Article

Not peer-reviewed version

An Overlooked Group of Citizen Scientists in NIS Information: Shell Collectors and Their Contribution to Molluscan NIS Diversity

Argyro Zenetos *, Cristiane DELONGUEVILLE, Roland SCAILLET

Posted Date: 18 April 2024

doi: 10.20944/preprints202404.1259.v1

Keywords: Alien species; Mediterranean Sea; mollusca; citizen science; amateur malacologists

 doi:10.20944/preprints202404.1259.v1

Article

An Overlooked Group of Citizen Scientists in NIS Information: Shell Collectors and Their Contribution to Molluscan NIS Diversity

Zenetos Argyro [1,*], Delongueville Christiane [2,4] and Scaillet Roland [3,4]

[1] Hellenic Centre for Marine Research (HCMR), 16604, Anavyssos, Greece
[2] Avenue Den Doorn, 5/10 – B - 1180 Bruxelles – Belgium christiane.delongueville@skynet.be
[3] Avenue Franz Guillaume, 63/4 – B - 1140 Bruxelles – Belgium scaillet.roland@skynet.be
[4] Royal Belgian Institute of Natural Sciences, D.O. Taxonomy & Phylogeny, Brussels, Belgium
* Correspondence: zenetos@hcmr.gr

Abstract: This work reports 60 marine alien molluscs, collected by two Belgian citizen scientists, from nine countries across the Mediterranean Sea and the Sea of Marmara. Some of their published observations concerning the collecting dates are compared with the year of first publication for these alien molluscs reported in the literature, which enabled to backdate some of these introductions. This underlines the importance of collaboration between volunteers and institutional scientists in tracing variations and changes in the environment and biodiversity.

Keywords. alien species; Mediterranean sea; mollusca; citizen science; shell collectors

1. Introduction

The role of citizen science (CS) in invasion biology [1,2] and in particular in biodiversity monitoring has been highlighted in recent literature [3,4].

Citizen science has existed for centuries, but the recent adoption of information and communications technology (ICT) in this field (e.g., web- or mobile application-based interfaces for citizen training and data generation) has led to a massive surge in popularity, mainly due to reduced geographic barriers to citizen participation [5].

The data produced from the cooperation of Citizen Scientists with Biological invasion experts, either directly or via information systems such as iNaturalist [6] or other dedicated networks (see [7] EASIN – European Alien Species Information Network) has led to detecting new nonindigenous species (NIS), and document their spread, all of which help to develop policy and environmental management for Invasive Alien Species (IAS) and large-scale biodiversity conservation [8].

Marine Citizen Science (MCS) is highly underrepresented in the citizen science literature, despite the instrumental (data-focused) and capacity-building (society-focused) benefits such projects offer for marine conservation. Nevertheless, the MCS literature has experienced continual growth since its first publications in the early 1990s [9].

In the marine environment the most active group of citizen scientists are Fishers. According to Kousteni et al. [8] with regards to fishes and molluscs, the main categories of citizen scientists at Pan-European level included school children, students, divers, naturalists, and various volunteers. Most of the CS records of molluscs were reported in NE Atlantic Ocean, mostly in the Greater North Sea. At Mediterranean level it appears that the most active CS group are fishers [10–12] followed by naturalists [12]. In Greece, 31 alien molluscan taxa were first detected by amateurs, mostly shell collectors, and SCUBA divers/photographers [13].

The valuable contribution of amateur malacologists hereafter call SC (shell collectors) in reporting alien molluscan species in the Mediterranean has been underestimated. The aim of this work is to highlight the role of SC as the oldest and most reliable non-institutional data providers of molluscan NIS in European Seas and particularly in the Mediterranean.

 doi:10.20944/preprints202404.1259.v1

2. Methodology

Molluscs were collected by Christiane Delongueville (CD) and Roland Scaillet (RS) during many trips conducted in the period 1981 to 2018 in nine countries across the Mediterranean Sea and as north as the Turkish coasts of Marmara Sea (Table 1). The areas visited are shown in Figure 1.

Table 1. Sampling trips per country. Details on the visited locations and dates in Supplementary file.

Country	Year
Greece (GR)	1981, 1995, 2016, 2018
Cyprus (CY)	1984, 1987, 1988, 1990, 2005, 2007, 2009, 2012
Italy (IT)	1985, 1987, 1989, 1997, 2000, 2005, 2009, 2012, 2017
Türkiye (TR)	1986, 1989, 1990, 1991, 1992, 1993, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2009, 2012
Israel (IL)	1987, 1998
Malta (MT)	1988
France (FR)	1990, 1992, 1994, 1998, 1999, 2001, 2003, 2009
Spain (ES)	1997, 2001
Tunisia (TN)	1986, 1990, 2001, 2004, 2006, 2007, 2010, 2011, 2012

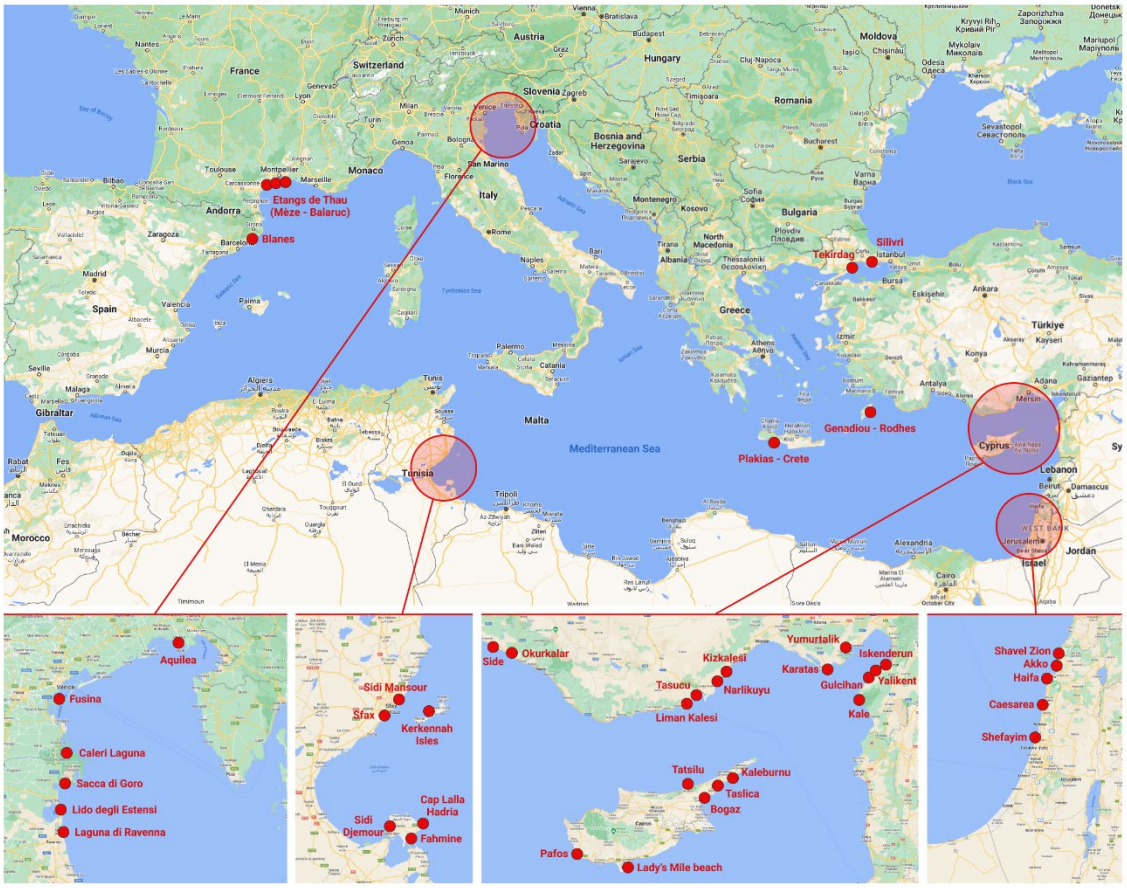

Figure 1. Map with areas visited. Some areas were visited more than once in different years. For details see Supplement.

We hereby define as "observation" any collection of a species conducted in a site at a certain time regardless of the number of specimens collected. A total of 418 observations were made, the vast

 doi:10.20944/preprints202404.1259.v1

majority along Mediterranean coasts with only 10 observations along the Marmara coast (Dardanelles to Bosphorus). Although many records, mostly micromolluscs, are based on empty shells they are considered as valid NIS records because their presence is confirmed by published records of living specimens in the country or other neighbouring Mediterranean countries [13].

Most of the shells (86 %) were collected by CD and RS (hand-picked, snorkeling, scuba diving), while 14 % of records come from material provided by fishermen. All the collection details (locations, habitat, depth and status of shells) can be seen in the supplementary file. All the shells are kept in the personal collection of CD and RS.

Nomenclature was checked against WoRMS [14].

The data on the first records and corresponding dates and sources of alien molluscs in Israel, Türkiye, Cyprus, and Greece was retrieved from the literature and the unpublished HCMR Data base administrated by Argyro Zenetos (AZ). At pan-Mediterranean scale this data was retrieved from Galanidi et al. [15]

3. Results

In the course of a total of 418 observations, 60 alien molluscan species were identified, the most frequent of which are listed in Table 2. The majority of species belong to the class of Gastropoda (38) while 22 species belong to Bivalvia. Among the observed specimens 54.3 % were collected alive, the rest were empty shells mostly beached or found in shell grit.

Table 2. Records per species >10 records.

Species	observations
Ruditapes philippinarum (Adams & Reeve, 1850)	11
Magallana gigas (Thunberg, 1793)	12
Rhinoclavis kochi (Philippi, 1848)	12
Septifer cumingii Récluz, 1849	12
Chama pacifica Broderip, 1835	14
Malleus regula (Forsskål in Niehbur, 1775)	15
Arcuatula senhousia (Benson in Cantor, 1842)	18
Pinctada radiata (Leach, 1814)	20
Cerithium scabridum Philippi, 1848	21
Ergalatax junionae Houart, 2008	23
Brachidontes pharaonis (P. Fischer, 1870)	26
Conomurex persicus (Swainson, 1821)	29

Table 3 summarizes the finding per country. Some of the records are here reported for the first time in the country or a Marine Strategy area (MSFD-Marine Strategy Framework Directive) of a country (e.g., *Brachidontes pharaonis* first record from the Levantine Sea subdivision of Greece); others are backdating species reported in the literature at a later date (e.g., *Bulla arabica* Malaquias & Reid, 2008 in South Türkiye in 1992 backdating the 2000 record, etc.). The finding of *Lioberus ligneus* (Reeve, 1858) in South Türkiye in 1993, backdates all previous records and constitutes the first Mediterranean record.

The number of species found in each country is positively related to the number of observations made in each country, being more pronounced in the eastern Mediterranean (Figure 2). However, it is not consistent with the number of visits per country. It correlates well in the eastern Mediterranean, peaking in Türkiye (15 visits, revealed 50 alien species), whereas in the western Mediterranean e.g., in France during 8 visits only 4 alien species were detected as opposed to Cyprus (eastern Mediterranean) where 8 trips rendered 19 species (Figure 2).

 doi:10.20944/preprints202404.1259.v1

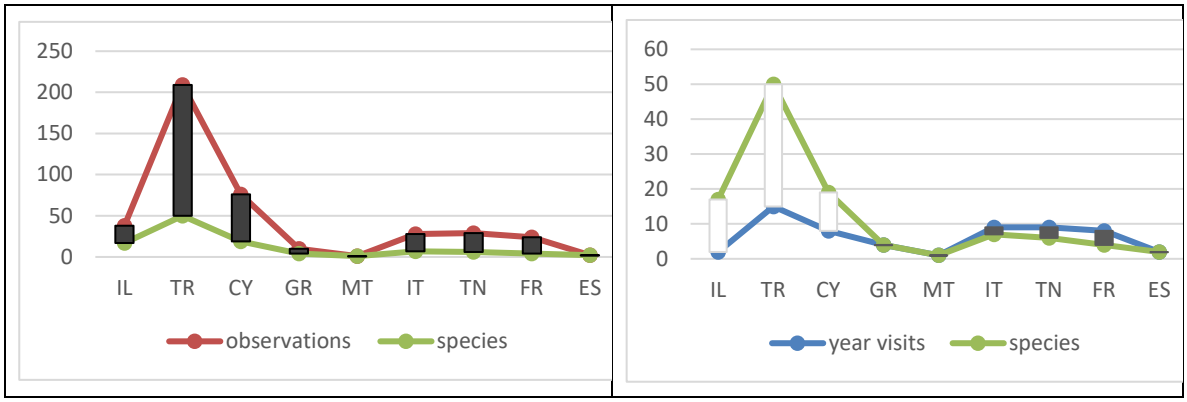

Figure 2. Number of species detected in each area related to left: number of observations per country, right: number of trips at each country.

Table 3. Species detected per country. Date refers to the first year the species was detected. In bold, records that constitute first records for a country (including new record for an MSFD area within the country, or backdated previously reported record). BS denotes Black Sea.

species	IL	CY	TR	GR	IT	TN	MT	FR	ES
Acteocina mucronata (Philippi, 1849)		2009	1993						
Afrocardium richardi (Audouin, 1826)			**1991**						
Amathina tricarinata Linnaeus, 1767			2005						
Anadara kagoschimensis Tokunaga, 1906			**1990 (BS)**		1985				
Anadara natalensis (Krauss, 1848)			2002						
Arcuatula senhousia (Benson in Cantor, 1842)					1997			1990	
Brachidontes pharaonis (P. Fischer, 1870)	1987	1984	1985	**1981**	2017				
Bulla arabica Malaquias & Reid, 2008			**1992**						
Bursatella leachii de Blainville, 1817						2006			
Cellana rota (Gmelin, 1791)	1998								
Cerithidium diplax (Watson, 1886)			2002						
Cerithiopsis pulvis (Issel, 1869)	1987	2009	1989						
Cerithiopsis tenthrenois (Melvill, 1896)	1987	**1984**	**1989**						
Cerithium scabridum Philippi, 1848	1987	2005	1985			2001			
Chama asperella Lamarck, 1819		**2009**	**1990 (BS)**						
Chama pacifica Broderip, 1835	1998	2007	2002						
Pyrgulina pupaeformis (Souverbie, 1865)	1987		1989						
Cingulina isseli (Tryon, 1886)	1987	2009	1992						
Conomurex persicus (Swainson, 1821)		1988	1985	1995					
Crepidula fornicata (Linnaeus, 1758)								1992	1997
Cucurbitula cymbium (Spengler, 1783)			2005						
Dendostrea cf *folium* (Linnaeus, 1758)		**2007**	**1989**						
Diala semistriata (Philippi, 1849)			**2002**						
Diodora ruppellii (Sowerby G.B. I, 1835)	1987		2002						
Ergalatax junionae Houart, 2008		2005	2002						
Finella pupoides Adams A., 1860			1989						
Fulvia fragilis (Forsskål, 1775)						2001			
Gafrarium savignyi (Jonas, 1846)			2002						
Gibborissoia virgata (Philippi, 1849)	1998		2002						
Indothais lacera (Born, 1778)							**1988**		
Leucotina natalensis E.A. Smith, 1910			1989						
Lienardia mighelsi Iredale & Tomlin, 1917			2007						
Lioberus ligneus (Reeve, 1858)			1993						
Crassostrea/ Magallana sp.			2002		1985			1992	2001
Malleus regula (Forsskål in Niehbur, 1775)	1987	2009	1989						
Megastomia lorioli (Hornung & Mermod, 1924)			**2002**						
Mnestia girardi (Audouin, 1826)		**1990**	1993						
Monetaria annulus (Linnaeus, 1758)						2006			
Monotygma lauta (Adams A., 1853)			**1989**						
Naria turdus (Lamarck, 1810)						2004			
Pinctada radiata (Leach, 1814)	1998	1984	1985			1986			
Pseudominolia nedyma (Melvill, 1897)			1993						
Purpuradusta gracilis notata (Gill, 1858)	1987	**1988**	1993						
Rapana venosa (Valenciennes, 1846)			**1989**		1989				
Rhinoclavis kochi (Philippi, 1848)	1987	2012	1989						
Rissoina bertholleti Issel, 1869	1987	2012	2002						
Ruditapes philippinarum (Adams & Reeve, 1850)			2004 (BS)		1997			2001	
Septifer cumingii Récluz, 1849		2009	2005	2016					
Siphonaria crenata de Blainville, 1827			2009						
Smaragdia souverbiana (Montrouzier, 1863)			**1989**						
Sphenia rueppellii A. Adams, *1851*			2005						
Spondylus spinosus Schreibers, 1793	1998		2001						
Syrnola lendix (A. Adams, 1863)			2002						
Syrnola fasciata Jickeli, 1882			1989						
Trochus erithreus Brocchi, 1821		1987	**1990**						
Turbonilla edgarii (Melvill, 1896)			1989						
Viriola cf. bayani (Jousseaume, 1884)				2018					
Xenostrobus securis (Lamarck, 1819)					1997				
Zafra savignyi (Moazzo, 1939)			1989						
Zafra selasphora (Melvill & Standen 1901)	1987		**1989**						

 doi:10.20944/preprints202404.1259.v1

The following observations: *Chama asperella* (2009, Cyprus), *Diala semistriata* and *Megastomia lorioli* (2002, S. Türkiye) and *Indothais lacera* (1988, Malta) (Figure 3) consitute first country /MSFD subdivision records (Figure 3)

In addition, the finding of *Rapana venosa* (Valenciennes, 1846) in 1989 consitutes the first record for S. Türkiye and that of *Chama asperella* Lamarck, 1819 in 1990 from Silivri harbor the first record for the Sea of Marmara (Figure 3).

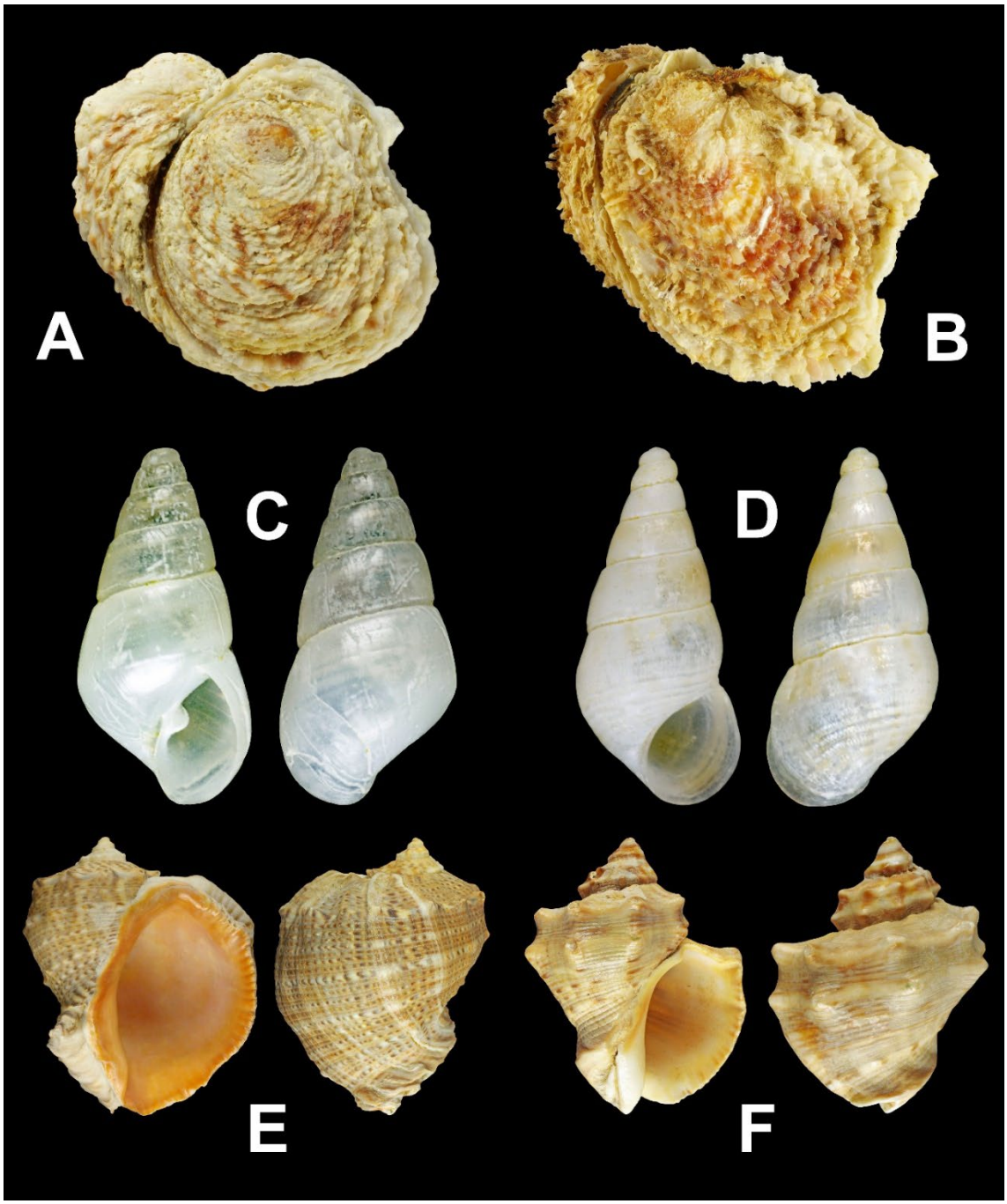

Figure 3. A. *Chama asperella,* Taslica (Cyprus), 25.1 mm. **B**. *Chama asperella*, Silivri harbor (Sea of Marmara), 29.0 mm. **C.** *Megastomia lorioli,* Yumurtalik (S. Türkiye), 2.6 mm. **D.** *Diala semistriata,* Liman Kalesi (S. Türkiye), 2.7 mm. **E.** *Rapana venosa,* Taşucu (S. Türkiye), 102.2 mm. **F.** *Indothais lacera,* Marsaxlokk (Malta), 39.5 mm.

 doi:10.20944/preprints202404.1259.v1

4. Discussion

In this work we collate and report a considerable number of largely unpublished records of 60 alien molluscs in 9 countries across the Mediterranean Sea and the Sea of Marmara. Some of the observations have been previously published by CD and RS either at country level [16] or as separate species finding [17–25].

In agreement with Galanidi et al. [15], the highest number of molluscan NIS observed in this study was found in the eastern Mediterranean. Although no pathway analysis was attempted in this work, excluding *Crepidula fornicata* and *Crassostrea* / *Magallana sp*., the vast majority of the molluscan encountered originate in the Indo-Pacific and have most likely been introduced to the eastern Mediterranean via the Suez Canal either spreading (Lessepsian immigrants) or with vessels.

The year of first detection of a NIS is essential in analyzing trends of introductions at any spatial level. The MSFD primary criterion concerning new NIS introductions states that: "The number of non-indigenous species which are newly introduced via human activity into the wild, per assessment period (6 years), measured from the reference year (2011) as reported for initial assessment under Article 8(1) of Directive 2008/56/EC, is minimised and where possible reduced to zero". Therefore, precision in the year of first detection (a proxy of the real first introduction) is crucial in assessing the number of new introductions in an area at a given interval.

Three of our observations, coincide with findings reported in the literature at the same year (1989) from South Turkiye by SC. We refer to: *Monotygma lauta* (Adams A., 1853) [26]; *Smaragdia souverbiana* (Montrouzier, 1863) [27], and *Zafra selasphora* (Melvill & Standen 1901) [28].

It is worth noting that ten of our observations, backdate the year of first detection as reported in the literature by at least a year. These are:

1. *Afrocardium richardi* (Audouin, 1826) in Türkiye 1991, backdating the 2000 record of [29] Published by [21];
2. *Brachidontes pharaonis* (P. Fischer, 1870) in east Rhodes (Levantine coast of Greece), 1981 backdating the 2010 record for the Levantine MSFD by [30];
3. *Bulla arabica* Malaquias & Reid, 2008 in S. Türkiye 1992, backdating the 2000 record by [31];
4. *Cerithiopsis tenthrenois* (Melvill, 1896) in S. Türkiye 1989, backdating the 2000 record by [32];
5. *Cerithiopsis tenthrenois* (Melvill, 1896) in Cyprus 1984, backdating the 1985 record by [33];
6. *Dendostrea* cf *folium* (Linnaeus, 1758) in S. Türkiye 1989, backdating the record of 1993 by [34];
7. *Dendostrea* cf *folium* (Linnaeus, 1758) in Cyprus 2007, backdating the record 2008 by [35]
8. *Mnestia girardi* (Audouin, 1826) in Cyprus 1990, backdating the 1992 record of [36]. Published by [37] as *Cylichnina girardi* (Audouin, 1826);
9. *Purpuradusta gracilis notata* (Gill, 1858) in Cyprus 1988, backdating the 2000 record [39];
10. *Trochus erithreus* Brocchi, 1821 in S. Türkiye, 1990, backdating the 1992 record by [38].

Of the above, the soundest case is that of the bivalve *Brachidontes pharaonis* one of the first Lessepsian invaders into the Mediterranean (x) that is widespread in the Levantine basin (eastern Mediterranean). Yet, its presence in east Rhodes (Levantine coast of Greece) was not noted before 2010 [30]. The present work backdates its presence in the area by 29 years and shows how a species easy to recognize can go unnoticed due to the lack of scientific effort in the area, a gap that can be filled by SC.

The following observations, even though they belong to species previously known and reported from a country, are considered first country records since the exact year of their detection had not been provided in the respective literature: *a) Chama asperella* in Cyprus [23] as *Chama aspersa* Reeve, 1846; b) *Diala semistriata* in Türkiye [37] as *Diala varia* Adams A., 1861; *Megastomia lorioli* in Türkiye [36] as *Odostomia lorioli* (Hornung & Mermod, 1924); *Indothais lacera* in Malta [27] as *Thais lacera* (Born, 1778).

Finally, the most interesting observations is that of the mytilid *Lioberus ligneus* (Reeve, 1858) from S.Türkiye in 1993 [40] that backdates all previous records in the Mediterranean by at least 6 years [It is worth noting that the previously reported first record of 1999 in Lebanon was reported with a lag of 14 years by Crocetta et al. [41]]. This is an example that highlights the importance of a regular collaboration at the international level between formally trained/institutional taxonomic experts on

 doi:10.20944/preprints202404.1259.v1

the one hand and dedicated and experienced shell collectors on the other to fill in the gaps in our knowledge of alien Mollusca distribution.

Malacologists (SC) are the oldest citizen science group contributing to biodiversity. However, their findings are not always published. With a few exceptions they are hidden in drawers of private collections, and sometimes come to light years later if donated to natural history Museums. When it comes to alien species, surprisingly their contribution is countable. There are several publications on alien molluscs in the Mediterranean, attributed to SC, since the 1950's when invasion biology was not yet developed as a formal/separate scientific field. In fact, approximately 37 % of alien molluscs in Israel [62 out of the 166 molluscan NIS listed by Galil et al. [42]], has been reported by SC (notably Henk Mienis and Jacobus J. van Aartsen are the two most renowned members in the SC community). In Türkiye this figure is even higher [68 species represent 55% of the 123 alien molluscs reported by Cinar et al. [43]]. If joint publications of SC with molluscan experts is considered, the percentage increases to 40% for Israel, 62% for Türkiye.The south Turkish, Cypriot and Greek coasts, favorite tourist destinations, have attracted the attentions of many SC, many of whom have published their findings [Germans [39], Dutch [29], Italians [13,26–28,32,36], Belgians [16–25]]. In Cyprus and Greece, the alien molluscs reported by CS reach 58 % and 40% respectively.

The iNaturalist program [6] has been recognised as a key tool for collecting biodiversity data produced by CS in multiple nations globally. However, SC have their own means of publishing their findings. These are: dedicated journals published by their Malacological societies such as *La Conchiglia* (Italy: ceased), *Triton* (Israel), *Bollettino Malacologico* (Italy), *Iberus* (Spain), *Xenophora* and *Xenophora Taxonomy* (France), *Basteria* (The Netherlands), *NOVAPEX* (Belgium). Yet, despite all these outlets, a number of observations remains unpublished. These valuable resources should not be neglected by taxonomic experts and invasion scientists studying xenodiversity and NIS trends.

CS who are reporting their observations care about nature and their aim is to learn more about the places they visit and to protect them. SC are an important tool for monitoring the biodiversity since they are numerous, frequently present on the field, and working on a voluntary basis without requiring grants / being constrained by grants to make their observations.

Some Scientific Natural History Institutions and or Museums have recognised the importance of CS being in the field and producing interesting zoogeographical observations. They are closely working with these CS like in this case the Royal Belgian Institute of Natural Sciences (RBINS – Brussels, Belgium) but also amongst others the "Muséum national d'Histoire naturelle (MNHN – Paris, France)" and the Steinhardt Museum of Natural History, Tel Aviv, Israel.

At Mediterranean scale, it is estimated that approximately 40% of all Mediterranean NIS Mollusca [90 out of the 225 NIS [44,45]] have been detected by SC. Taking into account that Mollusca is the most abundant taxonomic group among NIS in the Mediterranean [15] it is clear that collaboration of institutional experts with the malacological societies and SC will promote our knowledge on biodiversity changes and particularly on the introduction and spreading of NIS at any spatial scale.

References

1. Roy, H.; Groom, Q.; Adriaens, T.; Agnello, G.; Antic, M.; Archambeau, A.; Bacher, S.; Bonn, A.; Brown, P.; Brundu, G. et al. Increasing understanding of alien species through citizen science (Alien-CSI). *Res. Ideas Outcomes* **2018**, *4*, ff10.3897/rio.4.e31412ff. ffird-03774554f
2. Encarnação, J.; Teodósio, M.A.; Morais, P. Citizen science and biological invasions: A review. *Front. Environ. Sci.* **2021**, *8*, 602980 https://doi.orh/10.3389/fenvs.2020.602980
3. Chandler, M.; See, L.; Copas, K.; Bonde, A.M.; López, B.C.; Danielsen, F.; Legind, J.K.; Masinde, S.; Miller-Rushing, A.J.; Newman, G.; et al. Contribution of citizen science towards international biodiversity monitoring. *Biol. Conserv.* **2017**, *213*, 280–29 https://doi.org/10.1007/s10530-019-02083-w
4. Marchante, E., López-Núñez, F.A., Duarte, L.N., & Marchante, H. The role of citizen science in biodiversity monitoring: when invasive species and insects meet. pp. 291-314 In *Biological Invasions and Global Insect Decline* **2024**. Academic Press.
5. Johnson, B.A.; Mader, A.D.; Dasgupta, R.; Kumar, P. Citizen science and invasive alien species: An analysis of citizen science initiatives using information and communications technology (ICT) to collect invasive alien species observations. *Glob. Ecol. Conserv.* **2020**, *21*, e00812 https://doi.org/10.1016/j.gecco.2019.e00812

6. iNaturalist. Available online: http://www.inaturalist.org (accessed on 30 September 2023).
7. EASIN, European Commission - Joint Research Centre - European Alien Species Information Network (EASIN), **2022**, https://easin.jrc.ec.europa.eu / (accessed 2024-03-16).
8. Kousteni, V.; Tsiamis, K.; Gervasini, E.; Zenetos, A.; Karachle, P.K.; Cardoso, A.C. Citizen scientists contributing to alien species detection: The case of fishes and mollusks in European marine waters. *Ecosphere* **2022**, *13(1*), e03875. 10.1002/ecs2.3875
9. Sandahl, A.; Tøttrup, AP. Marine citizen science: recent developments and future recommendations. Citizen Sci: Theory Pract. **2020**, 5(1), 24. https://doi.org/10.5334/cstp.270
10. Giovos, I.; Kleitou, P.; Poursanidis, D.; Batjakas, I.; Bernardi, G.; Crocetta, F.; Doumpas, N.; Kalogirou, S.; Kampouris, T.E.; Keramidas, I. et al. Citizen-science for monitoring marine invasions and stimulating public engagement: A case project from the eastern Mediterranean. *Biol. Invasions* **2019**, *21*, 3707–3721. https://doi.org/10.1007/s10530-019-02083-w
11. Tiralongo, F.; Crocetta, F.; Riginella, E.; Lillo, A.O.; Tondo, E.; Macali, A.; Mancini, E.; Russo, F.; Coco, S.; Paolillo, G. et al. Snapshot of rare, exotic and overlooked fish species in the Italian seas: A citizen science survey. *J. Sea Res.* **2020**, *164*, 101930.
12. Michail, C.; Tanduo, V.; Crocetta, F.; Giovos, I.; Litsiou, S.; Kleitou, P. Engagement of fishers in citizen science enhances the knowledge on alien decapods in Cyprus (eastern Mediterranean Sea). *Aquat. Ecol.* **2024**, 58(1), 107-116.
13. Crocetta, F.; Gofas, S.; Salas, C.; Tringali, L.P.; Zenetos, A. Local Ecological Knowledge versus published literature: a review of Non-Indigenous mollusca in Greek marine waters. *Aquat. Invasions* **2017**, *12*, 415–434. doi:10.3391/ ai.2017.12.4.01
14. WoRMS Editorial Board. World Register of Marine Species. Available from https://www.marinespecies.org at VLIZ. Accessed 2024-04-01. doi:10.14284/170
15. Galanidi, M.; Aissi, M.; Ali, M.; Bakalem, A.; Bariche, M.; Bartolo, A.G.; Bazairi, H.; Beqiraj, S.; Bilecenoglu, M.; Bitar, G.; et al. Validated inventories of non-indigenous species (NIS) for the Mediterranean Sea as tools for regional policy and patterns of NIS spread. *Diversity* **2023**, *15*, 962 https://doi.org/10.3390//d15090962
16. Delongueville, C.; Scaillet, R. Colonisation des côtes de la République Turque de Chypre du Nord par un Muricidae originaire du Golfe Persique (*Egalatax* Iredale, 1931). *NOVAPEX* **2008**, *9(1),* 3–6.
17. Delongueville, C.; Scaillet, R. *Strombus decorus raybaudii* en Méditerranée, nouvelles localités de récolte. *Arion* **1985**, *10(6),* 3-5.
18. Delongueville, C.; Scaillet, R. *Palmadusta gracilis* (Gaskoin, 1849)-Récolte d'un spécimen sur la côte méditerranéenne d'Israël. *Arion* **1989**, *14 (1),* 5-7
19. Delongueville, C.; Scaillet, R. *Erosaria turdus* (Lamarck, 1810) (Gastropoda - Cypraeidae) dans le Golfe de Gabès (Tunisie). *NOVAPEX* **2004**, *5(4),* 147-148
20. Delongueville, C.; Scaillet, R. Illustration de *Gastrochaena cymbium* Spengler, 1783 en Méditerranée orientale sur *Hexaplex pecchiolianus* (d'Ancona, 1871). *NOVAPEX* **2005**, *6(4),* 129–131.
21. Delongueville, C.; Scaillet, R. *Afrocardium richardi* (Audouin, 1826) alive on *Spondylus spinosus* Schreibers, 1793 in the Gulf of Iskenderun (Eastern Mediterranean Sea). *Neptunea,* **2006a** *5(1),* 13–14.
22. Delongueville, C.; Scaillet, R. Mollusques associés à *Spondylus spinosus* Schreibers, 1793 dans le golfe d'Iskenderun (Turquie). *NOVAPEX* **2006b**, *7(2-3)*, 29–33.
23. Delongueville, C.; Scaillet, R. Echantillonnage de mollusques invasifs et première signalisation de *Chama aspersa* Reeve, 1846 à Chypre Nord. *NOVAPEX* **2010a**, *11(1),* 3–7.
24. Delongueville, C.; Scaillet, R. Importante population de *Siphonaria crenata* Blainville, 1827 implantée à l'ouest du golfe d'Iskenderun (Turquie). *NOVAPEX* **2010b**, *11(1),* 8–11.
25. Delongueville, C.; Scaillet, R. Note concernant la présence de *Monetaria annulus* (Linnaeus, 1758) dans le Golfe de Gabès. *NOVAPEX* **2013**, *14(4),* 75–77.
26. Micali P.; Palazzi S. Contributo alla conoscenza dei Pyramidellidae della Turchia, con segnalazione di due nuove immigrazioni dal Mar Rosso. *Boll. Malacol.* **1992**, *28 (1-4),* 83-90.
27. Buzzurro, G.; Greppi, E. Presenza di *Smaragdia (Smaragdella) souverbiana* (Montrouzier, 1863) nel Mediterraneo orientale. *Boll. Malacol.* **1994**, *29(9-12),* 319–321.
28. Palazzi S. Ci sono due Zafra in Mediterraneo, ma come si chiamano? *Notiziario del CISMA* **1993**, *14,* 13-18.
29. Aartsen J.J. van; Goud, J. European marine Mollusca: notes on less well-known species. XV. Notes on Luisitanian species of *Parvicardium* Montesoraro, 1884, & *Afrocardium richardi* (Audouin, 1826) (Bivalvia, Heterodonta, Cardiidae). *Basteria*, **2000**, *64,* 171-186
30. Zenetos, A.; Karachle, P.K.; Corsini-Foka, M.; Gerovasileiou, V.; Simboura, N.; Xentidis, N.J.; Tsiamis, K. Is the trend in new introductions of marine non-indigenous species a reliable criterion for assessing good environmental status? The case study of Greece. *Meditter. Mar. Sci.* **2020**, *21*, 775–793. https://doi.org/10.12681/mms.25136
31. Yokes, B.; Rudman, W.B. Lessepsian opisthobranchs from southwestern coast of Turkey: Five new records for Mediterranean. *Rapp. Comm. Int. Explor. Mer Méditerranée* **2004**, *37*, 557

32. Tringali L.; Villa R. Rinvenimenti malacologici dalle coste turche (Gastropoda, Polyplacophora, Bivalvia). *Notiziario del CISMA*, **1990**, *11(12),* 33-41.
33. Tornaritis, G. *Mediterranean Sea Shells*. **1987**, Nicosia, Cyprus, published by the author. 190 pp.
34. Çeviker, D. Recent Immigrant Bivalves in the Northeastern Mediterranean off Iskenderun. *La Conchiglia* **2001**, *298*, 39-46.
35. Zenetos, A.; Konstantinou, F.; Konstantinou, G. Towards homogenization of the Levantine alien biota: Additions to the alien molluscan fauna along the Cypriot coast. *Mar. Biodivers. Rec*. **2009**, 6717 https://doi.org/10.1017/S1755267209990832
36. Cecalupo, A.; Quadri, P. Contributo alla conoscenza malacologica per il nord dell'isola di Cipro (Parte I). *Boll. Malacol.* **1994**, *30(1-4),* 5–16.
37. Delongueville, C.; Scaillet, R. Les espèces invasives de mollusques en Méditerranée. *NOVAPEX*-**2007**, *8(2),* 47–70.
38. Zenetos, A.; Gofas, S.; Russo, G.; Templado, J. *CIESM atlas of exotic species in the Mediterranean.* Vol 3. Molluscs. [F. Briand, Ed.] 376 pp. **2004**, CIESM Publishers, Monaco.
39. Engl, W. Specie prevalentemente Lessepsiane attestate lungo le coste Turche. *Boll. Malacol.* **1995**, *31 (1-4),* 43-50
40. Delongueville, C.; Scaillet, R. The genus *Lioberu*s Dall, 1898 (Bivalvia - Mytilidae), some thoughts about its distribution in the Mediterranean Sea. *NOVAPEX* **2023**, *24(2),* 77–85.
41. Crocetta, F.; Bitar, G.; Zibrowius, H.; Oliverio, M. Biogeographical homogeneity in the eastern Mediterranean Sea. II. Temporal variation in Lebanese bivalve biota. *Aquat. Biol.* 2013, *19*, 75–84 https://doi.org/10.3354/ab00521
42. Galil, B.S.; Mienis, H.K.; Hoffman, R.; Goren, M. Non-indigenous species along the Israeli Mediterranean coast: Tally, policy, outlook. *Hydrobiologi*a **2021**, *848*, 2011–2029. https://doi.org/10.1007/s10750-020-04420-w
43. Çinar, M.E.; Bilecenoglu, M.; Yokes, M.B.; Ozturk, B.; Taskin, E.; Bakir, K.; Dogan, A.; Acik, S. Current status (as of end of 2020) of marine alien species in Turkey. *PLoS ONE* **2021**, *16*, e0251086 https://doi.org/10.1371/journal.pone.0251086
44. Zenetos, A.; Albano, P.G.; Garcia, E.L.; Stern, N.; Tsiamis, K.; Galanidi, M. Established non-indigenous species increased by 40% in 11 years in the Mediterranean Sea. *Meditter. Mar. Sci.* **2022a**, *23*, 196-212 https://doi.org/10.12681/mms.29106
45. Zenetos, A.; Albano, P.G.; Garcia, E.L.; Stern, N.; Tsiamis, K.; Galanidi, M. Corrigendum to the Review Article (Medit. Mar. Sci. 23/1 2022, 196-212) Established non-indigenous species increased by 40% in 11 years in the Mediterranean Sea. *Meditter. Mar. Sci*. **2022b**, *23*, 876-878 https://doi.org/10.12681/mms.31523