# A new record and range extension of an invasive amphipod Caprella scaura Templeton, 1836 in Tunisia, North Africa

**Article** · December 2018

CITATION
1

READS
272

**3 authors:**

Chebaane Sahar
University of Sfax
**2** PUBLICATIONS **1** CITATION
SEE PROFILE

Moez Shaiek
National Institute of Agronomy, Tunis
**23** PUBLICATIONS **14** CITATIONS
SEE PROFILE

Rym Zakhama-Sraieb
Institut Supérieur de Biotechnologie de Sidi Thabet
**38** PUBLICATIONS **244** CITATIONS
SEE PROFILE

J. Black Sea/Mediterranean Environment
Vol. 24, No. 3: 255-262 (2018)

## SHORT COMMUNICATION

# A new record and range extension of an invasive amphipod *Caprella scaura* Templeton, 1836 in Tunisia, North Africa

**Sahar Chebaane[1,2], Moez Shaiek[3*], Rym Zakhama-Sraieb[4,5]**

[1] Association Notre Grand Bleu (NGB, NGO), Diar El Marina, 5000 Monastir, TUNISIA
[2] University of Monastir, Higher Institute of Biotechnology of Monastir, Research Laboratory Bioresources, Biology Integrative and Valorization LR14ES06, Monastir, TUNISIA
[3] Association Méditerranée Action-Nature(MAN, NGO), 01 rue d'Istanbul, 7000 Bizerte, TUNISIA
[4] University of Tunis El Manar, Faculty of Sciences of Tunis, Unity of Research of Bio-ecology and Evolutionary Systematics. S11UR11, Tunis, TUNISIA
[5] University of Manouba, High Institute of Biotechnology of Sidi Thabet, BiotechPôle, BP-66, 2020 Sidi Thabet, Ariana, TUNISIA

***Corresponding author:** shaiekmoez@yahoo.fr

**Abstract**

We report the presence of the invasive amphipod *Caprella scaura* Templeton 1836 in the Bizerte Lagoon (North of Tunisia) in November 2017. This lagoon is approximately 100 km north from the Tunis Lagoon where the presence of *C. scaura* was previously recorded in 2014. This new species record is considered as the most northern in the southern Mediterranean. This invasive species was found attached to *Cymodocea nodoa* leaves, and the presence of adult male and gravid female specimens provides the evidence of a viable population in the site. This study showed that fouling has a positive impact on the settlement success of invasive species. We hypothesize that *C. scaura* was probably introduced to the Bizerte Lagoon through the fouling community on shellfish farms. We suggest that Bizerte Channel, used as commercial and fishing navigation, is an interesting area for future monitoring studies.

**Keywords:** *Caprella scaura*, invasive species, new record, Bizerte Lagoon, Tunisia

**Received:** 05.06.2018, **Accepted:** 12.08.2018

*Caprella scaura* Templeton, 1836 is a caprellid amphipod native to the western Indian Ocean. This amphipod is considered as the first alien caprellid and the most widespread introduced species in the Mediterranean Sea. It was recorded in 1994 for the first time in the Mediterranean Sea from Venice Lagoon in Italy (Sconfietti and Danesi 1996). Since then, it has been reported from several

localities along the Mediterranean countries, from Greece in 2002 (Krapp *et al*. 2006), Spain in 2005 (Martinez and Adarraga 2008), Turkey in 2008 (Bakir and Katagan 2011), Tunisia in 2009 (Ben Souissi *et al.* 2010), Malta in 2010 (Fernandez-Gonzalez *et al.* 2011), Morocco in 2011 (Ros *et al*. 2014) and France in 2012 (Ros *et al.* 2014).

In the southern Mediterranean coast, it was recorded only in three localities; 1) Marina Smir in Morocco (35º45'N; 5º20'W) associated with fouling bryozoans in 2011 (Ros *et al.* 2014), 2) on the south of Tunisia in Boughrara Lagoon (33º 55'N; 10º71'W) and El Bibane Lagoon (33º27'N; 11º26'W) associated with *Gracillaria* and *Polysiphonia* in shallow water in 2009 (Ben Soussi *et al.* 2010) and 3) in the northern coast in Tunis Lagoon (36º47'N; 10º17'W) in muddy and rocky bottoms in 2014 (Ounifi Ben Amor *et al.* 2017).

In this paper, we present a new record of *C. scaura* showing that this species has expanded its distribution eastwards in the Mediterranean Sea. Photos and description of specimens are given for the first time from the Tunisian coasts. This new record proves the "environmental resistance" and we assume the presence of this species on the whole Tunisian coastal waters and probably on the all southern Mediterranean coasts.

*Study site*

Bizerte Lagoon (37º08´-37º15´N; 9º45´- 9º57´E) is a saltwater lagoon lying on the northern Tunisia, with an area of over 150 $km^2$. This lagoon is an artificial lagoon connected to the sea only via a 6-km-long channel (Bizerte Channel) which opens in the Bay of Bizerte (Ben Amer *et al.* 2018). The area is under human impacts (urban and industrial) especially by the shellfish farming (Grami *et al.* 2008).

*Sampling*

In the framework of the activities conducted by the associations Notre Grand Bleu and Méditerranée Action Nature, the sampling was carried out in the Bizerte Lagoon in November 2017 in shallow water (0-1 m depth) to identify the invertebrates attached to *Cymodocea nodosa* leaves. A sample of shoots of *C. nodosa* were collected manually by hands, the associated fauna were extracted using forceps and preserved in 70 % ethanol. In the laboratory BIOLIVAL, the specimens of *C. scaura* were sorted, identified and photographed using a stereo-microscope (Leica MS-5).

The identification of *C. scaura* (Caprellidae, Templeton 1836) specimens was based on the morphological descriptions according to Templeton (1836) and Krapp *et al.* (2006).

*Systematics*

Order AMPHIPODA Latreille, 1816

Suborder SENTICAUDATA Lowry and Myers, 2013

Infraorder COROPHIIDA Leach, 1814

Family CAPRELLIDAE Leach, 1814

Subfamily CAPRELLINAE Leach, 1814

Genus *Caprella* Lamarck, 1801

*Caprella scaura* Templeton, 1836

*Material examined*

Two specimens, one adult male and one ovigerous female, were examined in detail. They were collected in the north-eastern part of the lagoon around a sandy lido or "lagooner islets" which is a newly formed island namely north-eastern islets (Shaiek *et al*. 2017) on 18 November 2017 at 37º13'12.3''N-9°56'1.84"E GPS position at 0.5 m depth (Figure 1). The specimens have been deposited in the laboratory BIOLIVAL, Faculty of Science of Monastir, Tunisia.

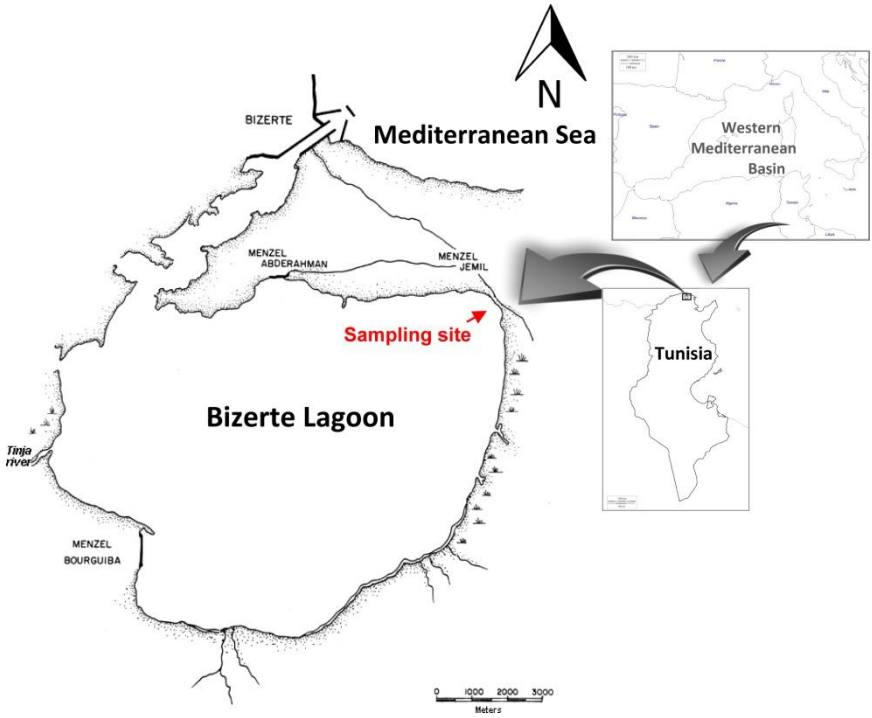


**Figure 1.** Map of the Bizerte Lagoon area showing the location of the sampling site

*Male description*

Length 17 mm, body with anteriorly cephalic spine. Antenna 1 approximately longer than one-half of the body length (Figure 2a). Head convex without rostrum. Occipital spine is acute and well visible (Figure 2b). Pereonites 1-5 dorsally smooth, without ventral spine. Propodus of gnathopod 2 is elongated and each palm bears two strong teeth (Figure 2c). Gills are elongated and elliptical (Figure 2d).

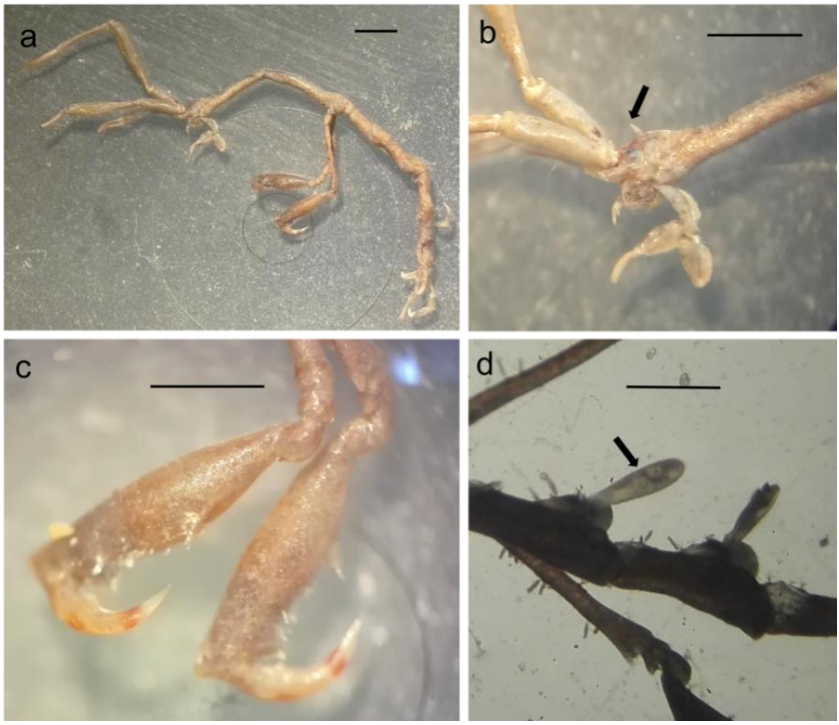


**Figure 2.** *Caprella scaura* adult male (a) entire animal, (b) head with the arrow showing the occipital spine, (c) gnathopod 2, (d) elliptical and elongate gills indicated by the arrow (Scale bar: 1mm)

*Female description*

Length 13 mm. Body with anteriorly cephalic spine, with variously developed knobs on some pereointes (Figure 3a). Head convex, lacking rostrum. Occipital spine acute and very well developed as the male (Figure 3b). Dorsal processes in pereonites without ventral spine. Gnathopods 2 basis much shorter than pereon segment 2; propodus of gnahopod 2 not elongated, palm with proximal spine, and small distal tooth (Figure 3c). Pereopds similar to the males.

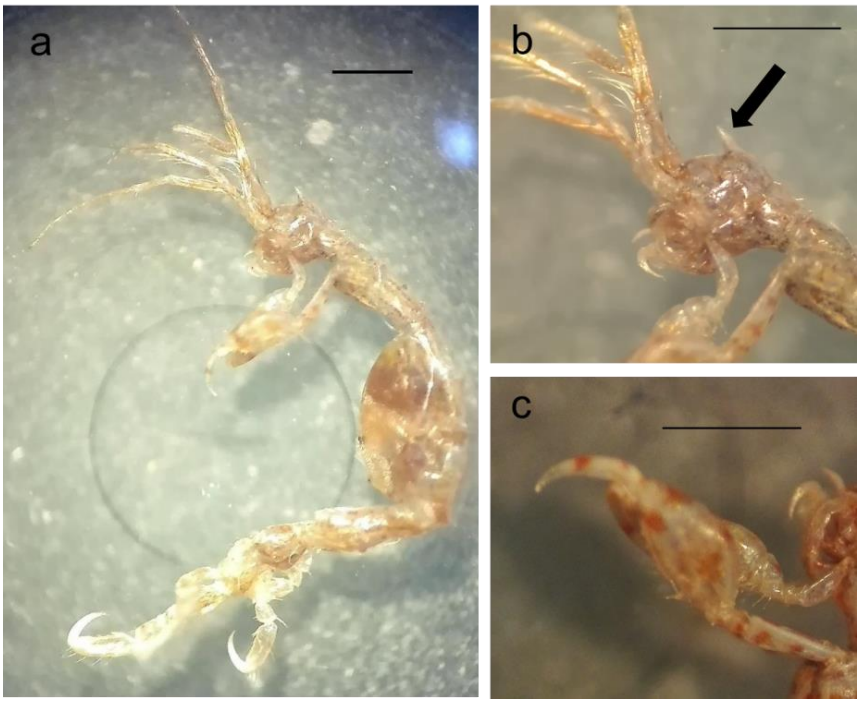


**Figure 3.** *Caprella scaura* adult female (a) entire animal, (b) head with the arrow showing the occipital spine, (c) gnathopod 2. (Scale bar: 1mm)

Six non-indigenous amphipods have been recorded in the Tunisian coasts: *C. scaura*, *Gammaropsis togensis*, *Hamimaera hamigera*, *Cymadusa filosa*, *Elasmopus pectenicrus* and *Stenothoe gallensis* (Zakhama-Sraieb *et al*. 2017). Most of those species were found in the coastal lagoons. According to Ounifi-Ben Amor *et al.* (2017), 16% of the alien fauna in Tunisia was recorded for the first time in lagoons. *C. scaura* is reported in four lagoons, namely, Bizerte, Tunis, Boughrara and El Bibane lagoons. However, it was never collected in open marine water until now. Hence, lagoons are considered as areas of refuge, transit and acclimatization of exotic species.

*C. scaura* is among the most widespread introduced species in the Mediterranean Sea; it can tolerate a wider range of temperature where it seems to be displacing an ecologically similar congener, *Caprella equilibra* (Say 1818) (Ros *et al.* 2017). Due to the occurrence of ovigerous females, it is probable that the population is well established in Bizerte Lagoon. In the climate change context, an increase in water temperature may favour the invasion success of *C. scaura* in invaded habitats subjected to salinity fluctuations (Ros *et al.* 2017) like the Bizerte Lagoon. Moreover, the greatest threat for such a closed ecosystem, is the combination between invasive species establishment and habitat degradation (Strayer and Dudgeon 2010). Indeed, Bizerte Lagoon ecosystem is affected by

various anthropogenic activities, including domestic sewage input, industrial waste, atmospheric pollution and as well as shellfish farming (mussel and oyster) (Grami *et al.* 2008; Béjaoui *et al.* 2008). According to Afli *et al.* (2008), shellfish farming is the third most important vector of non-indigenous species introduction, with an unintentionally introduced species via fouling organisms on oysters (Streftaris *el al.* 2005). However, in our case, *C. scaura* were found attached to a leaf of *Cymodocea nodosa* with other epiphytic hydroids. Thus epiphytic hydroids and fouling have a positive relationship for the establishment success of alien Caprellid in marine and coastal brackish ecosystems (Cunha *et al*. 2018; Ros *et al.* 2014). We hypothesize that *C. scaura* was probably introduced to the Bizerte Lagoon through the fouling community on oyster (note that the sampling location of *C. scaura* is very close to the mussel and oyster farms, in this north-eastern part of the lagoon) or perhaps via fouling on commercial ships and/or small boats (mainly fishing boats) during their cruise through the Bizerte Channel from the sea to the lagoon. Consequently, this canal which represents the only connection between the lagoon and the Mediterranean Sea seems to be an interesting area to monitor non-indigenous species.

**Acknowledgments**

We are grateful to the lab BIOLIVAL LR14ES06 for providing us the laboratory logistic support to identify and to photograph the Caprellid samples under the binocular stereomicroscope. This work results from a joint fieldwork on the site of north-eastern islets of Bizerte Lagoon in November 2017 and was done as a part of the partnership between the Association "Méditerranée Action-Nature" (MAN) and the Association "Notre Grand Bleu" (NGB).

## References

Afli, A., Ayari R., Zaabi, S. (2008) Ecological quality of some Tunisian coast and lagoon locations, by using benthic community parameters and biotic indices. *Estuar Coast Shelf Sci* 80: 269-280.

Bakir, K., Katagan, T. (2011) On the occurrence of *Caprella scaura* Templeton, 1836 (Crustacea: Amphipoda) in Turkish waters. *Zool Middle East* 52: 125-126.

Béjaouia, B., Harzallaha A., Moussab M., Chapellec A., Solidorod, C. (2008) Analysis of hydrobiological pattern in the Bizerte lagoon (Tunisia). *Estuar Coast Shelf Sci* 80(1): 121-129.

Ben Amer, I., Jaziri, S., Aissi, M., Ben Haj, S., Ouni, R., Nefla, A., Shaiek, M. (2018) New important site for birds nesting and biodiversity in Bizerte Lagoon (northeast Tunisia) - Proceeding Association Méditerranée Action-Nature (MAN, NGO) / The Regional Activity Centre for Specially Protected Areas (RAC-SPA). Premier Congrès Nord-Africain d'Ornithologie et Quatrième Colloque

International d'Ornithologie Algérienne Université Abderrahmane MIRA, Bejaia, Octobre 2017 (in press).

Ben Souissi, J., Kahri, C., Ben Salem, M, Zaouali, J. (2010) Les espèces non indigènes du macrobenthos des lagunes du sud-est tunisien: point sur la situation. *Rapp Comm int Mer Medit* 39: 449.

Cunha, A.F., Maruyama, P.K., Jacobucci, G.B. (2018) Epiphytic hydroids (Cnidaria, Hydrozoa) contribute to a higher abundance of Caprellid amphipods (Crustacea, Peracarida) on macroalgae. *Hydrobiologia* 808(1): 251-264.

Fernandez-Gonzalez, V., Png-Gonzalez, L., Sánchez-Jerez, P. (2011) Amphipods associated with fish farm fouling: an overview on the Mediterranean Sea. In: Monitoring European Biodiversity: the role and importance of amphipod crustaceans, 27-29 September 2011, Palermo, Italy, pp. 55-56.

Grami, B., Niquilb, N., Hlailia, A.S., Gosselinc, M., Hamelc, D., Hadj Mabrouk, H. (2008) The plankton food web of the Bizerte Lagoon (South-western Mediterranean): II. Carbon steady-state modelling using inverse analysis. *Estuar Coast Shelf Sci* 79: 101-113.

Krapp, T., Lang C., Libertini, A., Melzer, R.R. (2006) *Caprella scaura* Templeton 1836 *sensu lato* (Amphipoda: Caprellidae) in the Mediterranean. *Org Divers Evol* 6: 77-81.

Martínez, J., Adarraga, I. (2008) First record of invasive caprellid *Caprella scaura* Templeton, 1836 *sensu lato* (Crustacea: Amphipoda: Caprellidae) from the Iberian Peninsula. *Aquat Invasions* 3: 165-171.

Ounifi-Ben Amor, K., Ben Amor, M.M., Rifi M., Ben Souissi, J. (2017) Diversity of crustacean species from Tunis Southern Lagoon (Central Mediterranean) after an ecological restoration. *Cah Biol Mar* 58(1): 49-57.

Ros, M., Guerra-García, J.M., Navarro-Barranco, C., Cabezas, M.P., Vázques-Luis, M. (2014) The spreading of the non-native caprellid (Crustacea: Amphipoda) *Caprella scaura* Templeton, 1836 into southern Europe and northern Africa: a complicated taxonomic history. *Med Mar Sci* 15: 145-155.

Ros, M., Rivera-Ingraham, G., Guerra-García, J.M., Lignot, J.H. (2017) Ecophysiological performance of coexisting caprellids: new insights into mechanisms underlying invasive success. *Biodiversity Journal* 8(2): 435-436.

Sconfietti, R., Danesi, P. (1996) Structural variations in Peracarids communities at the opposite extremes of the Malamocco basin (Lagoon of Venice). *Atti Soc Ital Ecologia* 17: 407-410.

Shaiek, M., Ben Amer I., El Mokni R., Jaziri S., Aissi M., Ben Haj, S. (2017) Genesis of Islets in Bizerte Lagoon: Settlement of Pioneer Species. Proceeding Association Méditerranée Action-Nature (MAN, NGO)/ The Regional Activity Centre for Specially Protected Areas (RAC-SPA). 2nd Mediterranean Conference Biodiv 2017 October 2017, Monastir (Tunisia).

Strayer, D. L., Dudgeon, D. (2010) Freshwater biodiversity conservation: recent progress and future challenges. *J N Am Benthol Soc* 29: 344-358.

Streftaris, N., Zenetos A., Papathanassiou, E. (2005) Globalisation in marine ecosystems: the story of non-indigenous marine species across European seas. *Oceanography and Marine Biology - An Annual Review* 43: 419-453.

Templeton, R. (1836) Descriptions of some undescribed exotic Crustacea. *Transactions of the Entomological Society of London* 1: 185-198.

Zakhama-Sraieb, R., Mnasser I., Zribi I., Charfi-Cheikhrouha, F. (2017) Update of checklist of marine Amphipoda in Tunisia from 2009 to April 2017. *Biodiversity Journal* 8(2): 493-496.