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First record of the cryptogenic amphipod *Ampithoe bizseli* (Ampithoidae) in the European Atlantic waters

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Abstract

The amphipod *Ampithoe bizseli* Özaydinli and Coleman, 2012 is a cryptogenic species that was recently described in Turkey. Although to date it has only been recorded in the Mediterranean Basin, it is potentially native to the Red Sea and Indian Ocean. During a macrozoobenthos sampling campaign carried out in the Canary Islands in 2023, 25 individuals of *A. bizseli* were found in association with some fish farm facilities. This work represents the first report of this amphipod in European Atlantic waters and increases knowledge of the ecology of this non-indigenous species.

Introduction

The family Ampithoidae Boeck, 1871 is highly diverse and represents the most specious family of algae-dwellers herbivorous amphipods (Myers and Lowry, 2003; Poore *et al.*, 2008; Hughes and Peart, 2013; Sotka *et al.*, 2017). Ampithoids are cosmopolitan and are generally found in a wide range of vegetated shallow water marine environments (Poore and Lowry, 1997; Poore *et al.*, 2008; Peart and Ahyong, 2016). These peracarids can be locally very abundant and exert a significant influence on the structure of the host algal community (Duffy and Hay, 2000; Poore *et al.*, 2008; Peart and Ahyong, 2016). This taxon comprises 16 genera and 246 species (Horton *et al.*, 2024), all characterized by an entire and dorsoventrally thickened telson and the outer ramus of uropod 3 armed with 1 or 2 recurved and robust apical setae (Barnard and Karaman, 1991; Myers and Lowry, 2003; Sotka *et al.*, 2017). *Ampithoe* Leach, 1814 is the most speciose genus belonging to the family Ampithoidae and these amphipods are associated with a very high diversity of habitats such as soft and hard substrates, marine phanerogams, algae, corals and anthropogenic substrates (Poore and Lowry, 1997; Peart, 2007). Species belonging to this genus can be identified by certain common morphological characters such as: entire and thickened telson which can be armed with enlarged hooks or little knobs, striate setae on the distal margin of the propods and an atypical lower lip (Peart, 2007; Peart and Ahyong, 2016; Iwasa-Arai *et al.*, 2024). Nine species of this genus have been reported in European waters (Costello *et al.*, 2001) and among them *Ampithoe bizseli* Özaydinli and Coleman, 2012 was recently described in the Mediterranean basin (Özaydinli and Coleman, 2012). To date, only two species of *Ampithoe* are recorded from the Canary Islands: *Ampithoe ramondi* Audouin, 1826 and *Ampithoe rubricata* (Montagu, 1808) (Krapp-Schikel and Ruffo, 1990; Navarro-Mayoral *et al.*, 2020; Ugalde-Pozo and Riera, 2024). *Ampithoe bizseli* Özaydinli and Coleman, 2012 was described from Izmir Bay and until now was reported only for Turkey, Tanzania and Cyprus (Özaydinli and Coleman, 2012; Ulman *et al.*, 2017). Although this species has been reported from the Mediterranean Sea, some authors considered *A. bizseli* cryptogenic (Marchini and Cardeccia, 2017) and potentially native to the Red Sea and Indian Ocean (Ulman *et al.*, 2017; Bilecenoğlu and Çınar, 2021). In this work, for the first time, we report *A. bizseli* in the European Atlantic water and provide new information on the ecology and distribution of this species. Finally, this manuscript presents a dichotomous key and a descriptive table that facilitates the accurate identification of the three *Ampithoe* species that inhabit the waters of the Canary Islands.

Materials and methods

During a sampling campaign conducted on 10th October 2023 in an aquaculture facility located near the marinas of Los Cristianos, Island of Tenerife (Canaries Islands, Spain, Eastern Atlantic Ocean) (28.0333°N, 16.7124°W) (Figure 1), 25 individuals of *A. bizseli* were sampled from artificial hard substrates. Specifically, the specimens were found in association with fouling assemblages colonizing fish cages at a depth of approximately 0.5 m. The macrozoobenthos samples were collected using a $20 \times 20\ cm^2$ hand-operated net (0.5 mm mesh size), provided with a stainless-steel blade on the board. All the collected materials were fixed in 85% ethanol and preserved in 75% ethanol. In the laboratory the

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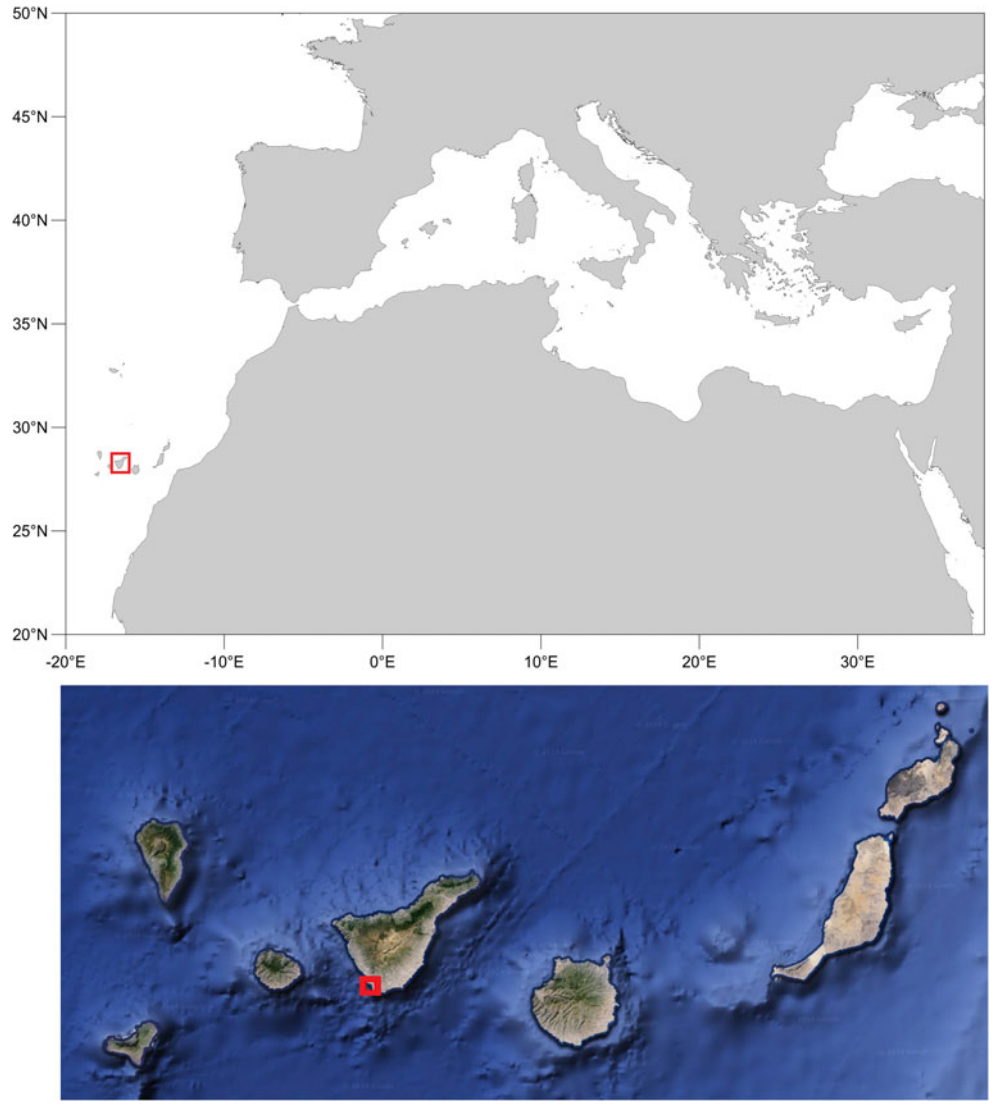

Figure 1. Map of study area.

collected material was sorted and the macrozoobenthic species were identified under a stereomicroscope (Olympus SZX-16) and optical microscope (Leica DM2000LED). All the specimens of *A. bizseli* (Figure 2A) were identified following Özaydinli and Coleman (2012) and were also achieved through direct comparison with some individuals of *A. ramondi*. All the individuals are deposited in the marine invertebrate collection of the Museum of Marine Biology 'Pietro Parenzan' of the University of Salento (Porto Cesareo, Italy), collection code: CA-CAN1123-AB01.

The original descriptions of the species previously recorded in the Canary Islands, together with the subsequent manuscripts, formed the basis for the development of the key and Table 1: Sars (1890); Ruffo (1982); Barrett (1966); Lincoln (1979); Uryupova (2005).

Results

All sampled and analysed individuals of the genus *Ampithoe*, representing by 16 males and 9 females, were found to be *A. bizseli*, their total length was between 10.5 and 7 mm. The distinctive morphological characters of the males analysed corresponded with those described by Özaydinli and Coleman (2012). These authors pointed out that the species resembles *A. ramondi* and therefore we performed a direct comparison between the two species to validate our identifications. Specifically, the diagnostic characteristics to distinguish these two species are: propodus of gnathopod 2 subrectangular with a conspicuous anterodistal lobe and a long and pointed posteromarginal tooth (Figures 2B, 3A); ischium of gnathopod 2 characterized by an anterior margin produced into a large circular lobe (Figures 2C, 3B); shape of gnathopod 1 (Figures 2D, 3C) and margin of its ischium extended into a rather narrow anteroventrally directed lobe (Figures 2E, 3D); third article of maxilliped palp inflated (Figures 2F, 3E).

Furthermore, male individuals of *A. bizseli* were compared with several descriptions of *A. rubricata* (Montagu, 1808; Sars, 1890; Barrett, 1966; Lincoln, 1979; Uryupova, 2005). The diagnostic characters useful for distinguishing the three species of *Ampithoe* occurring in the Canary Islands are detailed in Table 1.

Finally, we provide a dichotomous key useful for the correct identification of males of the three species of Canary Island *Ampithoe*.

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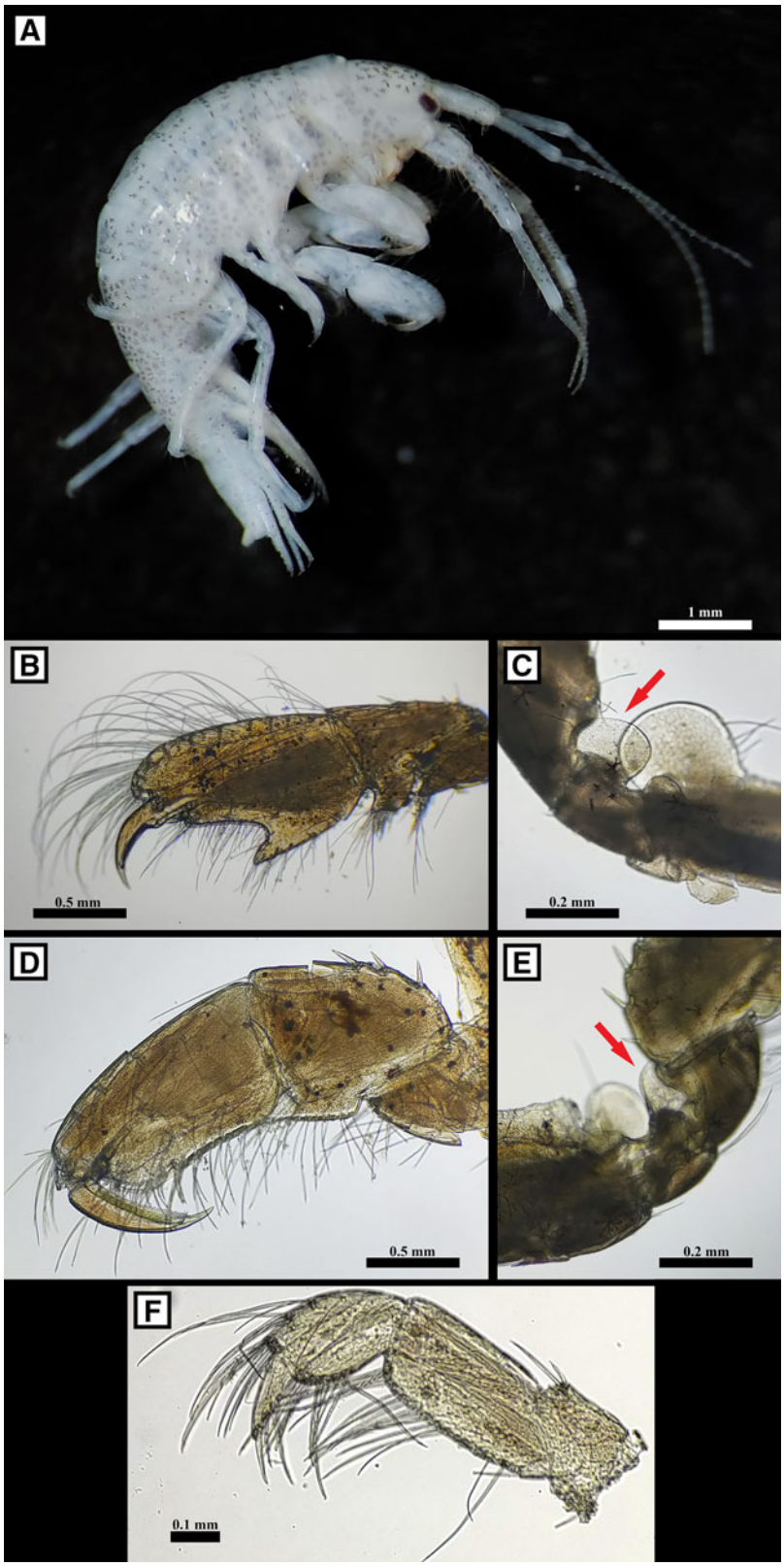

Figure 2. Male individual of *Ampithoe bizseli*, diagnostic characters. (A) Whole specimen; (B) gnathopod 2; (C) ischium of gnathopod 2, the red arrow indicates the circular lobe; (D) gnathopod 1; (E) ischium of gnathopod 1, the red arrow indicates the anteroventrally directed lobe; (F) maxilliped palp.

1. ♂ Gn 1-2 ischium without distal lobe; Gn2 propodus with weakly concave palm . . . . . ***A. rubricata***
   ♂ Gn 1-2 ischium with distal lobe; Gn2 propodus with strongly concave palm **2**

2. ♂ Gn 2 ischium with anterior margin produced into a rather narrow anteroventrally directed lobe; third article of maxilliped palp subrectangular . . . . . ***A. ramondi***
   ♂ Gn 2 ischium with anterior margin produced into a large circular lobe that is directed anteriorly; third article of maxilliped palp inflated . . . . . ***A. bizseli***

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Table 1. Distinctive diagnostic characteristics, distribution, type locality and habitat and of the three species of Ampithoe species recorded in Canary waters

	A. bizseli	*A. ramondi*	*A. rubricata*
Eyes shape	Large, oval	Moderately large, rounded	Very small, oval
3rd article of the maxilliped palp	Inflated	Subrectangular	Subrectangular with sinuous outer edge
Gn 2 propodus distal lobe	Very large	Large	Without lobe
Gn 2 propodus postero-marginal tooth	Very long	Long	Short
Gn 2 propodus excavation of the palm	Weakly concave	Strongly concave	Weakly concave
Gn 2 ischium antero-marginal lobe	Large, circular and directed anteriorly	Drawn out into a rather narrow anteroventrally directed lobe	Without lobe
Gn 2 basis antero-distal lobe	Very large, rounded	Large, rounded	Small, subtriangular
Gn 1 ischium inner distal lobe	Long, oval	Long, oval	Small, straight outer edge
Ur3 outer ramus	Without group of dorsal setae	Without group of dorsal setae	With group of dorsal setae
Telson shape	Subtrapezoidal, without apical cusps	Subtrapezoidal, two distal protuberances on each apical corner	Rounded, two distal cups on each apical corner
Telson setae	2 pairs of lateral setae and 1 pair of disto-lateral plumose setae	2 long setae between the distal protuberances and 4–6 shorter marginal setae	3 slender setae on each cup
Habitat	Hard substrates, algae and Hydrozoan.	Rocky substrates, algae, seagrasses and anthropogenic substrates.	Rochy substrates and algae.
Type locality	Turkey, Izmir, Çesme Peninsula	Egypt	United Kingdom, Devonshire
Distribution	Mediterranean Sea, west coast of Turkey and east coast of Africa.	Mediterranean Sea, Atlantic Ocean, Indian Ocean and Red Sea	North Atlantic Ocean; North Pacific Ocean, Arctic Ocean and European Atlantic Coasts.

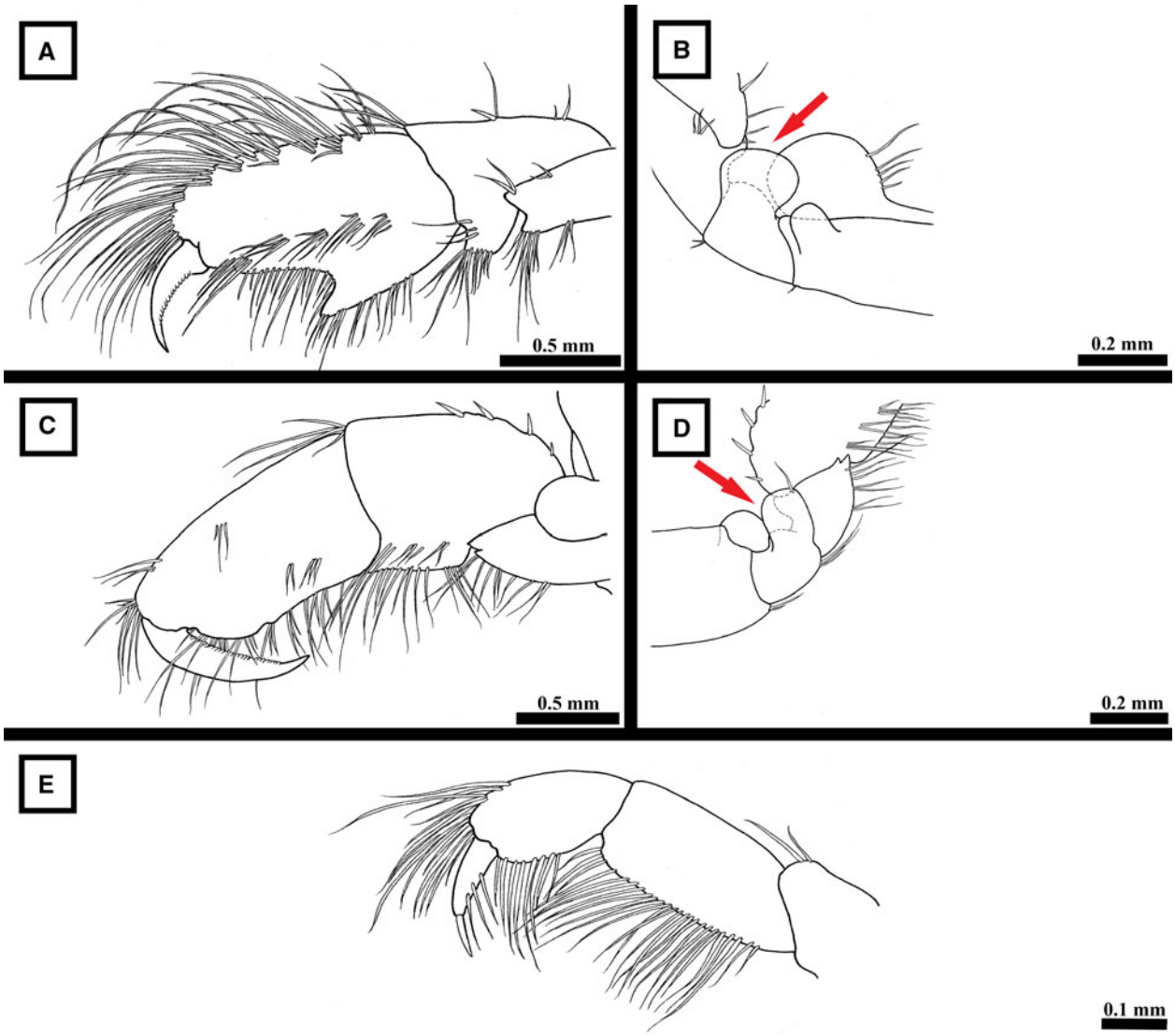

Figure 3. Drawings of dignostic characters useful for the identification of *Ampithoe bizseli*: (A) gnathopod 2; (B) ischium of gnathopod 2, the red arrow indicates the circular lobe; (C) gnathopod 1; (D) ischium of gnathopod 1, the red arrow indicates the anteroventrally directed lobe; (E) maxillary palpus.

Discussion

Ampithoe bizseli is considered to be a non-indigenous species in the Mediterranean (Marchini and Cardeccia, 2017; Ulman *et al.*, 2017; Bilecenoğlu and Çınar, 2021) and, like other species that lack the capacity for wide natural dispersal, this amphipod was probably introduced and spread secondarily by recreational boating through hull fouling (Ulman *et al.*, 2017). Additionally, it is conceivable that the distribution of this species in the Mediterranean and Tanzania has been underestimated, as it has likely been misidentified on numerous occasions as *A. ramondi* (Özaydinli and Coleman, 2012; Ulman *et al.*, 2017). Several studies have demonstrated that anthropogenic hard bottoms represent a preferred substrate for the colonization by non-native amphipods (Ros and Guerra-Garcia, 2012; Ros *et al.*, 2013, 2016; Bonifazi *et al.*, 2018; Ulman *et al.*, 2017; Guerra-Garcia *et al.*, 2013). In this context, anthropogenic fouling-rich surfaces facilitate colonization by non-native species, acting as a source of food and providing shelter and protection for many macrozoobenthic invertebrate species due to their structural complexity (Jenkins and Martins, 2010; Lezzi *et al.*, 2018; Lezzi and Giangrande, 2018). Furthermore, artificial substrates are regarded as a potential conduit for the dispersal of allochthonous and potentially invasive species, acting as a 'springboard' for these organisms (Mineur *et al.*, 2007; Giangrande *et al.*, 2021). The finding of *A. bizseli* in association with fish farm facilities leads us to this conclusion, as these conditions have been observed by other authors for other non-indigenous amphipods (Savini *et al.*, 2010; Fernandez-Gonzalez and Sanchez-Jerez, 2014; Fernandez-Leborans *et al.*, 2016). These anthropogenic structures could be considered an additional vector for the transport and dissemination of this species. In fact, the analysis of the fouling macrozoobenthic community with which our *A. bizseli* individuals were associated revealed the presence of other non-indigenous amphipods: the stenothoid *Stenothoe georgiana* Bynum and Fox, 1977, the ischyrocerid *Ericthonius didymus* Krapp-Schickel, 2013 and the cryptogenic maerid *Elasmopus rapax* A. Costa, 1853. Regarding *Ericthonius didymus*, this work represents the first report of this species in the area, but it must be highlighted that this report, like the others from the Mediterranean, probably refers to the alien Indo-Pacific species *Ericthonius pugnax* (Dana, 1852) (Ulman *et al.*, 2017). Furthermore, given that *A. bizseli* has only been observed in the Mediterranean, it is plausible that it reached the Atlantic via the Strait of Gibraltar. Although our study represents the first report of *A. bizseli* in the Atlantic, further research is required to ascertain whether the species spread

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into the Atlantic waters via the Strait of Gibraltar or whether this amphipod was already present in the coastal areas of the Canaries. It is possible that *A. bizseli* had already been present in the coastal waters of these islands for some time but was misidentified as *A. ramondi*. This work contributes to expanding knowledge on the distribution of this cryptogenic species and represents the first report of *A. bizseli* in the Atlantic Ocean. Given that *A. bizseli* is regarded as an invasive species, it is imperative to maintain surveillance of the study area to ascertain whether the species is extending its range into neighbouring regions.

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Author contributions. D. A. collected and analysed the specimens and wrote the manuscript. E. M. analysed, drew and photographed the specimens at stereo and optical microscope and wrote the manuscript. All authors read and approved the final version of the manuscript.

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Competing interest. None.

Data availability statement. The authors confirm that the data supporting the findings of this study are available within the article [and/or its supplementary materials].

References

Audouin V (1826) Explication sommaire des planches de Crustaces de l'Egypte et de la Syrie, publiees par Jules-Cesar Savigny, membre de l'Institut; offrant un expose des caracteres naturels des genres, avec la distinction des especes. In: Savigny, J. C., Description de l'Egypte, ou recueil des observations et des recherches qui ont ete faites en Egypte pendant l'expedition de l'armee francaise, publiee par les ordres de sa Majeste l'Empereur Napoleon le Grand. Animaux invertebres. 1 (4). Histoire naturelle, Imprimerie imperiale, Paris, 77–98.

Barnard JL and Karaman GS (1991) The families and genera of marine gammaridean Amphipoda (except marine gammaroids). *Records of the Australian Museum, Supplement* **13**, 1–866.

Barrett BE (1966) A contribution to the knowledge of the amphipodous crustacean, *Ampithoe valida*, smith 1873. *University of New Hampshire*, 1–11.

Bilecenoğlu M and Çınar ME (2021) Alien species threat across marine protected areas of Turkey-an updated inventory. *Journal of Marine Science and Engineering* **9**, 1077.

Boeck A (1871) Crustacea amphipoda borealia et arctica. *Forhandlinger i Videnskabs-Selskabet i Christiania* **1870**, 83–280.

Bonifazi A, Mancini E and Ventura D (2018) First record of the invasive and cryptogenic species *Jassa slatteryi* (Crustacea: Amphipoda) in Italian coastal waters. *Journal of Sea Research* **136**, 37–41.

Bynum KH and Fox RS (1977) New and noteworthy amphipod crustaceans from North Carolina, U.S.A. *Chesapeake Science* **18**, 1–33.

Costa A (1853) Richerche sui crostacei amfipodi del regno di Napoli / del Dot. Achille Costa. *Mem. Reale Accad. Sc. Napoli* **1**, 165–235.

Costello MJ, Emblow CS and White R (2001) European register of marine species. a check-list of the marine species in Europe and a bibliography of guides to their identification. *Patrimoines Naturels* **50**, 1–463.

Dana JD (1852) Conspectus crustaceorum quae in orbis terrarum circumnavigatione, Carolo Wikles e classe Reipublicae Faederatae Duce, lexit et descripsit Jacobus D.Dana, Pars III (Amphipoda n°1). *Proceedings of the American Academy of Arts and Sciences* **2**, 201–220.

Duffy JE and Hay ME (2000) Strong impacts of grazing amphipods on the organization of a benthic community. *Ecological monographs* **70**, 237–263.

Fernandez-Gonzalez V and Sanchez-Jerez P (2014) First occurrence of *Caprella scaura* Templeton, 1836 (Crustacea: Amphipoda) on off-coast fish farm cages in the Mediterranean Sea. *Helgoland Marine Research* **68**, 187–191.

Fernandez-Leborans G, Fernandez-Gonzalez V, Sanchez-Jerez P and Roura A (2016) Epibiontic associations between apostomid ciliates *Conidophrys* spp. and amphipods associated with fish farms fouling in the western Mediterranean Sea. *Helgoland Marine Research* **70**, 1–11.

Giangrande A, Arduini D, Borghese J, Del Pasqua M, Lezzi M, Petrocelli A, Cecere E, Longo C and Pierri C (2021) Macrobenthic success of non-indigenous species related to substrate features in the Mar Grande of Taranto, Italy (Mediterranean Sea). *BioInvasions Record* **10**, 238–256.

Guerra-Garcia JM, Revanales T, Saenz-Arias P, Navarro-Barranco C, Ruiz-Velasco S, Pastor-Montero M, Sempere-Valvedrde J, Chebaane S, Velez-Ruiz A, Martinez-Laiz G, Santos-Simon M, Ferrario J, Marchini A, Nour OM, Gouuillieux B, Hosie AM, Gerovasilieu V, Carvalho S, Balistrieri P, Sirchia B, Ruvolo V, Mancini E, Bonifazi A, Tempesti J, Tiralongo F, Ignoto S, Fernandez-Gonzalez V, Vazquez-Luis M, Cabezas MP and Ros M (2013) Quick spreading of the exotic amphipod *Laticorophium baconi* (Shoemaker, 1934): another small stowaway overlooked? *Mediterranean Marine Science* **24**, 644–655.

Horton T, Lowry, J, De Broyer C, Bellan-Santini D, Copilas-Ciocianu D, Corbari L, Costello MJ, Daneliya M, Dauvin JC, Fišer C, Gasca R, Grabowski M, Guerra-García JM, Hendrycks E, Hughes L, Jaume D, Jazdzewski K, Kim YH, King R, Krapp-Schickel T, LeCroy S, Lörz AN, Mamos T, Senna AR, Serejo C, Souza-Filho JF, Tandberg AH, Thomas JD, Thurston, M, Vader W, Väinölä R, Valls Domedel G, Vonk R, White K and Zeidler W (2024) World Amphipoda Database. Ampithoidae Boeck, 1871. Accessed through: World Register of Marine Species at: https://www.marinespecies.org/aphia.php?p=taxdetails&id=101366 on 2024-10-19.

Hughes LE and Peart RA (2013) New species and new records of Ampithoidae (Peracarida: Amphipoda) from Australian Waters. *Zootaxa* **3719**, 1–102.

Iwasa-Arai T, Siqueira SG, Sobral-Souza T, Leite FP and Andrade SC (2024) Continent-island boundary and environment-shaped evolution in the marine amphipod *Ampithoe marcuzzii* complex (Crustacea: Eumalacostraca: Ampithoidae). *Scientific Reports* **14**, 608.

Jenkins SR and Martins GM (2010) Succession on hard substrata. *Biofouling* **456**, 60–72.

Krapp-Schickel T (2013) New or amended data on Mediterranean Amphipoda: genera *Dexamine*, *Ericthonius* and *Stenothoe*. *Zootaxa* **3613**, 125–145.

Krapp-Schikel G and Ruffo S (1990) Marine amphipods of the Canary Islands with description of a new species of *Elasmopus*. *Miscellània Zoològica* **14**, 53–58.

Lezzi M and Giangrande A (2018) Seasonal and bathymetric effects on macrofouling invertebrates' primary succession in a Mediterranean non-indigenous species hotspot area. *Mediterranean Marine Science* **19**, 572–588.

Lezzi M, Del Pasqua M, Pierri C and Giangrande A (2018) Seasonal non-indigenous species succession in a marine macrofouling invertebrate community. *Biological Invasions* **20**, 937–961.

Lincoln RJ (1979) *British Marine Amphipoda: Gammaridea. British Museum*. London: Natural History.

Marchini A and Cardeccia A (2017) Alien amphipods in a sea of troubles: cryptogenic species, unresolved taxonomy and overlooked introductions. *Marine Biology* **164**, 69.

Mineur F, Belsher T, Johnson MP, Maggs CA and Verlaque M (2007) Experimental assessment of oyster transfers as a vector for macroalgal introductions. *Biological Conservation* **137**, 237–247.

Montagu G (1808) Description of several marine animals found on the south coast of Devonshire. *Transactions of the Linnean Society of London* **9**, 81–114.

Myers AA and Lowry JK (2003) A phylogeny and a new classification of the Corophiidea (Amphipoda). *Journal of Crustacean Biology* **23**, 443–485.

Navarro-Mayoral S, Fernandez-Gonzalez V, Otero-Ferrer F and Tuya F (2020) Spatio-temporal variability of amphipod assemblages associated with rhodolith seabeds. *Marine and Freshwater Research* **72**, 76–83.

Özaydinli M and Coleman CO (2012) *Ampithoe bizseli* n. sp. (Crustacea, Amphipoda) from the west coast of Turkey. *Zootaxa* **3388**, 17–28.

Peart RA (2007) A review of the Australian species of *Ampithoe* Leach, 1814 (Crustacea: Amphipoda: Ampithoidae) with descriptions of seventeen new species. *Zootaxa* **1566**, 1–95.

https://doi.org/10.1017/S0025315424001255 Published online by Cambridge University Press

Peart RA and Ahyong ST (2016) Phylogenetic analysis of the Family Ampithoidae (Crustacea: Amphipoda), with a synopsis of the genera. *Journal of Crustacean Biology* **36**, 456–474.

Poore AG and Lowry JK (1997) New ampithoid amphipods from Port Jackson, New South Wales, Australia (Crustacea: Amphipoda: Ampithoidae). *Invertebrate Systematics* **11**, 897–941.

Poore AG, Hill NA and Sotka EE (2008) Phylogenetic and geographic variation in host breadth and composition by herbivorous amphipods in the family Ampithoidae. *Evolution* **62**, 21–38.

Ros M and Guerra-García JM (2012) On the occurrence of the tropical caprellid *Paracaprella pusilla* Mayer, 1890 (Crustacea: Amphipoda) in Europe. *Mediterranean Marine Science* **13**, 134–139.

Ros M, Guerra-García JM, González-Macías M, Saavedra Á and Lopez-Fe CM (2013) Influence of fouling communities on the establishment success of alien caprellids (Crustacea: Amphipoda) in Southern Spain. *Marine Biology Research* **9**, 261–273.

Ros M, Lacerda MB, Vázquez-Luis M, Masunari S and Guerra-García JM (2016) Studying exotics in their native range: can introduced fouling amphipods expand beyond artificial habitats? *Biological Invasions* **18**, 2983–3000.

Ruffo S (1982) *The Amphipoda of the Mediterranean*. Part 1. Gammaridea (Acanthonotozomatidae to Gammaridae). *Mémoires de l'Institut océanographique, Monaco* **13**, 1–364.

Sars GO (1890) *An Account of the Crustacea of Norway: With Short Descriptions and Figures of all the Species*, vol. **1**. Christiania and Copenhagen: A. Cammermeyer.

Savini D, Occhipinti-Ambrogi A, Marchini A, Tricarico E, Gherardi F, Olenin S and Gollasch S (2010) The top 27 animal alien species introduced into Europe for aquaculture and related activities. *Journal of Applied Ichthyology* **26**, 1–7.

Sotka EE, Bell T, Hughes LE, Lowry JK and Poore AG (2017) A molecular phylogeny of marine amphipods in the herbivorous family Ampithoidae. *Zoologica Scripta* **46**, 85–95.

Ugalde-Pozo A and Riera R (2024) Epifaunal communities in floating buoys on Gran Canaria (Canary Islands, NE Atlantic Ocean). *Thalassas: An International Journal of Marine Sciences* **40**, 1–8.

Ulman A, Ferrario J, Occhpinti-Ambrogi A, Arvanitidis C, Bandi A, Bertolino M, Bogi C, Chatzigeorgiou G, Çiçek BA, Deidun A, Ramos-Esplá A, Koçak Lorenti M, Martinez-Laiz G, Merlo G, Princisgh E, Scribano G and Marchini A (2017) A massive update of non-indigenous species records in Mediterranean marinas. *PeerJ* **5**, e3954.

Uryupova EF (2005) SEM mouthparts morphology of four amphipod species-dwellers of red algae beds in the White Sea. *Arthropoda Selecta. Русский артроподологический журнал* **14**, 291–296.

https://doi.org/10.1017/S0025315424001255 Published online by Cambridge University Press