

# ISRG Journal of Multidisciplinary Studies (ISRGJMS)



## ISRG PUBLISHERS

Abbreviated Key Title: isrg j. multidiscip. Stud.

ISSN: 2584-0452 (Online)

Journal homepage: <https://isrgpublishers.com/isrgjms/>

Volume – II Issue - VIII (August) 2024

Frequency: Monthly



## First Record of the Giant Red Sea Shrimp-Goby (*Cryptocentrus caeruleopunctatus*) in Lebanese Waters: Expanding the Mediterranean Presence of a Non-Indigenous Species

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| Received: 21.08.2024 | Accepted: 22.08.2024 | Published: 24.08.2024

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### Abstract

This note documents the first recorded occurrence of the Giant Red Sea Shrimp-Goby *Cryptocentrus caeruleopunctatus* (Rüppell, 1830) in Lebanese waters, representing only the third known sighting of this species in the Mediterranean Sea. The specimen was captured at a depth of 3 meters near the port of Tyre, in southern Lebanon, and was identified through detailed morphological analysis. The presence of this Non-Indigenous Species (NIS) in the region suggests a potential for further expansion within the Mediterranean basin. This discovery underscores the critical need for ongoing monitoring and research into the establishment and proliferation of NIS, which may pose significant ecological risks.

**Keywords:** *Cryptocentrus caeruleopunctatus*, Non-Indigenous Species, Mediterranean Sea, Lebanese waters.

### Introduction

The giant red sea shrimp-goby, also known as the harlequin prawn-goby *Cryptocentrus caeruleopunctatus* (Rüppell, 1830), is a species belonging to the family Gobiidae (Cuvier, 1816), originally described from the Red Sea (Bogorodsky & Goren, 2023). It is typically associated with symbiotic relationships involving shrimp, particularly *Alpheus* species, which create burrows that the goby inhabits (Louisy, 2015). In the Mediterranean Sea, this species was

first documented in the southern Levantine Sea by Rothman & Goren (2015) and subsequently recorded in Turkish waters by Ergüden et al. (2022). However, no additional occurrences of this species in the Mediterranean have been reported in the literature since. Notably, there have been no previous records of the giant red sea shrimp-goby from Lebanese waters. In this context, this notes aims to present the first recorded occurrence of *Cryptocentrus*

*caeruleopunctatus* in Lebanese waters, marking the third documented sighting of this species in the Mediterranean Sea.

On August 15, 2024, a single specimen of a Gobiid species was captured by a recreational fisher (©Hussein Al-Zein) using a fishing rod in the waters near the port of Tyre (south Lebanon, Figure 1A), at a depth of 3 meters (33°16'29"N 35°11'50"E, Figure 1B). The unidentified species was photographed by the fisher and shared with a sea enthusiast (©Nadine El-Atab), who subsequently forwarded the image to one of us (AB). The fisher was then contacted for additional information regarding the captured specimen. Upon further examination, the species was identified as the non-indigenous *Cryptocentrus caeruleopunctatus*.



**Figure 1.** Capture location of *Cryptocentrus caeruleopunctatus* in the port of Tyre, South Lebanon. **A.** Geographic location of Tyre along the Lebanese coast. **B.** Specific capture site of *C. caeruleopunctatus* in the waters adjacent to the port of Tyre (scale 1000 ft, image source: © Google Earth).

Morphologically, the captured specimen of *Cryptocentrus caeruleopunctatus* (Figure 2) is characterized by its protruding eyes and a yellowish to brownish body marked with eight fine, oblique, light-colored lines extending across its length. The body is further adorned with large blue spots, particularly noticeable on the head and first dorsal fin. The species is also distinguished by two prominent ocelli: one located beneath the first dorsal fin and the other beneath the anterior third of the second dorsal fin. These ocelli, coupled with the species' unique coloration pattern, including reddish spots encircled by blue on the head and dorsal fins, make it easily identifiable. This specimen closely resembles those documented in the southern Levantine Sea by Rothman & Goren (2015) and in Turkish waters by Ergüden *et al.* (2022).



**Figure 2.** Specimen of *Cryptocentrus caeruleopunctatus* captured from the waters of Tyre, South Lebanon.

This record of *Cryptocentrus caeruleopunctatus* constitutes the first documentation of this species in Lebanese waters and the third record in the Mediterranean Sea. The presence of this Non-Indigenous Species (NIS) in Lebanese waters highlights the potential for further range expansion within the Mediterranean basin. Although the exact introduction pathway of *C. caeruleopunctatus* remains unclear, it is likely that this species, similar to other NIS, may have been introduced via ballast water, the aquarium trade, or other human-mediated mechanisms (Zenetos *et al.*, 2016).

The presence of *Cryptocentrus caeruleopunctatus* in Lebanese waters, irrespective of the introduction pathway, highlights the potential for further range expansion within the Mediterranean basin. Given the rapid proliferation of other non-indigenous species (NIS) in the Mediterranean (Galanidi *et al.*, 2023), particularly within Lebanese waters (Bitar & Badreddine, 2021), this development warrants thorough scrutiny. Recent observations suggest an increasing establishment of NIS in the region. For example, *Priacanthus sagittarius* Starnes, 1988, initially reported in Lebanon as *Heteropriacanthus cruentatus* (Lacepède, 1801) by Badreddine & Bitar (2019), is now well-established along the Lebanese coastline, from the southern to the northern regions (Figure 3A1, 3B, and 3C). Similarly, new occurrences of the Emperor Angelfish *Pomacanthus imperator* have been recorded in southern Lebanon (Tyre waters, Figure 3A2, 3A3) following its first documented appearance in 2023 by Badreddine *et al.* 2023 (Figure 3A4), with additional observations, including a juvenile specimen, reported from Beirut area (Figure 3D). These instances underscore the critical importance of continued monitoring and research on the establishment and spread of NIS in Lebanese waters.

Monitoring the spread of *C. caeruleopunctatus* along the Levantine coast is essential, as the potential for this species to establish and impact local ecosystems demands particular attention from the scientific community. Citizen science initiatives could play a valuable and cost-effective role in tracking the spread of *C. caeruleopunctatus* and other invasive species within the Mediterranean. Moreover, updating the checklist of non-indigenous species along the Lebanese coast and implementing regular monitoring in strategic areas, such as major harbors, will be crucial for the early detection and mitigation of potential impacts on local biodiversity. Establishing effective monitoring programs will not only assist in assessing the status of these species but also facilitate the development of appropriate management strategies to minimize their impact on native communities and habitats.



**Figure 3.** Photos of Non-Indigenous Species (NIS), *Acanthurus sohal*, *Pomacanthus imperator*, and *Priacanthus Sagittarius* documented in Lebanese waters.

- A.** Collection of NIS preserved at the Marine Protected Area of Tyre Coast Nature Reserve (TCNR), including (A1) New record of *Priacanthus sagittarius* captured by recreational longline fisherman ©Ahmad Nassar on 12 June 2024 in Tyre waters at a depth of 40 m, preserved at TCNR under code LEBSPI9; (A2) New record of

*Pomacanthus imperator* captured by fisherman ©Bilal Kourani on July 4, 2024, at a depth of 15 m in Tyre area using spearfishing, preserved in TCNR under code LEBSPI10; (A3) New record of *Pomacanthus imperator* captured by fisherman ©Ahmad Nassar on March 17, 2024, at a depth of approximately 40 m in Tyre waters, preserved in TCNR under code LEBSPI8; (4) Old record of *Pomacanthus imperator* captured by fisherman ©Hassan Youness on August 22, 2022, using spearfishing at a depth of 40 m off a sandy bottom in Sarafand (33°27'59.89"N; 35°16'43.25"E), preserved in TCNR under code LEBSPI1 (Badreddine *et al.*, 2023); and (A5) Old record of *Acanthurus sohal* captured by fisherman ©Bilal Kourani using spearfishing on April 29, 2021, at a depth of 5 m off Tyre waters, preserved in TCNR under code LEBSPI12 (Badreddine *et al.*, 2022).

- B. New record of *Priacanthus sagittarius* captured in Tripoli, North Lebanon by ©Samer Fatfat
- C. New Multiple records of *Priacanthus sagittarius* specimens displayed at the Mina fish market in North Tripoli, © Samer Fatfat.
- D. New record of a juvenile *Pomacanthus imperator* captured in Beirut area by fisherman ©Ahmad Itani on August 18, 2023.

## Acknowledgements

The authors express their sincere gratitude to fishermen Hussein Al-Zein, Ahmad Nassar, Bilal Kourani, and marine enthusiast Nadine Al Atab for their invaluable cooperation and for providing the essential photographs and videos used in this study.

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