



Short Communication

Citizen-science detects the arrival and establishment of *Branchiomma luctuosum* (Grube, 1870) (Annelida: Polychaeta: Sabellidae) in Albania

Valentina Tanduo[‡], Aleksander Golemaj[§], Fabio Crocetta[‡]

[‡] Department of Integrative Marine Ecology, Stazione Zoologica Anton Dohrn, Villa Comunale, I-80121, Napoli, Italy
[§] L. Dëshmoret, Rr. Petrit Bisha, Ap 544 Vlore, Albania

Corresponding author: Valentina Tanduo (valentina.tanduo@szn.it)

Academic editor: Yasen Mutafchiev

Received: 27 May 2020 | Accepted: 03 Aug 2020 | Published: 05 Aug 2020

Citation: Tanduo V, Golemaj A, Crocetta F (2020) Citizen-science detects the arrival and establishment of *Branchiomma luctuosum* (Grube, 1870) (Annelida: Polychaeta: Sabellidae) in Albania. Biodiversity Data Journal 8: e54790. <https://doi.org/10.3897/BDJ.8.e54790>

Abstract

The invasive fan worm *Branchiomma luctuosum* (Grube, 1870), originally described from the Red Sea, is first reported here from the Albanian coasts, based on records held in Vlora Bay, a locality near to Valona harbour and Narta Lagoon. Possible pathways of arrival in the area are uncertain. However, species' larval ecology and life-history traits suggest a secondary spreading through shipping. Social media data mining allowed the confirmation of its establishment in the area, with specimens showing high densities in shallow waters on artificial hard substrates and to backdate its arrival in the area since at least November 2016. Citizen science continues supporting marine biology in the Mediterranean area, especially in countries where proper field studies and research projects are still limited.

Keywords

Mediterranean Sea, social media data mining, bioinvasions, shipping, Sabellidae

Introduction

The Mediterranean Sea is considered a hotspot of biodiversity, with around 17,000 accepted species, of which around one fourth is endemic (Coll et al. 2010, Bianchi et al. 2012). This diversified biota is threatened by a number of anthropogenic factors, including the introduction of non-indigenous species (NIS), that may compete with local fauna and affect biodiversity maintenance (Wallentinus and Nyberg 2007, Katsanevakis et al. 2014). NIS invasion in the Mediterranean Sea is mainly due to Lessepsian migration through the Suez Canal, connecting two biogeographic provinces (the north-eastern Atlantic-Mediterranean and the Indo-Pacific), and commercial shipping traffic, with species transported worldwide as fouling or through ballast waters. A high number of species are also introduced either deliberately or not through aquaculture (Katsanevakis et al. 2014, Galil et al. 2017, Zenetos et al. 2017).

Despite Descriptor 2 of the EU Marine Strategy Framework Directive (European Commission 2008) suggesting to maintain the number of NIS at levels that do not adversely alter the ecosystems, NIS invasion in the Mediterranean Sea is an increasing phenomenon, with the most recent review enumerating 821 taxa, of which 613 have been established (Zenetos et al. 2017). This called the attention of the local scientific community, that tried to monitor this through a wide list of databases, inventories and horizon scannings (e.g. Tsiamis et al. 2015, Tsiamis et al. 2020, Crocetta et al. 2017, Zenetos et al. 2017). In recent years, the involvement of citizen scientists also further contributed to early detection and mapping of NIS species (e.g. Delaney et al. 2008, Crall et al. 2010, Zenetos et al. 2013, Langeneck et al. 2019, Paz-Sedano et al. 2019).

Amongst NIS species invading the Mediterranean Sea, the phylum Annelida ranks high (Zenetos et al. 2017). Within Annelida, the family Sabellidae Latreille, 1825 includes sedentary tube-building polychaetes commonly found in fouling communities (Keppel et al. 2015, Khedhri et al. 2017) and, within Sabellidae, the genus *Branchiommia* Kölliker, 1858 includes about 30 species, characterised by paired compound radiolar eyes and stylodes (epithelial flaps) on the outer surface of the radiolar axes of the crown (Tovar-Hernández and Knight-Jones 2006, Capa et al. 2013, Çinar 2013, WoRMS 2020). *Branchiommia* is a widespread genus whose taxa live in sheltered shallow waters worldwide and is represented in the Mediterranean Sea by nine species, of which three are aliens, namely *Branchiommia bairdi* (McIntosh, 1885), originally described from Bermuda, *Branchiommia boholense* (Grube, 1878), native to the Indo-Pacific, and *Branchiommia luctuosum* (Grube, 1870), originally described from the Red Sea (Licciano and Giangrande 2008, Keppel et al. 2015, Khedhri et al. 2017, Del Pasqua et al. 2018). Despite records of the complex constituted by the two former species dating back to at least 1927, misidentifications amongst them and a general unresolved taxonomy make difficult the delimitation of their distribution in the Mediterranean Sea (Del Pasqua et al. 2018, Langeneck et al. 2020). On the other hand, since the first sighting of *B. luctuosum* from Lago Lucrino (Naples, Tyrrhenian Sea) in the late 1970s (Giangrande 1989, Knight-Jones et al. 1991: statements/ records based on the material collected by C.N. Bianchi and partially published in Bianchi 1983), records of this latter species proliferated in the Mediterranean Sea due to its

characteristic colour pattern and straightforward identification, being subsequently observed in several localities in Italy (e.g. Giangrande 1989, Sordino and Gambi 1992, Gambi et al. 1998, Giangrande and Gambi 1998, Licciano et al. 2002, Mastrototaro et al. 2004, Cosentino et al. 2009, Tempesti et al. 2020, Licciano et al. 2012, Bianchi et al. 2018, Langeneck et al. 2020, Langeneck et al. 2020) and, beyond Italian waters, in Greece (Arvanitidis 2000, Zenetos et al. 2008, Zenetos et al. 2018), Turkey (Çinar et al. 2006), Cyprus (Çinar 2005) and Spain (El Haddad et al. 2008, El Haddad et al. 2012). Indeed, such a high spread in Italian waters and absence of records from several nearby countries may suggest that its distribution could be at least partially overlooked due to absence of field studies. We here confirm this statement by first reporting the presence of the invasive fan worm *B. luctuosum* in Albania (Adriatic Sea).

Materials and methods

The present record falls within the framework of an ongoing project that aims at monitoring the marine biodiversity in Albania. In particular, a folder of photos and videos of an unknown annelid species living in the shallow waters of Vlora Bay, Albania (40°45'72"N, 19°39'80"E) were posted by one of the authors (A.G.) in October 2019 on the Facebook group Regjistri Elektronik i Specieve Shqiptare (Electronic register of Albanian species: <https://www.facebook.com/groups/220793668293252>). Soon after its identification, additional photos uploaded on Facebook by the author of the present finding and dealing with the marine biota of the Vlora Bay were screened in the two Facebook profiles maintained by him (Albanian Mollusca: <https://www.facebook.com/connus74/>; Aleksander Golemaj: <https://www.facebook.com/conus74>) to search for a possible presence of the species in the area prior to the post noted in the origin. Finally, a careful bibliographic research was done to evaluate the distribution of this species in the Mediterranean Sea.

Results

The unknown annelid specimens were identified as *Branchiomma luctuosum* (Grube, 1870) based on their large sizes, external appearance/general colour pattern with a brownish/greenish body and a dark velvet crown and absence of macrostylodes. These characters altogether make this species easier to identify with respect to the other alien and native *Branchiomma* species living in the Mediterranean Sea, even from underwater photographs and videos. This is confirmed by the fact that the species has already been widely recorded in the Mediterranean Sea based on ROV observations and visual census (Matarrese et al. 2006, El Haddad et al. 2012, Katsanevakis et al. 2020). Facebook® data mining allowed us to confirm its establishment in the area, with specimens showing high densities in shallow waters (up to 1 m depth) on artificial hard substrates of local marinas, and to backdate the arrival of this species in Albania since at least November 2016 (Fig. 1). Finally, screening of the published literature revealed that this species was never recorded from Albania and that its presence in the entire Adriatic Sea was only known so far on the basis of a single sighting from Brindisi Harbour (Italy) (Mikac 2015, Suppl. material 1, Fig. 2).

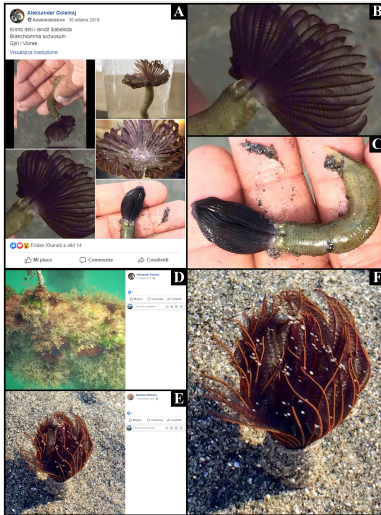


Figure 1. [doi](#)

The sabellid polychaete *Branchiomma luctuosum* (Grube, 1870) from Vlora Bay (Albania, Adriatic Sea). A. Folder of photos and videos posted in October 2019 on the Facebook group Regjistri Elektronik i Specieve Shqiptare; B-C. A magnification of selected photos; D. An artificial hard substrate dominated by *B. luctuosum* (red circles) and the spaghetti bryozoan *Amathia verticillata* (delle Chiaje, 1822), posted in May 2019 on the Facebook® profile of Aleksander Golemaj; E-F. The photo backdating the presence of *B. luctuosum* in Albania, posted in November 2016 on the Facebook® profile of Albanian Mollusca, and its magnification.

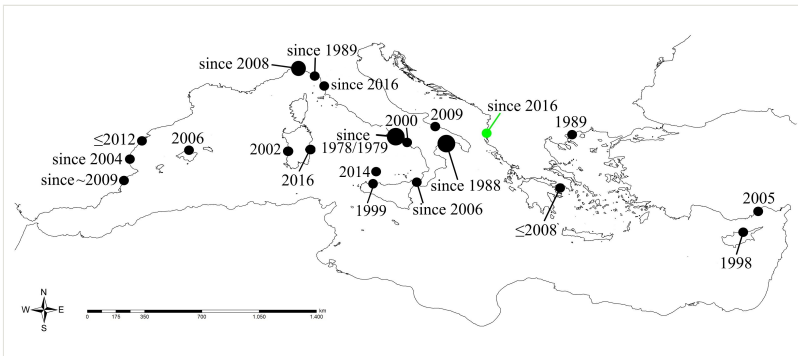


Figure 2. [doi](#)

Map of the known records of *Branchiomma luctuosum* (Grube, 1870) in the Mediterranean Sea, with first year of collection per area. Larger dots correspond to the presence of more than one locality known per wider geographic area. Green dot highlights the present sighting. Localities, coordinates and references reported in Table S1 (arranged for first finding date per paper).

Discussion

The present paper confirms the presence of *Branchiomma luctuosum* in the Adriatic Sea and supports the hypothesis that, after 50 years from its arrival, this taxon is well established in the Mediterranean region, as already suggested in recent literature reviews (e.g. Simboura and Nicolaidou 2001, Çinar et al. 2006, Zenetos et al. 2017, Servello et al. 2019) and, at the same time, it highlights the possibility that *B. luctuosum* could even further spread in the Mediterranean basin. In addition, the area where the species has been found in this study is a shallow water bay nearby Valona harbour and Narta Lagoon. It is well known that ports, estuaries and other brackish environments host a relatively low and restricted biodiversity and are generally characterised by multiple biotic and abiotic stressors that may alter the local biota and favour the presence of empty niches that could be colonised by alien species (Occhipinti-Ambrogi and Savini 2003, El Haddad et al. 2012). In this view, Vlora Bay can be easily considered a hot-spot for alien species introduction in Albania and the entire Adriatic Sea, as also confirmed by previous records of NIS species in the area (Gerovasileiou et al. 2017).

No certainties occur regarding a possible pathway of arrival of *B. luctuosum* in the Vlora Bay. This taxon is a hermaphrodite with a short life cycle, a rapid growth and a high fecundity (Licciano et al. 2002, Mastrototaro et al. 2014), circumstances that can indeed facilitate its expansion to areas with favourable conditions for settlement. In addition, its larvae are lecithotrophic, a feature that would allow its spreading through maritime vessels and ballast waters (Licciano et al. 2002, El Haddad et al. 2008). However, its spread in Vlora Bay could also have been achieved through recreational boating, a vector that has a pivotal role in facilitating and accelerating secondary spread of species with lecithotrophic larvae (Ulman et al. 2017). In agreement with that, despite of its Indo-Pacific origin that led some authors in the past to consider *B. luctuosum* as a Lessepsian element (Mastrototaro et al. 2014, Matarrese et al. 2006), the shipping pathway has already been suggested as the most probable vector even for its arrival in the Mediterranean Sea (El Haddad et al. 2008), supported by the fact that early records were registered from the central Mediterranean Sea and that the species is still undetected in the easternmost parts of the basin.

Generally, when an alien species colonises a new area, it could enter in competition with the local biota; in the case of *B. luctuosum*, its major antagonist may be the Mediterranean annelid *Sabella spallanzanii* (Gmelin, 1791), that occupies the same niche (Mastrototaro et al. 2014). However, there is still no particular evidence of competition nowadays; nevertheless, some authors (e.g. Licciano et al. 2002, El Haddad et al. 2008) observed that *B. luctuosum* settled on the base of the tubes of *S. spallanzanii* or amongst specimens of *Mytilus galloprovincialis* (Lamarck, 1819), *Actinia equina* (Linnaeus, 1758) and *Balanus perforatus* Bruguière, 1789, or as an epibiont of the ascidian *Styela plicata* (Lesueur, 1823) and the crustacean *Maja squinado* (Herbst, 1788) (Licciano et al. 2002, El Haddad et al. 2008).

Finally, worth a mention, the number of alien species detected in recent years in the Mediterranean Sea is also increasing thanks to citizen science projects and related field surveys (e.g. Giovos et al. 2019, Kleitou et al. 2019, Paz-Sedano et al. 2019, amongst others), and this also holds true for Albania (see discussions in Gerovasileiou et al. 2017). However, there is also a constant need to monitor distribution, establishment and propagation dynamics over time in order to understand if particular alien species are involved in interactions with other local organisms or can establish breeding populations. The active engagement of citizens and scuba divers in projects and scientific productions may constitute a practical management strategy of NIS and may offer accurate information about target species.

Acknowledgements

Pasqualina Fiorentino (Stazione Zoologica Anton Dohrn, Napoli, Italy) provided literature upon request.

Conflicts of interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

- Arvanitidis C (2000) Polychaete fauna of the Aegean Sea: inventory and new information. *Bulletin of Marine Science* 60: 73-96.
- Bianchi CN (1983) Serpuloidea (Annelida, Polychaeta) delle lagune costiere laziali e campane. *Annali Museo Civico Storia Naturale Genova* 84 (231): 243.
- Bianchi CN, Morri C, Chiantore M, Montefalcone M, Perravicini V, Rovere A (2012) Mediterranean Sea biodiversity between the legacy from the past and a future of change. In: Stambler N (Ed.) *Life in the Mediterranean Sea: a look at habitat changes*.
- Bianchi CN, Caroli F, Guidetti P, Morri C (2018) Seawater warming at the northern reach for southern species: Gulf of Genoa, NW Mediterranean. *Journal of the Marine Biological Association of the United Kingdom* 98 (1): 1-12. <https://doi.org/10.1017/S0025315417000819>
- Capa M, Pons J, Hutchings P (2013) Cryptic diversity, intraspecific phenetic plasticity and recent geographical translocations in *Branchiomma* (Sabellidae, Annelida). *Zoologica Scripta* 42: 637-655. <https://doi.org/10.1111/zsc.12028>
- Çınar ME (2005) Polychaetes from the coast of northern Cyprus (Eastern Mediterranean Sea), with two new records from the Mediterranean Sea. *Cahiers de Biologie Marine* 46: 143-159.
- Çınar ME, Bilecenoglu M, Öztürk M, Can A (2006) New records of alien species on the Levantine coast of Turkey. *Aquatic Invasions* 1 (2): 84-90. <https://doi.org/10.3391/ai.2006.1.2.6>

- Çinar ME (2013) Alien polychaete species worldwide: current status and their impacts. *Journal of the Marine Biological Association of the United Kingdom* 93 (5): 1257-1278. <https://doi.org/10.1017/s0025315412001646>
- Coll M, Piroddi C, Steenbeek J, Kaschner K, Ben Rais Lasram F, Aguzzi J, Ballesteros E, Bianchi CN, Corbera J, Dailianis T, Danovaro R, Estrada M, Froggia C, Galil BS, Gasol JM, Gertwagen R, Gil J, Guilhaumon F, Kesner-Reyes K, Kitsos M, Koukouras A, Lampadariou N, Laxamana E, López-Fé de la Cuadra CM, Lotze HK, Martin D, Mouillot D, Oro D, Raicevich S, Rius-Barile J, Saiz-Salinas JI, San Vicente C, Somot S, Templado J, Turon X, Vafidis D, Villanueva R, Voultsiadou E (2010) The biodiversity of the Mediterranean Sea: estimates, patterns, and threats. *PLOS One* 5 (8): e11842. <https://doi.org/10.1371/journal.pone.0011842>
- Cosentino A, Giacobbe S, Potoschi Jr. A (2009) The CSI of the Faro Coastal Lake (Messina): a natural observatory for the incoming of marine alien species. *Biologia Marina Mediterranea* 16 (1): 132-133.
- Crall A, Newman G, Jarnevich C, Stohlgren T, Waller D, Graham J (2010) Improving and integrating data on invasive species collected by citizen scientists. *Biological Invasions* 12 (10): 3419-3428. <https://doi.org/10.1007/s10530-010-9740-9>
- Crocetta F, Gofas S, Salas C, Tringali L, Zenetos A (2017) Local ecological knowledge versus published literature: a review of non-indigenous Mollusca in Greek marine waters. *Aquatic Invasions* 12 (4): 415-434. <https://doi.org/10.3391/ai.2017.12.4.01>
- Delaney D, Sperling C, Adams C, Leung B (2008) Marine invasive species: validation of citizen science and implications for national monitoring networks. *Biological Invasions* 10 (1): 117-128. <https://doi.org/10.1007/s10530-007-9114-0>
- Del Pasqua M, Schulze A, Tovar-Hernández MA, Keppel E, Lezzi M, Gambi MC, Giangrande A (2018) Clarifying the taxonomic status of the alien species *Branchiomma bairdi* and *Branchiomma boholense* (Annelida: Sabellidae) using molecular and morphological evidence. *PLOS One* 13 (5): e0197104. <https://doi.org/10.1371/journal.pone.0197104>
- El Haddad M, Capaccioni Azzati R, García-Carrascosa AM (2008) *Branchiomma luctuosum* (Polychaeta: Sabellidae): a non-indigenous species at Valencia Port (western Mediterranean Sea, Spain). *Marine Biodiversity Records* 1: e61. <https://doi.org/10.1017/s1755267207006604>
- El Haddad M, Bermell VT, Carmona JA, García C (2012) The use of georeferenced underwater TV devices for the study of the exotic invasive species *Branchiomma luctuosum* (Grube, 1869) (Polychaeta, Sabellidae) in ports from the Eastern Iberian coast (Western Mediterranean Sea). *BiolInvasions Records* 1 (4): 277-281. <https://doi.org/10.3391/bir.2012.1.4.06>
- European Commission (2008) Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive). *Official Journal of the European Union* L 164: 19-40.
- Galil B, Marchini A, Occhipinti-Ambrogi A, Ojaveer H (2017) The enlargement of the Suez Canal-Erythraean introductions and management challenges. *Management of Biological Invasions* 8 (2): 141-152. <https://doi.org/10.3391/mbi.2017.8.2.02>
- Gambi MC, Conti G, Bremec CS (1998) Polychaete diversity, distribution and seasonality related to seagrass cover in shallow soft bottoms of the Tyrrhenian Sea (Italy). *Scientia Marina* 62: 1-17.

- Gerovasileiou V, Akel EHKK, Akyol O, Alongi G, Azevedo F, Babali N, Bakiu R, Bariche M, Bennoui A, Castriota L, Chintiroglou CC, Crocetta F, Deidun A, Galinou-Mitsoudi S, Giovos I, Gökoğlu M, Golemaj A, Hadjioannou L, Hartingerova J, Insacco G, Katsanevakis S, Kleitou P, Korun J, Lipej L, Michailidis N, Mouzai Tifoura A, Ovalis P, Petović S, Piraino S, Rizkalla SI, Rousou M, Savva I, Sen H, Spinelli A, Vougioukalou KG, Xharahi E, Zava B, Zenetos A (2017) New Mediterranean biodiversity records (July, 2017). *Mediterranean Marine Science* 12 (2): 355-384. <https://doi.org/10.12681/mms.2068>
- Giangrande A (1989) Censimento dei policheti dei mari italiani: Sabellidae Malmgren, 1867. *Atti della Società Toscana di Scienze Naturali, Memorie (Serie B)* 96: 153-189.
- Giangrande A, Gambi MC (1998) Anellidi Policheti come nuova risorsa marina: un esempio con alcuni sabellidi. *Biologi Italiani* 10: 13-19.
- Giovos I, Kleitou P, Poursanidis D, Batjakas I, Bernardi G, Crocetta F, Doumpas N, Kalogirou S, Kampouris T, Keramidas I, Langeneck J, Maximidi M, Mitsou E, Stoilas V, Tiralongo F, Romanidis-Kyriakidis G, Xentidis N, Zenetos A, Katsanevakis S (2019) Citizen-science for monitoring marine invasions and stimulating public engagement: a case project from the eastern Mediterranean. *Biological Invasions* 21 (12): 3707-3721. <https://doi.org/10.1007/s10530-019-02083-w>
- Katsanevakis S, Coll M, Piroddi C, Steenbeek J, Ben Rais Lasram F, Zenetos A, Cardoso AC (2014) Invading the Mediterranean Sea: biodiversity patterns shaped by human activities. *Frontiers in Marine Science* 1 (32). <https://doi.org/10.3389/fmars.2014.00032>
- Katsanevakis S, Poursanidis D, Hoffman R, Rizgalla J, Rothman SB, Levitt-Barmats Y, Hadjioannou L, Trkov D, Garmendia JM, Rizzo M, Bartolo AG, Bariche M, Tomas F, Kleitou P, Schembri PJ, Kletou D, Tiralongo F, Pergent C, Pergent G, Azzurro E, Bilecenoglu M, Lodola A, Ballesteros E, Gerovasileiou V, Verlaque M, Occhipinti-Ambrogi A, Kytinou E, Dailianis T, Ferrario J, Crocetta F, Jimenez C, Evans J, Ragkousis M, Lipej L, Borg JA, Dimitriadis C, Chatzigeorgiou G, Albano PG, Kalogirou S, Bazairi H, Espinosa F, Ben Souissi J, Tsiamis K, Badalamenti F, Langeneck J, Noel P, Dedidun A, Marchini A, Skouradakis G, Royo L, Sini M, Bianchi CN, Sghaier YR, Ghanem R, Doumpas N, Zaouali J, Tsirintanis K, Papadakis O, Morri C, Çinar ME, Terrados J, Insacco G, Zava B, Soufi-Kechaou E, Piazzzi L, Ounifi Ben Amor K, Andriotis E, Gambi MC, Ben Amor MM, Garrabou J, Linares C, Fortič A, Digenis M, Cebrian E, Fourt M, Zotou M, Castriota L, Di Martino V, Rosso A, Pipitone C, Falautano M, García M, Zakhama-Sraieb R, Khamassi F, Mannino AM, Ktari MH, Kosma I, Rifi M, Karachle PK, Yapıcı S, Bos AR, Balistreri P, Ramos Esplá AA, Tempesti J, Inglese O, Giovos I, Damalas D, Benhissoune S, Huseyinoglu MF, Rjiba-Bahri W, Santamaría J, Orlando-Bonaca M, Izquierdo A, Stamouli C, Montefalcone M, Cerim H, Golo R, Tsioli S, Orfanidis S, Michailidis N, Gaglioti M, Taşkın E, Mancuso E, Žunec A, Cvitković I, Filiz H, Sanfilippo R, Siapatis A, Mavrič B, Karaa S, Türker A, Monniot F, Verdura J, El Ouamari N, Selfati M, Zenetos A (2020) Unpublished Mediterranean records of marine alien and cryptogenic species. *BioInvasions Records* 9 (2): 165-182. <https://doi.org/10.3391/bir.2020.9.2.01>
- Keppel E, Tovar-Hernández MA, Ruiz G (2015) First record and establishment of *Branchiomma coheni* (Polychaeta: Sabellidae) in the Atlantic Ocean and review of non-indigenous species of the genus. *Zootaxa* 4058 (4): 499-518. <https://doi.org/10.11646/zootaxa.4058.4.3>

- Khedhri I, Tovar-Hernández M, Bonifácio P, Ahmed A, Aleya L (2017) First report of the invasive species *Branchiomma bairdi* McIntosh, 1885 (Annelida: Sabellidae) along the Tunisian coast (Mediterranean Sea). *BiolInvasions Records* 6 (2): 139-145. <https://doi.org/10.3391/bir.2017.6.2.09>
- Kleitou P, Giovos I, Wolf W, Crocetta F (2019) On the importance of citizen-science: the first record of *Goniobranchus obsoletus* (Rüppell and Leuckart, 1830) from Cyprus (Mollusca: Gastropoda: Nudibranchia). *BiolInvasions Records* 8 (2): 252-257. <https://doi.org/10.3391/bir.2019.8.2.06>
- Knight-Jones P, Knight-Jones EW, Ergen Z (1991) Sabelliform polychaetes, mostly from Turkey's Aegean coast. *Aegean coast. Journal of Natural History* 25: 837-858. <https://doi.org/10.1080/00222939100770561>
- Langeneck J, Crocetta F, Doumpas N, Giovos I, Piraino S, Boero F (2019) First record of the non-native jellyfish *Chrysaora cf. achlyos* (Cnidaria: Pelagiidae) in the Mediterranean Sea. *BiolInvasions Records* 8 (3): 608-613. <https://doi.org/10.3391/bir.2019.8.3.17>
- Langeneck J, Lezzi M, Del Pasqua M, Musco L, Gambi MC, Castelli A, Giangrande A (2020) Non-indigenous polychaetes along the coasts of Italy: a critical review. *Mediterranean Marine Science* 21 (2): 238-275. <https://doi.org/10.12681/mms.21860>
- Licciano M, Giangrande A, Gambi MC (2002) Reproduction and simultaneous hermaphroditism in *Branchiomma luctuosum* (Polychaeta, Sabellidae) from the Mediterranean Sea. *Invertebrate Biology* 121 (1): 55-65. <https://doi.org/10.1111/j.1744-7410.2002.tb00129.x>
- Licciano M, Giangrande A (2008) The genus *Branchiomma* within the Mediterranean Sea with description of the new species *B. maerli*. *Scientia Marina* 72 (2): 383-391.
- Licciano M, Murray JM, Watson GJ, Giangrande A (2012) Morphological comparison of the regeneration process in *Sabella spallanzanii* and *Branchiomma luctuosum* (Annelida, Sabellida). *Invertebrate Biology* 131 (1): 40-51. <https://doi.org/10.1111/j.1744-7410.2012.00257.x>
- Mastrototaro F, Petrocelli A, Cecere E, Matarrese A (2004) Non indigenous species settle down in the Taranto Seas. *Biogeographia – The Journal of Integrative Biogeography* 25 (1): 47-54. <https://doi.org/10.21426/b6110029>
- Mastrototaro F, Chimienti G, Matarrese A, Gambi MC, Giangrande A (2014) Growth and population dynamics of the non-indigenous species *Branchiomma luctuosum* Grube (Annelida, Sabellidae) in the Ionian Sea (Mediterranean Sea). *Marine Ecology* 36 (3): 517-529. <https://doi.org/10.1111/maec.12160>
- Matarrese A, Mastrototaro F, D'onghia G, Maiorano P, Tursi A (2006) Mapping of the benthic communities in the Taranto seas using side-scan sonar and an underwater video camera. *Chemistry and Ecology* 20 (5): 377-386. <https://doi.org/10.1080/02757540410001727981>
- Mikac B (2015) A sea of worms: polychaete checklist of the Adriatic Sea. *Zootaxa* 3943 (1): 1-172. <https://doi.org/10.11646/zootaxa.3943.1.1>
- Occhipinti-Ambrogi A, Savini D (2003) Biological invasions as a component of global change in stressed marine ecosystems. *Marine Pollution Bulletin* 46 (5): 542-551. [https://doi.org/10.1016/s0025-326x\(02\)00363-6](https://doi.org/10.1016/s0025-326x(02)00363-6)
- Paz-Sedano S, Tanduo V, Yonow N, Yokeş MB, Kleitou D, Crocetta F (2019) *Baeolidia moebii* Bergh, 1888 (Mollusca: Gastropoda: Nudibranchia) is spreading in the eastern

- Mediterranean Sea. *Regional Studies in Marine Science* 32: 100830. <https://doi.org/10.1016/j.rsma.2019.100830>
- Servello G, Andaloro F, Azzurro E, Castriota L, Catra M, Chiarore A, Crocetta F, D'Alessandro M, Denitto F, Frogliola C, Gravili C, Langer M, Lo Brutto S, Mastrototaro F, Petrocelli A, Pipitone C, Piraino S, Relini G, Serio D, Xentidis NJ, Zenetos A (2019) Marine alien species in Italy: A contribution to the implementation of descriptor D2 of the marine strategy framework directive. *Mediterranean Marine Science* 20 (1): 1-48. <https://doi.org/10.12681/mms.18711>
 - Simboura N, Nicolaidou A (2001) The Polychaetes (Annelida, Polychaeta) of Greece: checklist, distribution and ecological characteristics. *Monographs on Marine Sciences*, 4. Attiki, Greece: National Centre of Marine Research.
 - Sordino P, Gambi MC (1992) Prime osservazioni sulla biologia riproduttiva e sul ciclo vitale di *Branchiommma luctuosum* (Grube, 1869) (Polychaeta, Sabellidae). *Oealia* 17 (supplementary): 425-427.
 - Tempesti J, Langeneck J, Maltagliati F, Castelli A (2020) Macrobenthic fouling assemblages and NIS success in a Mediterranean port: The role of use destination. *Marine Pollution Bulletin* 150: e110768. <https://doi.org/10.1016/j.marpolbul.2019.110768>
 - Tovar-Hernández MA, Knight-Jones P (2006) Species of *Branchiommma* (Polychaeta: Sabellidae) from the Caribbean Sea and Pacific coast of Panama. *Zootaxa* 1189 (1): 1-37. <https://doi.org/10.11646/zootaxa.1189.1.1>
 - Tsiamis K, Zuljevic A, Çinar ME, Crocetta F, Zenetos A, Foka MC, Katsanevakis S, Golani D (2015) Illustrated guide of marine alien species for students and citizen scientists - Target species for rapid assessment surveys in the Mediterranean. COST1209 Action: Alien Challenge.
 - Tsiamis K, Azzurro E, Bariche M, Çinar M, Crocetta F, De Clerck O, Galil B, Gómez F, Hoffman R, Jensen K, Kamburska L, Langeneck J, Langer M, Levitt-Barmats Y, Lezzi M, Marchini A, Occhipinti-Ambrogi A, Ojaveer H, Piraino S, Shenkar N, Yankova M, Zenetos A, Žuljević A, Cardoso AC (2020) Prioritizing marine invasive alien species in the European Union through horizon scanning. *Aquatic Conservation: Marine and Freshwater Ecosystems* 30 (4): 794-845. <https://doi.org/10.1002/aqc.3267>
 - Ulman A, Ferrario J, Occhipinti-Ambrogi A, Arvanitidis C, Bandi A, Bertolino M, Bogi C, Chatzigeorgiou G, Çiçek BA, Deidun A, Ramos-Esplá A, Koçak C, Lorenti M, Martinez-Laiz G, Merlo G, Princisigh E, Scribano G, Marchini A (2017) A massive update of non-indigenous species records in Mediterranean marinas. *PeerJ* 5 (e3954). <https://doi.org/10.7717/peerj.3954>
 - Wallentinus I, Nyberg C (2007) Introduced marine organisms as habitat modifiers. *Marine Pollution Bulletin* 55: 323-332. <https://doi.org/10.1016/j.marpolbul.2006.11.010>
 - WoRMS (2020) Editorial Board World Register of Marine Species. <http://www.marinespecies.org>
 - Zenetos A, Vassilopoulou V, Salomidi M, Poursanidis D (2008) Additions to the marine alien fauna of Greek waters (2007 update). *Marine Biodiversity Records* 1: e91. <https://doi.org/10.1017/s1755267207009281>
 - Zenetos A, Koutsogiannopoulos D, Ovalis P, Poursanidis D (2013) The role played by citizen scientists in monitoring marine alien species in Greece. *Cahiers de Biologie Marine* 54: 419-442.
 - Zenetos A, Çinar ME, Crocetta F, Golani D, Rosso A, Servello G, Shenkar N, Turon X, Verlaque M (2017) Uncertainties and validation of alien species catalogues: The

Mediterranean as an example. *Estuarine, Coastal and Shelf Science* 191: 171-187.

<https://doi.org/10.1016/j.ecss.2017.03.031>

- Zenetos A, Corsini-Foka M, Crocetta F, Gerovasileiou V, Karachle P, Simboura N, Tsiamis K, Pancucci-Papadopoulou M (2018) Deep cleaning of alien and cryptogenic species records in the Greek Seas (2018 update). *Management of Biological Invasions* 9 (3): 209-226. <https://doi.org/10.3391/mbi.2018.9.3.04>

Supplementary material

Suppl. material 1: Supplementary-Citizen-science detects the arrival and establishment of *B. luctuosum* in Albania [doi](#)

Authors: Valentina Tanduo, Aleksander Golemaj, Fabio Crocetta

Data type: Record of *Branchiomma luctuosum* in the Mediterranean Sea

[Download file](#) (20.74 kb)