

MARINE RECORD

Open Access



# First confirmed presence of the Red Sea goatfish *Parupeneus forsskali* (Fourmanoir & Guézé, 1976) from Cyprus

Niki Chartosia<sup>1,2\*</sup> and Nikolas Michailidis<sup>3</sup>

## Abstract

**Background:** Cyprus is affected by the invasion of non-indigenous ‘lessepsian’ species due to its proximity to the Suez Canal. Thus, recent ongoing studies in the marine area of Cyprus reveal new records of such Erythrean species.

**Results:** The first confirmed presence of the Red Sea goatfish *Parupeneus forsskali* in the coastal waters of Cyprus is reported. Description of the specimen, together with some distributional notes of the species in the Mediterranean are provided.

**Conclusions:** This record of *P. forsskali* from Cyprus, together with the previous occurrences in Israel, Lebanon and Turkey supports further the establishment of a population in the eastern Mediterranean.

**Keywords:** *Parupeneus forsskali*, Mullidae, Lessepsian migrants, Eastern Mediterranean, Cyprus

## Background

Cyprus, less than 400 nm from the Suez Canal (Fig. 1), is affected by the invasion of non-indigenous ‘lessepsian’ species. Michailidis (2010) estimated that ‘lessepsian’ fish constitute up to 10 % of the biomass of the local annual artisanal landings.

Until recently, only four species of goatfish have been identified in Cyprus: the indigenous *Mullus barbatus barbatus* Linnaeus, 1758 and *M. surmuletus* Linnaeus, 1758 and the lessepsians *Upeneus moluccensis* (Bleeker, 1855), recorded for the first time in 1961 by Demetropoulos and Neocleous (1969) and *U. pori* Ben-Tuvia and Golani, 1989, recorded for the first time in 2004 by Tzomos et al. (2007). Iglésias and Frotté (2015) reported the presence of *Parupeneus forsskali* (Fourmanoir & Guézé, 1976) in Cyprus, but the record was based on an assertion of a fish-monger who photographed a single individual with a smartphone, and the photograph was not recovered. Therefore, the identification of the species was based only on retained diagnostic characters.

Here we report the first confirmed presence of the mullid *P. forsskali* in Cyprus, expanding further its known distribution in the Eastern Mediterranean.

## Methods

On August 20, 2014, a specimen of the Red Sea goatfish, *P. forsskali* was caught on a 36 mm inner mesh size opening trammel net, by the artisanal boat “Granitis”, in the area of Cape Pyla, Cyprus (34.9398°N 33.8584°E) (Fig. 1). The net was set at a depth of 24 m, over mixed bottom (mainly rocky substrate and *Posidonia oceanica*). The total catch consisted mostly of parrotfishes, *Sparisoma cretense* (Linnaeus, 1758) and surmulletts, *M. surmuletus*. The specimen was hastily photographed using a low resolution camera and stored in a freezer for a ten-month period before being received by the authors. When examined, the specimen was in bad condition and significantly discoloured (Fig. 2), but still presented sufficient attributable characteristics so as to make the species identifiable and allow for important basic measurements. The morphometric measurements were taken using a digital caliper. The specimen was deposited in the Department of Biological Sciences (University of Cyprus) collections, in 90 % ethanol solution.

It is noteworthy to report that according to the fisherman who provided our specimen, another individual of

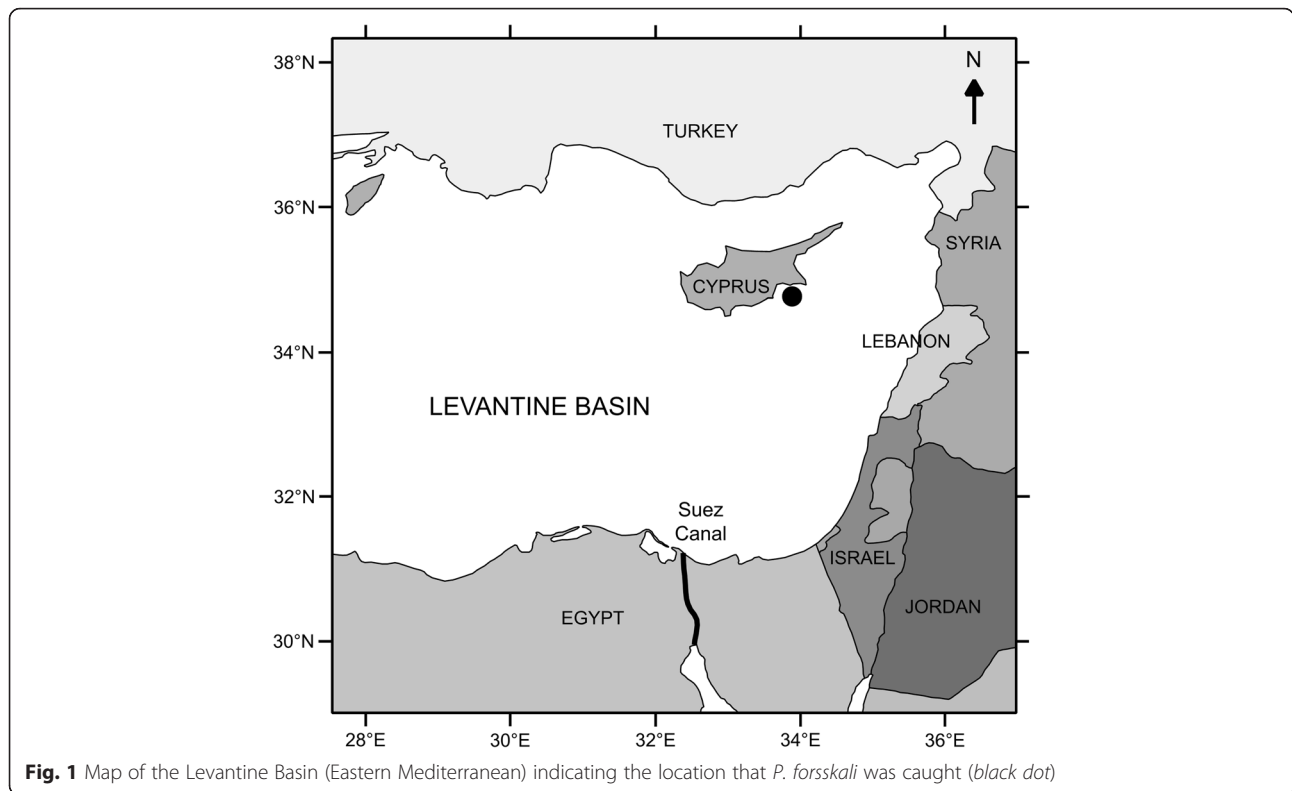
\* Correspondence: nchartos@ucy.ac.cy; nchartos@gmail.com

<sup>1</sup>Department of Biological Sciences, University of Cyprus, 1 Panepistimiou Str., 2109 Aglantzia, Nicosia, Cyprus

<sup>2</sup>Oceanography Centre, University of Cyprus, P.O. Box 20537, 1678 Nicosia, Cyprus

Full list of author information is available at the end of the article





the same species of a bigger size, was caught by him a month later (September 2014), at the same depth, area, bottom type and on the same gear. Unfortunately, the specimen was sold along with surmullets.

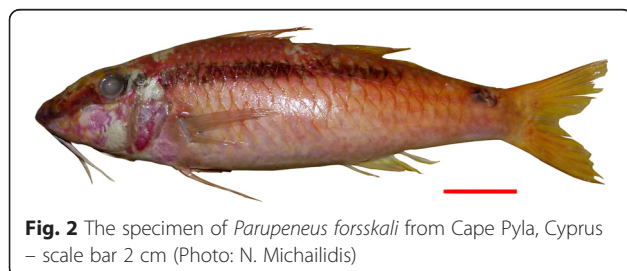
**Results**

The specimen did not differ from earlier descriptions (Al-Absy 1988; Ben-Tuvia and Kissil 1988; Khalaf and Disi 1997; Çınar et al. 2006; Sonin et al. 2013 and Bariche et al. 2013a). The total weight of the fish is 48 g (defrosted). Meristic counts are the following: two dorsal fins, the first with eight spines and the second with six rays (D1, VIII; D2, 6); anal fin with seven rays (A, 7); pectoral fin with 15 rays (P, 15) and ventral fin with one spine and five rays (V, I + 5); 28 lateral line scales (LL, 28); seven rakers on upper and 20 on lower gill limbs (GR, 7 + 20). All morphometric measurements are shown in Table 1. One row of teeth is present on each

jaw, with canine teeth only on the upper jaw. The specimen has the typical dark longitudinal stripe from the snout, through the eye, proceeding to below the end of the second dorsal fin base and a dark spot on the upper caudal peduncle (Fig. 2). Like other specimens collected from the Mediterranean (e.g., Sonin et al. 2013), the specimen from Cyprus has a pinkish rather than a white

**Table 1** Morphometric measurements of the specimen of *Parupeneus forsskali* from Cape Pyla, Cyprus

Measurement	mm	%
Total length (TL)	158	–
Fork length	144	91.1 TL
Standard length (SL)	126	79.7 TL
Preanal length	82	65.1 SL
Predorsal length	45	35.7 SL
Prepelvic length	41	32.5 SL
Prepectoral length	40	31.7 SL
Max. Body depth	33	26.2 SL
Caudal peduncle depth	13	10.3 SL
Head length (HL)	39	31.0 SL
Preorbital length	17	43.6 HL
Eye diameter	8	20.5 HL
Barbel length	28	71.8 HL
Interorbital width	12	30.8 HL



background (the same was also noticed from the photograph of the fresh specimen). The first dorsal, pectoral and ventral fins also have a pink colour while the second dorsal, anal and caudal fins are rather yellowish.

## Discussion

The record of *P. forsskali* from Cyprus supports further the establishment of a population in the eastern Mediterranean and expands its known distribution in the basin. The depth at which this specimen was collected (24 m) falls in the general depth distribution of the species (1–30 m) in the Red Sea and Gulf of Aden (Randall and Heemstra 2009). Furthermore, the presence of *P. forsskali* in Cyprus supports the view of Bariche et al. (2013a) that this species is probably overlooked in the Levantine Basin, due to its sporadic occurrences in Israel, Lebanon, Turkey and now similarly from Cyprus. In the Mediterranean, *P. forsskali* was first observed in Mersin, Turkey in 2000, while in 2004 an individual was photographed in the same area at a depth of 15 m (Çinar et al. 2006). Confirmed records of the species were only provided very recently by Bariche et al. (2013a) from Lebanon at a depth of 40 m and Sonin et al. (2013) from Israel at a depth of 45 m, thus expanding the depth distribution of the species in the Mediterranean.

Concerning Cyprus, there are only a few studies which record the presence of lessepsian migrants in the island. Among the most recent, Katsanevakis et al. (2009) documented 25 lessepsian fish species, excluding the questionable record of the chondrichthyan *Himantura uarnak*. Ioannou et al. (2010); Michailidis (2010); Bariche et al. (2013b) recorded *Scarus ghobban* Forsskål, 1775, *Torquigener flavimaculosus* Hardy & Randall, 1983 and *Pterois miles* (Bennett, 1828), respectively. A recent study concerning alien marine fish in Cyprus, conducted by Iglésias and Frotté (2015), reported 7 new lessepsian fish species. Finally, Crocetta et al. (2015) recorded *Cheilodipterus novemstriatus* (Rüppell, 1838), raising the number of lessepsian fish species in Cyprus to 36. Considering that the total number of lessepsian fish species recorded in the Mediterranean has been reported at 97 species (Fricke et al. 2015), the recorded number for Cyprus is low compared with neighbouring countries (e.g., Por 1978; Tzomos et al. 2007; Katsanevakis et al. 2009; Nunes et al. 2014). We believe that this is due to the lack of targeted sampling effort as well as Cyprus' position and hydrographic conditions prevailing in the area, mainly the predominant water circulation (Gerin et al. 2009; Bergamasco and Malanotte-Rizzoli 2010).

As is the case for most goatfishes, *P. forsskali* is a species economically exploited in its native region (Sabrah 2015; Bariche et al. 2013a). It remains to be seen whether this species will manage to reach high abundances and become a commercial species in the area as

in the case of the other two lessepsian mullids, *U. moluccensis* and *U. pori* which constitute a notable addition to the local fish market.

## Conclusions

The record of *P. forsskali* from Cyprus supports further the establishment of a population in the eastern Mediterranean and expands its known distribution in the basin. Furthermore, the confirmed presence of *P. forsskali* in Cyprus supports the view that this species is probably overlooked in the Levantine Basin, due to its sporadic occurrences in Israel, Lebanon, Turkey and now from Cyprus.

## Acknowledgments

The authors are grateful to the professional fisherman Mr. Floros Kallistionis for providing the specimen and the related information given in the manuscript. Moreover, we thank the two anonymous reviewers for their useful comments that helped us improve our manuscript.

## Funding

This research received no specific grant from any funding agency, commercial or not-for-profit sectors.

## Availability of data and material

The material described in the manuscript is freely available to any scientist wishing to use it, without breaching participant confidentiality. The sample is deposited in the Department of Biological Sciences (University of Cyprus) collections, in 90 % ethanol solution.

## Authors' contributions

The fisherman took the sample to NM who has identified it to species level. Both authors contributed to draft the manuscript and they read and approved the final manuscript.

## Competing interests

The authors declare that they have no competing interests.

## Author details

<sup>1</sup>Department of Biological Sciences, University of Cyprus, 1 Panepistimiou Str., 2109 Aglantzia, Nicosia, Cyprus. <sup>2</sup>Oceanography Centre, University of Cyprus, P.O. Box 20537, 1678 Nicosia, Cyprus. <sup>3</sup>Department of Fisheries and Marine Research, 101 Vitheleem Str., 1416 Strovolos, Nicosia, Cyprus.

Received: 24 May 2016 Accepted: 3 June 2016

Published online: 04 July 2016

## References

- Al-Absy AH. Review of the goatfishes (Pisces: Perciformes: Mullidae) in the Gulf of Aqaba, Red Sea. *Fauna of Saudi Arabia*. 1988;9:152–68.
- Bariche M, Bilecenoglu M, Azzurro E. Confirmed presence of the Red Sea goatfish *Parupeneus forsskali* (Fourmanoir & Guézé, 1976) in the Mediterranean Sea. *Biol Invasions Records*. 2013a;2(2):173–5.
- Bariche M, Torres M, Azzurro E. The presence of the invasive lionfish *Pterois miles* in the Mediterranean Sea. *Mediterr Mar Sci*. 2013b;14(2):292–4.
- Ben-Tuvia A, Kissil GW. Fishes of the Family Mullidae in the Red Sea, with a key to the species in the Red Sea and the Eastern Mediterranean. *Ichthyol Bull*. 1988;52:1–16.
- Bergamasco A, Malanotte-Rizzoli P. The circulation of the Mediterranean Sea: a historical review of experimental investigations. *Adv Oceanogr Limnol*. 2010; 1(1):11–28.
- Çinar ME, Bilecenoglu M, Öztürk B, Can A. New records of alien species on the Levantine coast of Turkey. *Aquat Invasions*. 2006;1:84–90.
- Crocetta F, Agius D, Balistreri P, Bariche M, Bayhan YK, Çakir M, et al. New Mediterranean Biodiversity Records (October 2015). *Mediterr Mar Sci*. 2015;16: 682–702.

- Demetropoulos A, Neocleous D. The fishes and crustaceans of Cyprus. Fisheries Bulletin, Ministry of Agriculture and Natural Resources, Fisheries Department. 1969;1:1–21.
- Gerin R, Golani D. and Appelbaum-Golani B. First record of the Indian anchovy *Stolephorus indicus* (van Hasselt 1823) in the Mediterranean Sea (Clupeiformes: Engraulidae). *BiolInvasions Records*. 2015;4(4):293–97. doi:10.3391/bir.2015.4.4.11.
- Gerin R, Poulain PM, Taupierletage I, Millot C, Ben IS, Sammari C. Surface circulation in the Eastern Mediterranean using drifters (2005–2007). *Ocean Sci Discuss*. 2009;6:525–55.
- Iglésias SP, Frotté L. Alien marine fishes in Cyprus: update and new records. *Aquat Invasions*. 2015;10. in press.
- Ioannou G, Michailidis N, Loucaides A, Manitaras I. First occurrence of *Scarus ghobban* (Actinopterygii: Scaridae) in the coastal waters of Cyprus (eastern Mediterranean Sea). *Mediterr Mar Sci*. 2010;11(2):353–6.
- Katsanevakis S, Tsiamis K, Ioannou G, Michailidis N, Zenetos A. Inventory of alien marine species of Cyprus (2009). *Mediterr Mar Sci*. 2009;10(2):109–33.
- Khalaf MA, Disi AM. Fishes of the Gulf of Aqaba. Aqaba: Marine Science Station; 1997. 252.
- Michailidis N. *Study on the Lessepsian migrant Lagocephalus sceleratus in Cyprus*. EastMED Technical Documents. 2010;4:74–87.
- Nunes AL, Katsanevakis S, Zenetos A, Cardoso AC. Gateways to alien invasions in the European Seas. *Aquat Invasions*. 2014;9(2):133–44.
- Por F. Lessepsian Migration. The influx of Red Sea biota into the Mediterranean by way of the Suez Canal. Berlin: Ecological Studies Springer Verlag; 1978. 123.
- Randall JE, Heemstra PE. Three new goatfishes of the genus *Parupeneus* from the western Indian Ocean, with resurrection of *P. seychellensis*. *Smithiana Bulletin*. 2009;10:37–50.
- Sabrah MM. Fisheries biology of the Red Sea goatfish *Parupeneus forsskali* (Fourmanoir & Guézé, 1976) from the northern Red Sea, Hurghada, Egypt. *Egypt J Aquat Res*. 2015;41(1):111–7.
- Sonin O, Salameh P, Edelist D, Golani D. First record of the Red Sea goatfish, *Parupeneus forsskali* (Perciformes: Mullidae) from the Mediterranean coast of Israel. *Mar Biodivers Rec*. 2013;6(1 of 3):e105. doi:10.1017/S175526721300079.
- Tzomos T, Kitsos S, Christodoulou M, Koukouras A, Eleftheriou A. Investigation of the evolution and dispersion rates of the lessepsian Pisces in the Mediterranean. Proceedings of the 1st Panhellenic meeting for the invasion of alien aquatic species in the eastern Mediterranean. Crete, Greece: Heraklion; 2007.

Submit your next manuscript to BioMed Central and we will help you at every step:

- We accept pre-submission inquiries
- Our selector tool helps you to find the most relevant journal
- We provide round the clock customer support
- Convenient online submission
- Thorough peer review
- Inclusion in PubMed and all major indexing services
- Maximum visibility for your research

Submit your manuscript at  
[www.biomedcentral.com/submit](http://www.biomedcentral.com/submit)

