists of a rocky shore platform exposed during low tide, characterized by crevice-rich limestone and coral-derived substrates interspersed with shallow tidal pools, boulders, and narrow channels. This structurally complex environment provides essential microhabitats for blenniid fishes, particularly *Petroscirtes mitratus*, which exhibits strong site fidelity and shelter-oriented behavior.

The abundance of rock crevices, fissures, and persistent water-filled depressions offers refugia that mitigate desiccation, thermal stress, and predation during tidal emersion, consistent with the well-documented cryptobenthic and shelter-dependent ecology of *Petroscirtes* species. Individuals typically occupy and defend small shelters, emerging briefly for feeding and social interactions before retreating to protective cavities. Rock surfaces partially covered by epilithic algae and encrusting organisms support benthic food resources and facilitate foraging within close proximity to shelters. In addition, the open yet structurally heterogeneous nature of the intertidal platform may enhance the effectiveness of aggressive mimicry, a key behavioral trait of *Petroscirtes mitratus*, which resembles non-threatening or cleaner fishes to reduce predation risk and gain access to potential prey. The moderate hydrodynamic conditions and high visibility typical of this habitat are conducive to such visual-based mimicry strategies. Overall, the intertidal rocky ecosystem of Qeshm Island represents a behaviorally suitable habitat for *Petroscirtes mitratus*, supporting its shelter-based lifestyle, site attachment, and adaptive behavioral strategies in a physically demanding environment

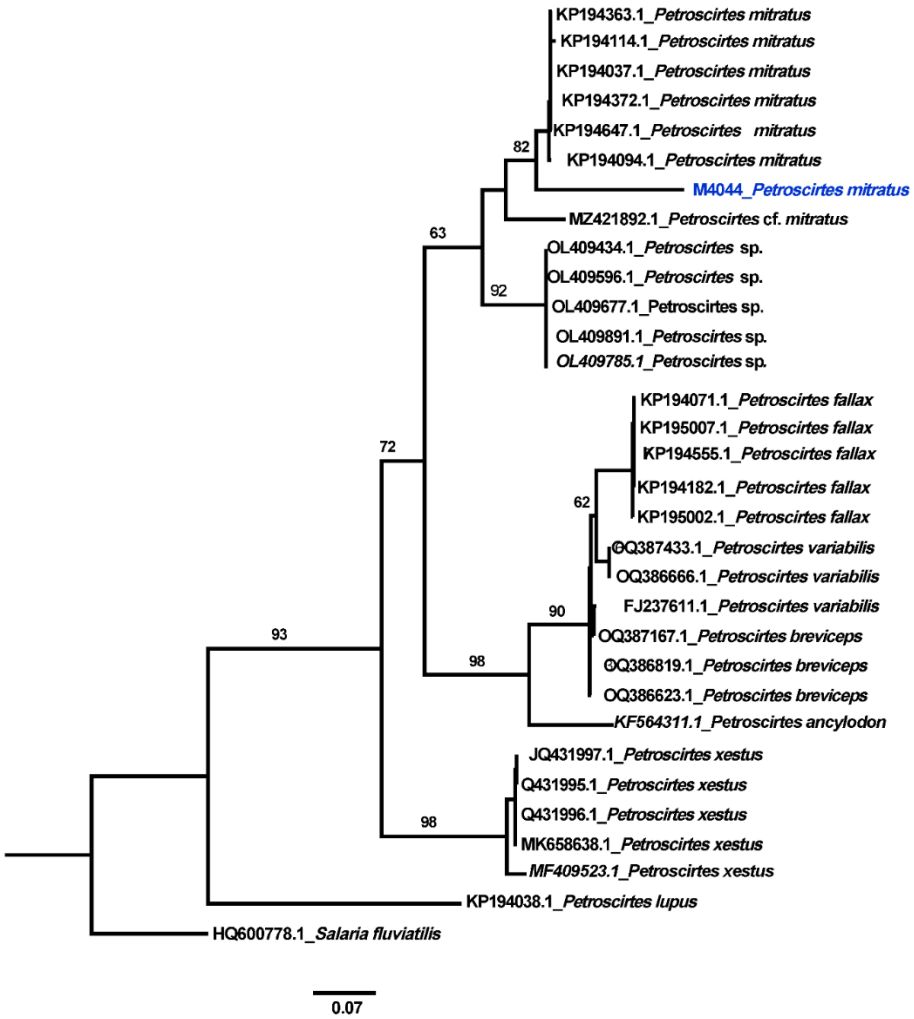

Fig.7. Maximum Likelihood (ML) molecular systematics of *Petroscirtes* COI sequences, highlighting the position of *Petroscirtes mitratus* (M044 in blue) and outgroup *Salaria fluviatilis* (HQ600778.1) at base.

marked by strong tidal influence and environmental variability.

Key to species of WIO (Modified from Smith-Vaniz 1976; Williams & Springer 2022)

1a) First dorsal-fin spine distinctly longer than 4th spine, giving fin notched appearance, and 1st spine usually longer than 2nd (sometimes subequal); dark spot near base of outermost pelvic-fin ray ……*P. mitratus*

1b) First spine of dorsal fin subequal to or shorter than 4th spine, and 1st spine shorter than 2nd; no dark spot near base of outermost pelvic-fin ray…….……2

2a) Lower jaw symphysis with multifid cirrus; cirri present on 3–6 preopercular pores on each side ……*P. xestus*

2b) Lower jaw symphysis with simple cirrus or no cirrus; preopercular pores without cirri ..……...……...3

3a) Adults pale with ≥2 dark stripes (sometimes broken into series of large dark spots midlaterally); typically 3 supratemporal pores.…...……*P. breviceps*

3b) No dark stripes on body; 3–5 supratemporal pores ……..……...……..…....4

4a) Posterior nostril with simple short flap on front rim; dorsal- and anal-fin rays with narrow bars or small dark spots, frequently forming diagonal rows posteriorl……...*P. variabilis*

4b) Posterior nostril a simple opening (without flap on front rim); dorsal- and anal-fin rays with large dark blotches; anal fin 17–20 (rarely 17) rays……..……..……..*P. ancylodon*

Molecular results: The maximum-likelihood phylogenetic tree (Fig. 7) shows that *Petroscirtes mitratus* M4044 (blue) from Qeshm Island forms a strongly supported clade with other *P. mitratus* sequences, with high ultrafast bootstrap (UFBoot) values exceeding 90%, indicating high confidence in this relationship. Internal nodes within the *P. mitratus* clade exhibit high support (>80%), reflecting *Petroscirtes lupus* (KP194363.1) nested in the *Petroscirtes mitratus* clade is probably a mis identification and thus was considered as *P. mitratus* here.

Distinct species-level lineages were recovered for other members of the genus, including *P. variabilis*, *P. fallax*, *P. breviceps*, and *P. xestus*, most of which are supported by moderate to high bootstrap values (62-98%). Deeper nodes separating major species groups also show acceptable support, suggesting stable phylogenetic structuring within *Petroscirtes*. *Salaria fluviatilis*, positioned at the base of the tree, was used as an outgroup and exhibits clear genetic separation from the ingroup taxa, confirming its suitability for rooting the phylogeny. Branch length patterns indicate greater divergence among species than within *P. mitratus*. Table 1 shows the average estimates of evolutionary divergence (K2P) based on the COI barcode region among the studied *Petroscirtes* species with lowest differentiation between *P. variabilis* and *P. breviceps* (2% K2P) and largest differentiation between *P. lupus* and *Petroscirtes* sp. (26% K2P). The intraspecific genetic distance also showed that the lowest distance was 0, found in *P. breviceps*; *P. fallax* and *Petroscirtes* sp., while the highest was 5, found in *P. mitratus*.

DISCUSSION

The present study documents the first confirmed record of the floral blenny, *Petroscirtes mitratus* from Qeshm Island in the northern Persian Gulf, based on an integrative approach combining detailed morphology, osteology, and DNA barcoding representing a noteworthy extension of the known geographic distribution of the species. This record fills an important biogeographic gap between previously documented populations in the western Indian Ocean and adjacent regions and contributes to a more complete understanding of the ichthyofaunal composition of the Persian Gulf, a semi-enclosed and environmentally extreme marine system that remains comparatively under-sampled for cryptobenthic reef-associated fishes.

The specimen from Qeshm Island exhibits the definitive morphological characters of the species, including the diagnostic notched dorsal fin (with the first spine elongate and sub-equal to or longer than the second), the presence of a dark spot near the base of the outer pelvic-fin rays, and the characteristic suite of cephalic cirri (Smith-Vaniz 1976; Williams & Springer 2022). These features clearly separate it from other Western Indian Ocean *Petroscirtes* species, as illustrated in the provided key. The osteological examination further confirms its placement within Blenniidae, revealing the elongate, compressed body plan and caudal skeleton structure typical of benthic, percomorph fishes adapted to cryptobenthic life.

The taxonomic validity of this record is also supported by mitochondrial COI sequence data. Molecular analysis including DNA barcoding offers conclusive evidence for species identity (e.g., Muhala et al. 2024; Oladipo et al. 2025; Qiao et al. 2026). The generated COI sequence from the Qeshm specimen clusters with strong statistical support (ultrafast bootstrap >80%) within a monophyletic *P. mitratus* clade, which includes sequences from across its known Indo-Pacific range. The observed low intraspecific divergence within the *P. mitratus* clade contrasts with the significant genetic distances (between 13 to 25% K2P) separating it from congeners. This pattern reinforces *P. mitratus* as a distinct evolutionary lineage. The phylogenetic tree also suggests potential taxonomic issues, such as the sequence labeled *P. lupus* (KP194363.1) nesting within the *P. mitratus* clade, which likely represents a case of misidentification in public NCBI databases. The concordance between morphological traits and molecular placement provides robust evidence for the presence of *P. mitratus* in the northern Persian Gulf and minimizes the risk of misidentification, which has

historically complicated the taxonomy of blenniid fishes.

From a biogeographic perspective, the occurrence of *P. mitratus* at Qeshm Island suggests a broader distributional range than previously recognized and indicates potential connectivity between Persian Gulf populations and those of the broader Indian Ocean. This finding may reflect larval dispersal facilitated by regional circulation patterns or previously overlooked resident populations due to limited sampling effort. Given the ecological specialization and cryptic behavior of many blenniids, such species are easily under-recorded, and their true distributions may be underestimated.

Finally, this first record has important implications for regional biodiversity assessments and conservation planning. The Persian Gulf is subject to intense anthropogenic pressures, including coastal development, pollution, and climate-driven environmental extremes. Accurate documentation of species diversity, supported by integrative taxonomic approaches, is therefore essential for establishing reliable baselines for future ecological and evolutionary studies. The present record of *P. mitratus* from Qeshm Island highlights the value of combining morphological and molecular data in uncovering hidden components of marine biodiversity in the northern Persian Gulf and contributes to a more refined understanding of blenniid diversity in the region.

In conclusion, by integrating traditional taxonomy with molecular genetics, this study not only confirms a significant range extension for *Petroscirtes mitratus* but also contributes a verified DNA barcode reference for future biodiversity and phylogeographic studies in the region. It highlights the continued importance of targeted sampling and integrative methods in uncovering the true diversity and distribution of crypto-benthic fishes.

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مقاله کامل

تأیید حضور بلنی گلدار (*Petroscirtes mitratus*) (ماهیان استخوانی عالی: بلنی‌های دندان شانه‌ای) در جزیره قشم، خلیج فارس با استفاده از بارکدینگ DNA

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چکیده: بلنی گلدار یا بلنی دندان شمشیری تاج‌دار (*Petroscirtes mitratus*) گونه‌ای از بلنی‌های دندان شانه‌ای است که پراکنش وسیعی در غرب اقیانوس هند دارد. پیش از این، حضور این گونه از جنوب خلیج فارس و دریای عمان گزارش شده بود، اما تاکنون گزارشی مستند از حضور آن در شمال خلیج فارس ارائه نشده بود. مطالعه حاضر، نخستین گزارش مستند حضور این گونه را در شمال خلیج فارس براساس نمونه‌ای از منطقه جزر و مدی جزیره قشم (ایران) ارائه می‌دهد. شناسایی این گونه با استفاده از رویکرد یکپارچه آرایه‌شناسی (تلفیقی از روش‌های ریخت‌شناسی و مولکولی) تأیید شد. بررسی‌های دقیق ریخت‌سنجی و شمارشی، مطابقت کامل با ویژگی‌های تشخیصی گونه از جمله وجود بریدگی مشخص در باله پشتی و لکه تیره روی باله لگنی را نشان داد. شناسایی مولکولی از طریق تعیین توالی ژن میتوکندریایی سیتوکروم اکسیداز ۱ انجام شد. توالی‌های به‌دست‌آمده با سایر توالی‌های متعلق به همین گونه از نقاط مختلف جهان در یک کلاد (با بوت‌استرپ بالای ۸۰ درصد) قرار گرفت. آنالیزهای ژنتیکی همچنین تمایز واضح این گونه را از سایر گونه‌های جنس *Petroscirtes* تأیید نمود. این مطالعه، اهمیت به‌کارگیری همزمان ابزارهای ریخت‌شناسی و مولکولی را در شناسایی دقیق ماهیان نهان‌زیِ کف‌زی یا کریپتوبنتیک (صخره‌ای-مرجانی) آشکار ساخته و پیامدهای مهمی برای ارزیابی تنوع زیستی منطقه و برنامه‌ریزی حفاظتی دارد.

کلمات‌کلیدی: سیتوکروم اکسیداز ۱، تنوع زیستی، بلنی‌سانان، حفاظت، ایران