



**HAL**  
open science

## Objective record of *Epinephelus marginatus* (Serranidae: Epinephelinae) from the Sultanate of Oman (Arabian Sea)

Philippe Béarez, Marion I. Mennesson, Eric Pellé

### ► To cite this version:

Philippe Béarez, Marion I. Mennesson, Eric Pellé. Objective record of *Epinephelus marginatus* (Serranidae: Epinephelinae) from the Sultanate of Oman (Arabian Sea). *Cybium: Revue Internationale d'Ichtyologie*, 2020, 44 (3), pp.251-254. 10.26028/cybium/2020-443-005 . hal-02971180

**HAL Id: hal-02971180**

**<https://hal.science/hal-02971180v1>**

Submitted on 22 Oct 2020

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Submitted: 25 May 2020  
Accepted: 21 Aug. 2020  
Editor: R. Causse

## Objective record of *Epinephelus marginatus* (Serranidae: Epinephelinae) from the Sultanate of Oman (Arabian Sea)

by

Philippe BÉAREZ\* (1), Marion I. MENNESSON (2) & Eric PELLÉ (3)

**Résumé.** – Signalement objectif d'*Epinephelus marginatus* (Serranidae : Epinephelinae) sur la côte du Sultanat d'Oman (mer d'Arabie).

Deux spécimens (268-665 mm de longueur standard) du mérou *Epinephelus marginatus* (Lowe, 1834) ont été prélevés au marché aux poissons de Salalah, dans le Sultanat d'Oman. Ces spécimens confirment la présence de l'espèce en Oman et représentent son signalement le plus au nord dans l'océan Indien.

**Key words.** – Epinephelinae – *Epinephelus marginatus* – Dusky grouper – New record – Oman – Indian Ocean.

Groupers (subfamily Epinephelinae) include 185 valid species (Fricke *et al.*, 2020). Most of them are among the most prized fishes and are subject to considerable fishing pressure throughout their range (Craig *et al.*, 2011; Sadovy de Mitcheson *et al.*, 2012). The dusky grouper, *Epinephelus marginatus* (Lowe, 1834) is no exception to this rule; it is classified by the IUCN as Endangered in the Mediterranean (Cornish and Harmelin-Vivien, 2011) and Vulnerable at global scale (Pollard *et al.*, 2018), and its capture is subject to protective measures in several countries.

The dusky grouper is not only an iconic demersal species of the Mediterranean Sea, but also has one of the strangest disjunct geographical distribution among groupers. Originally described from off Madeira, the dusky grouper is distributed in the eastern Atlantic, from the Bay of Biscay, with stray specimens reported as far north as the British Isles and the English Channel (Mahé *et al.*, 2012), south to Angola, including oceanic islands and throughout the Mediterranean Sea (Heemstra and Anderson, 2016); in the southwestern Atlantic, from central Brazil to Argentina (Irigoyen *et al.*, 2005); in the southwestern Indian Ocean, from South Africa to southern Mozambique (Heemstra and Heemstra, 2004) and Madagascar (Fourmanoir and Crosnier, 1964), with vagrant specimens reported from Réunion Island (Reid *et al.*, 2016). Randall (1995) also recorded the species from Oman. However, despite pictures made by J. Hoover and J. Randall (Randall, 1995, 1997) in several places of the country (see also Froese and Pauly, 2019), Pollard *et al.* (2018) considered the records from southern Oman as probable waifs or misidentifications.

The present report confirms the presence and documents the range of *Epinephelus marginatus* into the northwestern part of the Indian Ocean (Fig. 1), and provides the first COI sequence for the species in this area.



Figure 1. – Map of the Arabian Sea with the location of Salalah, Dhofar, in the Sultanate of Oman.

### MATERIALS AND METHODS

Two specimens were purchased at the fish market of Salalah, Dhofar, Sultanate of Oman (Fig. 1): the largest one (665 mm standard length (SL)) on 7 Jan. 2018 (Fig. 2A) and the small one (278 mm SL) on 21 Jan. 2019 (Fig. 2B). Fishermen caught these specimens around Mirbat, ca. 65 km west of Salalah, while targeting demersal fish, mostly emperors (*Lethrinus nebulosus*), sea breams and groupers, with hook and line at a depth of 25-30 m.

Methods of measuring specimens follow Heemstra and Randall (1993). The last two dorsal and anal soft rays are counted as one if they are adjacent at the base and share the same pterygiophore. Gill-raker counts are made on the first gill arch and include rudiments.

To corroborate identification, the sequence for the partial (barcode region) Cytochrome c oxidase subunit 1 (COI) was obtained, and compared to reference sequences in the Barcode of Life Database (BOLD). We followed Dettai *et al.* (2012) for DNA extraction, PCR, sequencing and quality control. Data processing and sequence assembly were done in Geneious 9.0.5 (<http://www.geneious.com>, Kearse *et al.*, 2012). All the COI sequences were aligned with Muscle Alignment. Percentage of identity between sequences was obtained in Geneious. Sequences were used to blast search the full BOLD, as well as GenBank.

- (1) Archéozoologie, archéobotanique : sociétés, pratiques et environnements (AASPE 7209), Muséum national d'Histoire naturelle, CNRS, CP56, 57 rue Cuvier, 75005 Paris, France. [bearez@mnhn.fr]
- (2) Biologie des organismes et écosystèmes aquatiques (BOREA 7208), Muséum national d'Histoire naturelle, Sorbonne Université, Université de Caen Normandie, Université des Antilles, CNRS, IRD, CP26, 57 rue Cuvier, 75005 Paris, France. [marion.menesson@mnhn.fr]
- (3) Direction des Collections, Muséum national d'Histoire naturelle, CP11, 57 rue Cuvier, 75005 Paris, France. [pelle@mnhn.fr]

\* Corresponding author



Figure 2. – Specimens of dusky grouper from Salalah, Oman. **A:** *Epinephelus marginatus*, 793 mm TL (MNHN-ICOS-01381). **B:** *E. marginatus*, 331 mm TL (MNHN-IC-2019-0025). **C:** Three individuals of *E. marginatus* observed at the Salalah fish market on 19/01/2019.

Due to the large size of one of the specimens, only its skeleton was kept and deposited in the fish osteological collection at the Muséum national d'Histoire naturelle (MNHN) under the number MNHN-ICOS-01381. The small specimen is preserved in the MNHN fish collection under the number MNHN-IC-2019-0025. The two COI sequences were deposited in GenBank under accession numbers MT762946 and MT762945, respectively.

## RESULTS

Both morphometric and molecular data confirm that the two grouper individuals collected from the Salalah fish market belong to the species *Epinephelus marginatus* (Lowe, 1834) (Fig. 2A, B).

### Morphologic data

331-793 mm total length (TL), 268-665 mm SL, 115-280 mm head length (HL), 571-9371 g total fresh weight. Head length contained 2.3 to 2.4 times in SL. Dorsal fin with 11 spines and 14 soft rays. Anal fin with 3 spines and 8 soft rays. Caudal fin rounded. Measurements of the small specimen are presented in table I as percentages of standard length.

### Molecular data

There are many COI sequence in BOLD for *E. marginatus*. The two sequences are 100% similar; percentage of identity between these sequences and those from France, Tunisia, Turkey, Israel and South Africa (BOLD sequences) are between 99.3% and 100%. This level of similarity is generally characteristic of intraspecific divergence (Ward *et al.*, 2009), and strongly corroborates the identification as *E. marginatus*.

### Distribution

In the northwestern Indian Ocean, the dusky grouper has a distribution range restricted to the Arabian Sea coast of Oman. According to previous observations (Randall, 1997; J. Hoover pers. comm.), it has been objectively reported from Ra's Madrasah to Salalah. The present records confirm the presence of this grouper in the Arabian Sea coast off Oman.

## DISCUSSION

Up to now it seems that *E. marginatus* has only been reported from the Arabian Sea coast off Oman and that it is absent from surrounding areas: *i.e.* Gulf of Aden (Al Sakaff and Esseen, 1999); Socotra (Zajonz *et al.*, 2019); Red Sea (Golani and Bogorodsky, 2010); Persian Gulf (Eagderi *et al.*, 2019); Pakistan (Psomadakis *et al.*, 2015). Reddy (1984) recorded the species from a rockpool on the Visakhapatnam coast, Bay of Bengal. Despite a rather good correspondence of the morphomeristic data (considering that body depth = 75% of HL, not SL) of his 200 mm SL individual with our data, the author mentioned that the edges of all fins are black but did not mention the typical white distal margin of the median fins of *E. marginatus*, well visible on young individuals. Hence, in this study, this specimen is regarded either as a stray or a misidentification. Randall (1995) suggested that the restricted occurrence of such a temperate species off southern Oman could be related to the presence of the seasonal coastal upwelling (Vic *et al.*, 2017). The coastal upwelling is more intense between Salalah and Ra's Madrasah (Vic *et al.*, 2017), an area that corresponds well with the known range of the dusky grouper in Oman. This area also corresponds, biogeographically, to most part of the Western Arabian Sea Ecoregion (Spalding *et al.*, 2007).

The dusky grouper is not rare in southern Oman and can be observed regularly at the fish market of Salalah, at least in January (Fig. 2C). The question of its origin in Oman is puzzling and would deserve more investigation, as the closest records in the Indian Ocean are from the southwest part, at least 4,000 km south of Salalah. Such a disjunct distribution is however also found among other bony fish families present in Oman coastal waters (Randall, 1995). Sparids are probably the best example, with the occurrence of several close relatives of northeastern Atlantic and/or southern African species: *Boops lineatus* (Boulenger, 1892), *Diplodus capensis* (Smith, 1844), *D. kotschy* (Steindachner, 1876), *D. omanensis* Bauchot & Bianchi, 1984, *Lithognathus mormyrus* (Linnaeus, 1758), *Pagellus affinis* Boulenger, 1888.

A modern origin of the Omani population of the dusky grouper from the Mediterranean Sea through the Suez Canal is unlikely, as the species has never been reported from the red Sea (Golani and Bogorodsky, 2010). Long distance colonization from South Africa is also unlikely even if vagrant have been detected far from their source population, as for example in Réunion Island (Reid *et al.*,

Table I. – Meristics and measurements (in mm or expressed as percent of SL) for the small specimen of *Epinephelus marginatus* from Oman (MNHN-IC-2019-0025).

	<i>Epinephelus marginatus</i> MNHN-IC-2019-0025
Standard length	268
Total length	331
Dorsal-fin ray count	X-I, 14
Anal-fin ray count	III, 8
Pectoral-fin ray count	17
Pelvic-fin ray count	I, 5
Lateral line scales	66
Lateral scale series	105
Gill raker count	8 + 14
% of SL	
Body depth	32.55
Body width	17.13
Head length	42.78
Snout length	9.66
Orbit diameter	7.65
Preorbital depth	3.84
Interorbital width	6.47
Maxilla width	5.30
Upper jaw length	18.31
Caudal peduncle depth	11.94
Caudal peduncle length	17.57
Predorsal length	38.79
Preanal length	72.76
Prepelvic length	41.60
Dorsal-fin base	51.99
Longest dorsal spine	14.22
Longest soft dorsal ray	17.35
Anal-fin base	15.43
Third anal spine length	11.66
Longest anal soft ray	18.10
Caudal-fin length	22.88
Pectoral-fin length	21.46
Pelvic-fin length	20.43
Pelvic spine length	10.72

2016). Clearly, further genetic research on populations of the dusky grouper is needed to determine their origin, the timing of colonization and their connectivity at global scale.

**Acknowledgements.** – We would like to thank the people from the Salalah fish market for their cordial reception and help to obtain fish specimens. Special thanks are due to Salim Al-Ghassani from the Salalah Fisheries Research Center, to Ali Al-Mashani (MOHC), and to Ahmed Salim Mohammed Al-Mashaikhi from Mirbat, and to Khamis Nasser Khamis Al-Amri from Ra's al-Jinz for their help and advice. Thanks to John P. Hoover who kindly provided information of the dusky grouper in Oman. Funding was provided by the ANR NeoArabia program (dir. J.F. Berger), the French Archaeological Mission of the MEAE "Archaeology of the Arabian seashores" (dir. V. Charpentier), and the Oman Ministry of Heritage and Culture.

## REFERENCES

- AL SAKAFF H. & ESSEEN M., 1999. – Occurrence and distribution of fish species off Yemen (Gulf of Aden and Arabian Sea). *Naga, ICLARM Quart.*, 22(1): 43-47.
- CORNISH A. & HARMELIN-VIVIEN M., 2011. – *Epinephelus marginatus*. The IUCN Red List of Threatened Species 2011: e.T7859A12856576. Downloaded on 25 April 2020.
- CRAIG M., SADOVY DE MITCHESON Y.J. & HEEMSTRA P.C., 2011. – Groupers of the World: a Field and Market Guide. North America: CRC Press/Taylor and Francis Group. 356 p.
- DETTAI A., BERKANI M., LAUTREDOU A.C., COULOUX A., LECOINTRE G., OZO UF COSTAZ C. & GALLUT C., 2012. – Tracking the elusive monophyly of nototheniid fishes (Teleostei) with multiple mitochondrial and nuclear markers. *Mar. Genom.*, 8: 49-58. DOI: 10.1016/j.margen.2012.02.003
- EAGDERI S., FRICKE R., ESMAEILI H.R. & JALILI P., 2019. – Annotated checklist of the fishes of the Persian Gulf: diversity and conservation status. *Iran. J. Ichthyol.*, 6(Suppl. 1): 1-171. DOI: 10.22034/iji.v6i0.454
- FOURMANOIR P. & CROSNIER A., 1964. – Deuxième liste complémentaire des poissons du canal de Mozambique. Diagnoses préliminaire de 11 espèces nouvelles. *Cah. ORSTOM, Sér. Océanogr.*, 6: 2-32.
- FRICKE R., ESCHMEYER W.N. & FONG J.D., 2020. – Eschmeyer's Catalog of Fishes: Species by family/subfamily. Available from: <http://researcharchive.calacademy.org/research/ichthyology/catalog/SpeciesByFamily.asp> (accessed 25 Apr. 2020).
- FROESE R. & PAULY D. (Eds.), 2019. – FishBase. Available from <https://www.fishbase.org> (version 12/2019).
- GOLANI D. & BOGORODSKY S.V., 2010. – The fishes of the Red Sea – Reappraisal and updated checklist. *Zootaxa*, 2463: 1-135. DOI: 10.11646/zootaxa.2463.1.1
- HEEMSTRA P.C. & ANDERSON W.D. Jr., 2016. – Serranidae: Groupers (seabass, hinds, creolefish, combers, anthiines, soapfish). In: *The Living Marine Resources of the Eastern Central Atlantic*. Vol. 4. Bony Fishes part 2 (Perciformes to Tetraodontiformes) and Sea Turtles (Carpenter K.E. & De Angelis N., eds), pp. 2365-2413. FAO Species Identification Guide for Fishery Purposes. Rome: FAO.
- HEEMSTRA P.C. & HEEMSTRA E., 2004. – Coastal Fishes of Southern Africa. Grahamston: NISC and SAIAB.
- HEEMSTRA P.C. & RANDALL J.E., 1993. – FAO Species Catalogue. Vol. 16. Groupers of the World (family Serranidae, subfamily Epinephelinae). An annotated and illustrated catalogue of the grouper, rockcod, hind, coral grouper and lyretail species known to date. Rome: FAO.
- IRIGOYEN A.J., GALVAN D.E. & VENERUS L.A., 2005. – Occurrence of dusky grouper *Epinephelus marginatus* (Lowe, 1834) in gulfs of northern Patagonia, Argentina. *J. Fish Biol.* 67: 1741-1745. DOI: 10.1111/j.1095-8649.2005.00866.x
- KEARSE M., MOIR R., WILSON A., STONES-HAVAS S., CHEUNG M., STURROCK S., BUXTON S., COOPER A., MARKOWITZ S., DURAN C., THIERER T., ASHTON B., MENTJIES, P. & DRUMMOND A., 2012. – Geneious Basic: an integrated and extendable desktop software platform for the organization and analysis of sequence data. *Bioinformatics*, 28: 1647-1649. DOI: 10.1093/bioinformatics/bts199
- MAHÉ K., COCHARD M.L., QUÉRO J.C., SEVIN K., BAILLY N. & TETARD A., 2012. – First record of *Epinephelus marginatus* (Serranidae: Epinephelinae) in the eastern English Channel. *Cybium*, 36(3): 485-486. DOI: 10.26028/cybium/2012-363-008
- POLLARD D.A., AFONSO P., BERTONCINI A.A., FENNESSY S., FRANCOUR P. & BARREIROS J., 2018. – *Epinephelus marginatus*. The IUCN Red List of Threatened Species 2018: e.T7859A100467602. Available from <https://www.iucnredlist.org/species/7859/100467602> (accessed 18 April 2020).



- PSOMADAKIS P.N., OSMANY H.B. & MOAZZAM M., 2015. – Field Identification Guide to the Living Marine Resources of Pakistan. FAO Species Identification Guide for Fishery Purposes. Rome: FAO. 386 p.
- RANDALL J.E., 1995. – Coastal Fishes of Oman. University of Hawaii Press, Honolulu, Hawaii. 439 p.
- RANDALL J.E., 1997. – Randall's tank photos. Collection of 10,000 large-format photos (slides) of dead fishes. Unpublished. Available from <https://www.fishbase.org> (version 12/2019).
- REDDY N.A.V.P., 1984. – A new record of *Epinephelus guaza* (Linnaeus, 1758) (Serranidae: Pisces) from Indian waters. *J. Bombay Nat. Hist. Soc.*, 80(3): 650-651.
- REID K., CROCHELET E., BLOOMER P. & HOAREAU T.B., 2016. – Investigating the origin of vagrant dusky groupers, *Epinephelus marginatus* (Lowe, 1834), in coastal waters of Réunion Island. *Mol. Phylogenet. Evol.*, 103: 98-103. DOI: 10.1016/j.ympev.2016.07.012
- SADOVY DE MITCHESON Y., CRAIG M.T., BERTONCINI A.A., CARPENTER K.E., CHEUNG W.W.L., CHOAT J.H., CORNISH A.S., FENNESSY S.T., FERREIRA B.P., HEEMSTRA P.C., LIU M., MYERS R.F., POLLARD D.A., RHODES K.L., ROCHA L.A., RUSSELL B.C., SAMOILYS M.A. & SANCIANGCO J., 2012. – Fishing groupers towards extinction: a global assessment of threats and extinction risks in a billion dollar fishery. *Fish Fish.*, 14: 119-136. DOI: 10.1111/j.1467-2979.2011.00455.x
- SPALDING M.D., FOX H.E., ALLEN G.R., DAVIDSON N., FERDAÑA Z.A., FINLAYSON M.A.X., HALPERN B.S., JORGE M.A., LOMBANA A., LOURIE S.A., MARTIN K.D., MCMANUS E., MOLNAR J., RECCHIA C.A. & ROBERTSON J., 2007. – Marine ecoregions of the world: a bioregionalization of coastal and shelf areas. *BioScience*, 57: 573-583. DOI: 10.1641/B570707
- VIC C., CAPET X., ROULLET G. & CARTON X., 2017. – Western boundary upwelling dynamics off Oman. *Ocean Dyn.*, 67: 585-595. DOI: 10.1007/s10236-017-1044-5
- WARD R.D., HANNER R. & HEBERT P.D., 2009. – The campaign to DNA barcode all fishes, FISH-BOL. *J. Fish. Biol.*, 74(2): 329-356. DOI: 10.1111/j.1095-8649.2008.02080.x
- ZAJONZ U., LAVERGNE E., BOGORODSKY S.V., SAEED F.N., AIDEED M.S. & KRUPP F., 2019. – Coastal fish diversity of the Socotra Archipelago, Yemen. *Zootaxa*, 4636(1): 1-108. DOI: 10.11646/zootaxa.4636.1.1