

First confirmed record of *Zu cristatus* in the Mediterranean coast of Israel and the eastern shores of the Levant

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Contributing Editor: Branko DRAGICEVIC

Received: 04 August 2022; Accepted: 23 November 2022; Published online: 27 January 2023

Abstract

In the present paper we report the first substantiated record of the Scalloped ribbonfish *Zu cristatus* (Bonelli, 1819) from the Mediterranean coast of Israel. The previous unsubstantiated record from Israel was based on a juvenile specimen that was found on the shore over seven decades ago and was not saved. This report constitutes the first confirmed record of this species from the Levant.

Keywords: *Zu cristatus*; Mediterranean; Israel; record.

Introduction

The Scalloped ribbonfish *Zu cristatus* is a mesopelagic cosmopolitan species. It was first described from the Gulf of Spezia, Italy by Bonelli (1820) under the genus *Trachipterus* G \ddot{u} lan 1770 (now spelled *Trachipterus*). Later it was placed by Walters & Fitch (1960) in the genus *Zu*. In subsequent years, it was reported from various locations in the Mediterranean (Albano *et al.*, 2022a). Palmer (1986) and Fischer *et al.* (1978) included the entire Mediterranean including the eastern shores in its distribution range. Later they were followed by many authors (see Ben-Tuvia 1971; Golani, 2005, 2021). However, the inclusion of the eastern Mediterranean shores was based on a single unsubstantiated record from Israel ("collected of [by] Dr. M. Dor found dead on the sea shores [of Israel] length 190 mm") (Ben-Tuvia 1953, p. 12). This specimen was not saved. Therefore, Goren & Galil (2015) and Albano *et al.* (2022a; 2022b) did not include *Zu cristatus* as occurring in the Levant.

In the present paper we report the first substantiated record of *Zu cristatus* from the Mediterranean coast of Israel and the Levantine coast, including Lebanon and Syria.

Materials and Methods

On 14 June 2022, a 1275 mm total length (1115 mm SL) specimen of *Zu cristatus* was collected by mid-water long-line at an estimated depth of 250-400 m (Fig. 1) opposite Palmahim (31.95 °N, 34.48333 °E) at the Mediterranean coast of Israel. The specimen was deposited in the



Fig. 1: *Zu cristatus*, 1275 mm TL, HUJ 21023, Palmahim (31.95 °N, 34.48333 °E) at the Mediterranean coast of Israel, 14 June 2022, mid-water long-line at an estimated depth of 250-400 m.

National Fish Collection of the Hebrew University of Jerusalem and received the catalogue number HUI 21023. Before fixation in formaldehyde, a small tissue sample was removed and saved in ethanol for further molecular study. Additionally, while sorting the material at the Fish Collection of the Hebrew University, we found a small specimen of 234 mm TL (Fig.2) (HUI 5538) that was collected on the Mediterranean coast of Israel in 1978.

Measurements and counts follow Hubbs & Lagler (1947).

Genetic analysis

A 707bp fragment of the mitochondrial *cytochrome oxidase subunit 1* (COI) was amplified using the primer Fish F2, following the protocol of Ward *et al.* (2005). The contiguous sequence has been uploaded to the BOLD platform and granted the accession voucher BIM1089-22. Genetic comparisons were conducted after retrieving all other sequences of *Z. cristatus* from both GenBank and BOLD platforms, on condition that they had clear designated sampling localities. Pairwise comparisons were computed in MEGA X (Kumar *et al.*, 2018) under the Kimura 2-parameter (K2P) corrected distance (Kimura, 1980).

Results

Short description of HUI 21023

Body elongated and compressed, its anterior half rather high while the posterior half becoming very slender. Ventral ridge running from lower gill opening to anus. Massive head with protrusible oblique mouth with broad maxilla reaching back slightly before the vertical anterior of eye. Two patches of small sharp teeth in the anterior of both upper and lower jaws. Large eye, its diameter 3.1 times in Head Length. Dorsal fin originated above pos-

terior edge of eye with 118 rays; (the first 6 rays are cut to the base). Pectoral fin short with ten rays. No anal nor pelvic fins. Upper lobe of caudal fin fan-like with eight rays, lower lobe rudimentary. Body covered with delicate bump-like tubercles. No scales, except on the lateral line that originated behind the upper eye, gradually descending toward the vertical ridge and running adjacent to the caudal fin base.

Color: Body silvery with four vertical dark bars. Dorsal and pectoral fins red, black upper lobe of caudal fin.

Genetic results

Analyzing the nucleotide diversity of the “barcoding” COI mtDNA revealed a shallow genealogy over wide geographic distances, with maximum genetic divergence of 1.63% between the Celtic Sea (BOLD - UNAFI005-18) and South Korean samples (BOLD - UNAFI005-18). The sample in this study showed maximum similarity of 0.49% with two Atlantic Ocean samples (BOLD - MFLE081-12 and BOLD - SCFAC461-06).

Discussion

The family of Trachipteridae consists of 14 species in three genera (Nelson *et al.* 2016). The genus *Zu* has two species (Froese & Pauly, 2022). *Zu cristatus* is a cosmopolitan species that occurs in all major oceans. It feeds on fish and cephalopods. Eggs and larvae are planktonic. During growth, this species undergoes metamorphosis. This species reaches a maximum size of 118 cm SL. We therefore conclude that the collected specimen (HUI 21023) is a fully grown individual. It lacks the first six dorsal rays but their bases remain. In addition, the absence of a pelvic fin is a natural known phenomenon that occurs during growth and after metamorphosis, the pelvic fin of some specimens degenerates (Bauchot *et al.*, 1984; Oliney, 2002; Albano *et al.*, 2022a).



Fig. 2: Juvenile of *Zu cristatus*, 234 mm TL, HUI 5538, Mediterranean coast of Israel, 1978. Photo credits: D. Golani.

Genetic diversity revealed a shallow genealogy over wide geographic distances, although only six previously published sequences were available for comparison. In order to describe the population structure of *Z. cristatus*, additional samples are inevitably needed.

Albano *et al.* (2022b), in their comprehensive study, presented all published records of *Zu cristatus* throughout the Mediterranean. Most of the records were in the central Mediterranean, mainly in the northern Ligurian and Adriatic Seas, none in the Levant. However, this does not necessarily reflect the true regional abundance. Most specimens of *Zu cristatus* have been captured in deep waters, which are not evenly utilized throughout the Mediterranean. In addition, since this species has no commercial value, individuals are often discarded, without reaching the attention of the scientific community.

Acknowledgements

We would like to thank Mr. Z. Sabo and Mr. I. Poliba for providing the specimen and also Dr. R. Fricke for taxonomic advice.

References

- Albano, M., D'Iglio, C., Spanò, N., Di Paola, D., Alesci, A. *et al.*, 2022a. New report of *Zu cristatus* (Bonelli, 1819) in the Ionian Sea with in-depth morphological comparison with all Mediterranean records. *Fishes*, 7, 305.
- Albano, M., D'Iglio, C., Spanò, N., Fernandes, J.M.O., Savaco, S. *et al.*, 2022b. Distribution of the order Lampriformes in the Mediterranean Sea with note on their biology, morphology and taxonomy. *Biology*, 11 (10), 1534.
- Bauchot, M.L., 1984. Trachipteridae – Ribbonfishes. In: Fischer, W. and Bianchi, G. (eds.). FAO species identification sheets for fishery purposes. Western Indian Ocean; (Fishing Area 51). FAO, Rome.
- Ben-Tuvia, A., 1953. Mediterranean fishes of Israel. *Bulletin of the Sea Fisheries Research Station, Haifa*, 8, 1-40.
- Ben-Tuvia, A., 1971. Revised list of the Mediterranean fishes of Israel. *Israel Journal of Zoology*, 20, 1-39.
- Bonelli, F.A., 1820. Description d'une nouvelle espèce de poisson de la Méditerranée appartenant au genre Trachyptère avec des observations sur les caractères de ce même genre. *Memorie della Reale Accademia delle Scienze di Torino*, 24 (for 31 May 1819), 485-494, Pl. 9.
- Fischer, W., Bauchot, M.-L., Schneider, M.S., 1987. Fishes FAO d'Identification des Espèces pour les Besoins de la Pêche. *Méditerranée et mer Noire*. Vol. II (Vertébrés). FAO, Rome, 1529 pp.
- Froese, R. Pauli, D. (Eds.), 2022. FishBase [Version 6/2022]. <http://www.fishbase.org>.
- Golani, D., 2005. *Checklist of the Mediterranean Fishes of Israel*. Zootaxa 947, Magnolia Press, Auckland, New Zealand. 90 pp.
- Golani, D., 2021. An updated Checklist of the Mediterranean fishes of Israel, with illustrations of recently recorded species and delineation of Lessepsian migrants. *Zootaxa*, 4956 (1), 1-108.
- Goren, M. Galil, B. S. 2015. A checklist of the deep sea fishes of the Levant Sea, Mediterranean Sea. *Zootaxa*, 3994 (4), 507-530.
- Hubbs C.L., Lagler K.F., 1947. *Fishes of the Great Lakes Region*. Cranbrook Institute of Science. Michigan, USA. 186 pp.
- Kimura, M., 1980. A simple method for estimating evolutionary rates of base substitutions through comparative studies of nucleotide sequences. *Journal of Molecular Evolution*, 16, 111-120.
- Kumar, S., Stecher, G., Li, M., Knyaz, C., Tamura, K., 2018. MEGA X: molecular evolutionary genetics analysis across computing platforms. *Molecular Biology and Evolution*, 35, 1547-1549.
- Nelson J.S., Grande T.C., Wilson, M.V.H., 2016. *Fishes of the World*. 5th edition. John Wiley & Sons, Hoboken, New Jersey, USA. 707 pp.
- Oliney, J.E., 2002. Trachipteridae. Pp. 957-958. In: *The living marine resources of the Western Central Atlantic Vol. 2*. Carpenter, K.E. (Ed.). FAO Species Identification Guide for Fishery Purposes, FAO, Rome.
- Palmer, G., 1986. Trachipteridae. Pp. 729-732. In: *Fishes of the North-eastern Atlantic and the Mediterranean*. Whitehead, P.J.P., Bauchot, M.-L., Hureau, J.-C., Nielsen, J and Tortonese, E. (Eds). UNESCO, Paris.
- Walters, V., Fitch, J.E., 1960 The families and genera of the lampridiforms (Allotriognath) suborder Trachipteroidei. *California Fish and Game*, 46 (4), 441-451.
- Ward, R.D., Zemlak, T.S., Innes, B.H., Last, P.R., Hebert, P.D.N., 2005. DNA barcoding Australia's fish species. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 360 (1462), 1847-1857.

Postscript: On 7 July 2022 another specimen of *Zu cristatus* of a similar size was captured by the same method and at the same location as the reported specimen (HUJ 21023). However, this new specimen was not saved.