



## First Record Of *Synalpheus Africanus* Crosnier & Forest, 1965 (Caridea, Alpheidae) In The Libyan Mediterranean Coast

Amani Fitori<sup>1\*</sup>, Ali Al-Fituri<sup>2</sup>, Ayad Masry<sup>3</sup>, Alia Salem<sup>4</sup>, Jamila Rizgalla<sup>5</sup>

### Abstract

The snapping shrimp *Synalpheus africanus* Crosnier & Forest (1965) is recorded for the first time on the Libyan Mediterranean coast. During August 2022, specimens were collected during a diving trip in Tripoli, Libya. This note gives details about this observation.

**Keywords:** Alpheidae, *Synalpheus africanus*, first record, Tripoli, Libya.

<sup>1\*</sup>Department of Marine Resource, Faculty of Natural Resource, Tobruk University, Libya.

<sup>2</sup>Marine Biology Research Center, Tripoli, Libya.

<sup>3</sup>Department of Zoology, Faculty of Science, Tobruk University, Libya

<sup>4</sup>Department of Zoology, Faculty of Science, Derna University, Libya

<sup>5</sup>Department of Aquaculture, Faculty of Agriculture, University of Tripoli, Tripoli, Libya.

**\*Corresponding author:-** Amani Fitori

<sup>\*</sup>Department of Marine Resource, Faculty of Natural Resource, Tobruk University, Libya Email: amanifitori1@gmail.com

## Introduction

Crustacea is a subphylum that belongs to the Arthropoda and includes more than 67,000 species (Zhang, 2011). The Mediterranean region is home to more than 30,000 different species. The number of species varies depending on the depth and geography of the area. In the Mediterranean, amphipods are the most prevalent crustaceans (Zakhama-Sraieb et al., 2009). The family Alpheidae includes a variety of marine crustaceans known as Alpheid shrimps, also referred to as pistol shrimps or snapping shrimp. Researchers and marine enthusiasts have been drawn to them because of their distinctive adaptations and fascinating habits. Gaining knowledge of the biology, behaviour, and ecological functions of alpheid shrimps is essential for understanding the dynamics of marine ecosystems and the complex interactions they engage in (Anker, 2010). A deeply varied taxon of crustacean decapods, alpheid shrimps include more than 600 species spread across 47 genera (De Grave and Fransen, 2011). The initial pair of pereopods in members of the family Alpheidae (snapping shrimps) are incredibly asymmetrical, and this asymmetry starts in the juvenile stage (Young et al., 1994). Only the family Alpheidae has acquired effective snapping claws (Anker et al., 2006); it includes the *Alpheus Fabricius* (1798, *Metalpheus* Coutière (1908, *Pomagnathus* Chace (1937, *Racilius* Paulson (1875, and *Synalpheus* Spence Bate (1888 major genera and accounts for around 75% of the alpheid species. The snapping claw fostered the widespread radiation that these shrimps experienced (Anker et al., 2006). The minor chela has thin fingers that are usually used for eating and burrowing but are not designed to produce sound (Govind et al., 1988). The family alpheidae's most diversified genus, *Alpheus* Fabricius, 1798, contains more than 300 known species (De Grave and Fransen, 2011; Almeida et al., 2014; Bracken-Grissom and Felder, 2014; Anker et al., 2015). With more than 250 species and subspecies, *Synalpheus* Spence Bate, 1888, is the second-most diversified genus in the family (WoRMS,

2018). In all tropical and subtropical oceans, members of the genus *Synalpheus* play a significant role in the communities of coral reefs and bottom fauna (Dardeau, 1984). *Synalpheus africanus* has reportedly been found in the eastern Atlantic, the Cape Verde Islands, close to Biafra Bay in Guinea (Conakry), and the islands of So Tomé, Príncipe, and Annobon, according to Crosnier & Forest (1965, 1966). This species has been observed in a variety of locations in the Mediterranean Sea: Israel (Lewinsohn and Holthuis, 1964); Morocco's coasts (Lagardère, 1971); Greece (Koukouras and Kattoulas, 1974); the Alboran Sea and southern Spain (Garca Raso, 1988; Garca Raso and Fernández Muoz, 1988); the Italian waters (Bacci et al., 2010); and the Egyptian Mediterranean Coast (Abdelsalam and Hamdy, 2018). However, it was registered from the Canary Islands (González-Pérez, 1995; Quiles et al., 2001) and included in the inventory of decapod crustaceans in the north-eastern Atlantic, the Mediterranean, and adjacent inland seas north of 25 °N (d'Udekem d'Acoz, 1999). There were 18 species of amphipods described in the first study on crustaceans in Libya (Maccagno, 1939). 33 new species were added to the Libyan list of amphipods during the Romanian Expedition (Tignus 1984), which was conducted on the country's shores in 1975–1976. Later, Ortiz and Petrescu (2007) classified 125 species of amphipods, which are divided into 27 families. A French scientific expedition gathered 20 species of crustacea along the Libyan coast in 1966 (Rawag 2004); this resulted in new entries for the Libyan crustacea list. Information is scarce on the littoral areas along the Libyan coast. The present study aims to document the first record of *Synalpheus africanus* Crosnier & Forest (1965), which was collected from Libyan waters.

## مادة وطرق Material and Methods

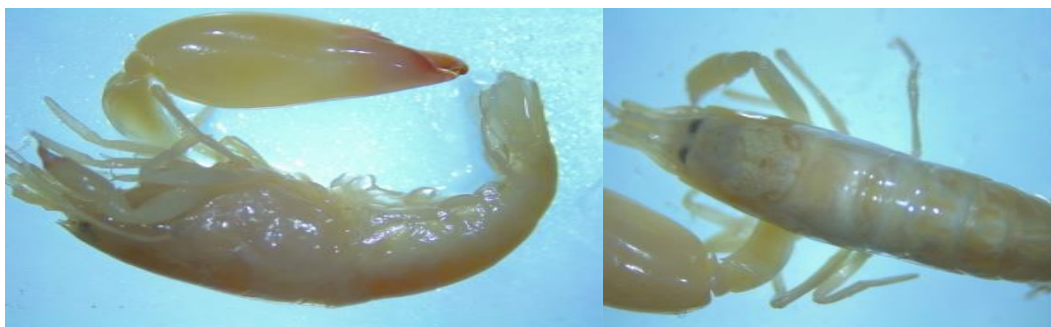
In August 2022, 28 specimens were collected during a diving trip at 50 m depth in Tripoli, Libya (Figure 1). The specimens were photographed (Fig.2A,B). Accordingly, the

collected specimens were shared with one of us (AF) for identification. The specimens were preserved in alcohol. Specimens were studied using dissecting microscopes, (Leica microsystem,model:EZ4E). Taxonomic position was performed based on Crosnier & Forest (1965) as follows: Phylum:

Arthropoda, Subphylum: Crustacea, Class: Malacostraca, Order: Decapoda, Family: Alpheidae, Genus: *Synalpheus*, Species: *Synalpheus africanus* The specimens collected were mostly males and 16 oviparous females. (Fig.3C,D,E)



**Fig.1.**Location where *Synalpheus africanus* specimens were collected in Tripoli, Libyan waters



**Fig. 2.** Whole mount of *Synalpheus africanus* Crosnier & Forest, 1965 (A). collected *Synalpheus africanus* during this study with distinct morphological features (B)



**Fig3.***Synalpheus africanus*. (C). Ovigorous female, Lateral view (D). Anterior carapace, lateral view (E)

### Results and Discussion

For the first time, the investigated, *Synalpheus africanus* Crosnier & Forest, 1965 has been described as a new record from the Libyan Coast in the Mediterranean Sea. *Synalpheus africanus* has a total length ranged between 5-6mm. A little snapping prawn. A thin rostrum that inserts in the centre of a depression for separating the two acute orbital spines and extends at least as far as the distal third of the first article of the

antennular peduncle, the carapace's pterygostomial angle, which has an acute tooth. Stylocerite, beyond the middle second article of the antennular peduncle, is triangular and extremely sharp. Basicerite's external spine, which is sharp and twice as long as its internal spine, clearly exceeds the anterior extremity of the first antennular peduncle. The distal spiny tooth on the upper margin of the merus has a little downward bend. The fingers and palm of the minor cheliped

forceps are somewhat shorter than the height. The length of the second pereopod is equal; the forceps have slightly longer fingers than the palmar area, and the carpus has five fingers. The pleurons of the second abdominal segment are mostly rounded in both sexes, while those of the sixth abdominal segment form a slightly sharp, blunt-pointed angle. The first segment of the pleurons in males has strong, acute teeth that point backward and downward; the lower edges of the third and fifth segments of the pleurons are nearly straight and form an obtuse angle with the supero-posterior edge, while the lower edges of the fourth segment meet the supero-posterior edge at a right angle. Those of the females with an "appendix interna" on the second to fifth pair of pleopods; those of the males without an "appendix interna" or "appendix masculina". The dorsal side of the telson bears two pairs of thorns, one inserted towards its centre and the other at the level of the posterior quarter. It also has two pairs of posterolateral spines. The telson has very slightly concave lateral margins in its posterior half and a convex posterior margin (Fig. 3C,D,E).

Tropical *Synalpheus africanus* is found in the Eastern Atlantic: the Mediterranean Sea stretches from Gibraltar to Israel, Morocco, and Cape Verde, and the Gulf of Guinea stretches from the tropical Gulf of Guinea north to the warm-temperate waters of the Canary Islands, So Tomé and Príncipe, and Annobón (Crosnier and Forest, 1966; d'Udekem d'Acoz, 1999; Quiles et al., 2001; Bacci et al., 2010; Anker et al., 2012). It is evident that this species gets transported over the Strait of Gibraltar into the Mediterranean Sea. For the spread of decapod larvae, the Atlantic-Mediterranean connection across the Strait of Gibraltar is crucial (Pires et al., 2018). primarily free-ranging snapping prawns found among coralline algae and rock crevices, occasionally with *Antipathes* species in Cape Verde, *Mesophyllum lichenoides* in southern Spain, or *Dendrophyllia cornigera* in Israel (Anker et al., 2012). Due to its unique geographic location in the warm, central

region of the Mediterranean Sea, Libya may accommodate tropical species that are migrating from the east (of Indo-Pacific origin) or the west (of tropical Atlantic origin). Since the coastline is so long, there aren't many records of these species, or maybe they prefer the ecosystems in the eastern Mediterranean to those in the south (Shakman et al. 2017). In comparison to other Mediterranean nations, Libya has a comparatively low recorded number of alien species. For instance, according to Ben Amor et al. (2016), 136 foreign species were found in the waters around Tunisia, The paucity of taxonomic competence in some taxonomic groups, such as macrophytes and annelids, as well as the restricted research effort, despite its recent increase, can be used to explain this (Bazairi et al., 2013).

In conclusion, the present study confirms the existence of snapping shrimp *Synalpheus africanus* Crosnier & Forest, 1965 for the first time in the Libyan Mediterranean waters. From a protection and conservation point of view, further research on Crustacea diversity in the Libyan waters is required to monitor the existing species status and investigate the presence of new records, especially the non-indigenous ones. Finally, it is also essential to finalize an updated checklist of the marine alien species from the Libyan waters.

### Acknowledgements

We would like to thank Dr. Fabio Crocetta for his help in the classification and Mr. Mohammed bin Baraka for his help in collecting samples.

### References

1. Abdelsalam, K. M, ., & Hamdy R. (2018). First Record of *Synalpheus africanus* Crosnier & Forest, 1965 (Caridea, Alpheidae) in the Egyptian Mediterranean Coast. *Journal of King Abdulaziz University*, 28(2), 89-97.
2. Almeida, A.O., Terossi, M. and Mantelatto, F.L. (2014) Morphology and DNA analyses reveal a new cryptic snapping shrimp of the Alpheus

- heterochaelis Say, 1818 (Decapoda: Alpheidae) species complex from the western Atlantic. *Zoosystema*, 36: 53-71.
3. Anker, A. (2010). Gobiid Shrimps: A Worldwide Review. *Aquatic Biology*, 9(1), 291-317.
  4. Anker, A., Ah Yong, S. T., Noel, P. Y. and Palmer, A. R. (2006) Morphological phylogeny of alpheid shrimps: parallel preadaptation and the origin of a key morphological innovation, the snapping claw. *Evolution*, 60: 2507-2528.
  5. Anker, A., Komai, T. and Marin, I. N. (2015) A new echiuran associated snapping shrimp (Crustacea: Decapoda: Alpheidae) from the Indo-West Pacific. *Zootaxa*, 3914: 441-455.
  6. Anker, A., Pachelle, P.G., De Grave, S. and Hultgren, K. M. (2012) Taxonomic and biological notes on some Atlantic species of the snapping shrimp genus *Synalpheus* Spence Bate, 1888 (Decapoda, Alpheidae). *Zootaxa*, 3598: 1-96.
  7. Bacci, T., Marusso, V., Trabucco, B. and Magaletti, E. (2010) First record of *Synalpheus tumidomanus africanus* (Crosnier & Forest, 1965) (Caridea, Alpheidae) in Italian waters. *Crustaceana*, 83: 821-827.
  8. Bazairi, H., Sghaier, Y., Benamer, I., Langarh, H., Pergent, G., Borass, E., Verlaque, M., Ben Souissi, J., Zenetos, A. (2013) Alien marine species of Libya: first inventory and new records in El-Kouf National Park (Cyrenaica) and the neighboring areas. *Mediterranean Marine Science* 14(2): 451-462.
  9. Ben Amor K., Rifi M., Ghanem R., Draief I., Zaouali J., Ben Souissi J. (2016) Update of alien fauna and new records from Tunisian marine waters. *Medit Mar Sci* (17)1: 124-143.
  10. Bracken-Grissom, H. D. and Felder, D. L. (2014) Provisional revision of American snapping shrimp allied to *Alpheus floridanus* Kingsley, 1878 (Crustacea: Decapoda: Alpheidae) with notes on *A. floridanus africanus*. *Zootaxa*, 3914: 441-455.
  11. Crosnier, A. and Forest, J. (1965) Note préliminaire sur les Alpheidae recueillis par la Calypso dans l'Atlantique Oriental Tropical (Crustacea Decapoda Natantia). *Bulletin du Muséum national d'Histoire naturelle*, 36 (2): 602-610.
  12. Crosnier, A. and Forest, J. (1966) Résultats Scientifiques des Campagnes de la "Calypso". Fascicule VII. Campagne de la Calypso dans la Golfe de Guinée et aux Iles Principe, São Tomé et Annobon (1956), et campagne aux Iles du Cap Vert (1959) (suite). 19. Crustacés décapodes: Alpheidae. *Annales de l'Institut Océanographique*, 44: 199-314.
  13. d'Udekem d'Acoz, C. (1999) Inventaire et distribution des crustacés décapodes de l'Atlantique nord-oriental, de la Méditerranée et des eaux continentales adjacentes au nord de 25°N. Institut d'Ecologie et de Gestion de la Biodiversité, SPN, Muséum national d'Histoire naturelle, Paris, 383 pp.
  14. Dardeau, M. R. (1984) *Synalpheus* shrimps (Crustacea: Decapoda: Alpheidae) I. The Gambarelloides group, with a description of a new species. *Memoirs of the Hourglass Cruises*, 7 (II): 1-125.
  15. De Grave, S. and Fransen, C. H. J. M. (2011) Carideorum catalogus: the recent species of the dendrobranchiate, stenopodidean, procarididean and caridean shrimps (Crustacea: Decapoda). *Zoologische Mededelingen*, 85 (9): 195-589.
  16. García Raso, J. E. (1988) Consideraciones generales sobre la taxocenosis de crustáceos decápodos de fondos de concrecionamiento calcáreo superficial del alga *Mesophyllum lichenoides* (Ellis and Sol.) Lemoine (Corallinacea) del Mar de Alborán. *Investigación Pesquera*, 52: 245-264.
  17. García Raso, J. E. and Fernández Muñoz, R. (1988) Estudio de una comunidad de crustáceos decápodos de fondos "coralígenos" del alga *Calcarea mesophyllum lichenoides* del sur de España. *Investigación Pesquera*, 51: 301-322.

18. González-Pérez, J. A. (1995) Catálogo de los crustáceos decápodos de las Islas Canarias. Gambas. Langostas. Cangrejos. Publicaciones Turquesa S. L., Santa Cruz de Tenerife, 282 pp.
19. Govind, C. K., Wong, A. and Pearce, J. (1988) Experimental induction of claw transformation in snapping shrimps. *The Journal of Experimental Zoology*, 248: 371-375.
20. Koukouras, A. and Kattoulas, M. (1974) Benthic fauna of the Evvoia coast and Evvoia Gulf. III. Natantia (Crustacea, Decapoda). *Scientific Annals of the Faculty of Physics and Mathematics, University of Thessaloniki*, 14: 369-382.
21. Lagardère, J. P. (1971) Les crevettes des côtes du Maroc. *Travaux de l'Institut Scientifique Chérifien et de la Faculté des Sciences, Zoologie*, 36: 6-140.
22. Anker, A., Ahyong, S. T., Noel, P. Y. and Palmer, A. R. (2006) Morphological phylogeny of alpheid shrimps: parallel preadaptation and the origin of a key morphological innovation, the snapping claw. *Evolution*, 60: 2507-2528.
23. Lewinsohn, C. and Holthuis, L.B. (1964) New records of decapod Crustacea from the Mediterranean coast of Israel and the eastern Mediterranean. *Zoologische Mededelingen*, 40: 45-63.
24. Maccagno, T.P. (1939) Contributo alla conoscenza dei crostacei della Tripolitania. *Bolletino dei Musei di Zoologia e di Anatomia Comparata della R. Università di Torino* 47(108): 437-452.
25. Pires, R., Pan, M., Catalán, I., Prieto, L., Santos, M., Faria, C., Ferreira, S. and Santos, A. (2018) The Atlantic–Mediterranean ecological connection: a study on decapod larval communities. *Mediterranean Marine Science*, 19 (3): 477-490.
26. Quiles, J.A., Gonzáles, J. A. and Santana, J. I. (2001) Dendrobranchiata y Caridea nuevos o poco conocidos para las islas Canarias (Crustacea, Decapoda). *Boletín Instituto Español de Oceanografía*, 17: 7-13.
27. Rawag, A.A., Haddoud, D.A., Zgozi, S.W. (2004) Commercial demersal marine species of Libya. Report of the Expert Consultation on Spatial Distribution of Demersal Resources in the Straits of Sicily and the Influence of Environmental Factors and Fishery Characteristics. GCP/ ER/010/ITA/MSM-TD-02 MedSudMed Technical Documents 2: 102pp
28. Shakman, E., Ben Abdalha, A., Talha, F., Faturi, A., Bariche, M. (2017) First records of seven marine organisms of different origins from Libya (Mediterranean Sea). *BioInvasions Records* 6(4): 377-382.
29. Tigãnus, V. (1984) Contributions à la connaissance de la faune associée aux macrophytes de la cote lybienne de la Méditerranée. *Travaux du Muséum National d'Histoire Naturelle* 26: 61-68.
30. WoRMS (2018). *Synalpheus* Spence Bate, 1888. Accessed at: <http://www.marinespecies.org/aphia.php?p=taxdetail&s&id=106982&allchildren=1> on 2018-10-20.
31. Young, R. E., Pearce, J. and Govind, C. K. (1994) Establishment and maintenance of claw bilateral asymmetry in snapping shrimps. *Journal of Experimental Zoology*, 269: 319-326.
32. Zakhama-Sraieb, R., Yassine-Ramzi, S., Charfi-Cheikhrouha, F. (2009) Amphipod biodiversity of the Tunisian coasts: update and distributional ecology. *Marine Biodiversity Records* 2: e155.
33. Zhi-Qiang, Z.Q. (2011) Phylum Arthropoda von Siebold, 1848. *Zootaxa* 4138: 99-103.