

First record of the gastropod Stramonita haemastoma (Linnaeus, 1767) in the English Channel

Jean-Philippe Pezy, Aurore Raoux, Francis Kerckhof, Jean-Claude Dauvin

▶ **To cite this version:**

Jean-Philippe Pezy, Aurore Raoux, Francis Kerckhof, Jean-Claude Dauvin. First record of the gastropod Stramonita haemastoma (Linnaeus, 1767) in the English Channel. BioInvasions Records, 2019, 8 (2), pp.266-272. 10.3391/bir.2019.8.2.08 . hal-02153586

HAL Id: hal-02153586

https://normandie-univ.hal.science/hal-02153586

Submitted on 12 Jun 2019

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

BioInvasions Records (2019) Volume 8, Issue 2: 266–272

Rapid Communication

First record of the gastropod *Stramonita haemastoma* (Linnaeus, 1767) in the English Channel

Jean-Philippe Pezy[1,*], Aurore Raoux[1], Francis Kerckhof[2] and Jean-Claude Dauvin[1]

[1]*Normandie Univ, UNICAEN, UNIROUEN, Laboratoire Morphodynamique Continentale et Côtière, CNRS UMR 6143 M2C, 24 rue des Tilleuls, 14000 Caen, France*

[2]*Royal Belgian Institute of Natural Sciences, Operational Directorate Natural Environment, Aquatic and Terrestrial Ecology, Marine Ecology and Management, 3de en 23ste Linieregimentsplein, 8400 Oostende, Belgium*

**Corresponding author*

E-mail: *jean-philippe.pezy@unicaen.fr*

Citation: Pezy J-P, Raoux A, Kerckhof F, Dauvin J-C (2019) First record of the gastropod *Stramonita haemastoma* (Linnaeus, 1767) in the English Channel. *BioInvasions Records* 8(2): 266–272, https://doi.org/10.3391/bir.2019.8.2.08

Received: 9 July 2018

Accepted: 14 October 2018

Published: 12 March 2019

Handling editor: Fabio Crocetta

Thematic editor: Cynthia McKenzie

Copyright: © Pezy et al.

This is an open access article distributed under terms of the Creative Commons Attribution License (Attribution 4.0 International - CC BY 4.0).

OPEN ACCESS

Abstract

Here we report the first record of the red mouthed rock shell *Stramonita haemastoma* (Linnaeus, 1767) (Gastropoda, Muricidae) a predatory gastropod newly introduced to the English Channel. This species originally lives in the western Atlantic, eastern Pacific and Mediterranean Sea. Three specimens were collected on *Pecten maximus* at St-Martin-de-Bréhal, Normandy, France, on 2 February 2018. We present some hypotheses about the mode of introduction of *S. haemastoma* and its potential impact on the ecosystem in the English Channel.

Key words: introduced species, Muricidae, first record, Normandy, non-native species, *Pecten maximus*

Introduction

Species of the oyster drill *Stramonita haemastoma* complex (several subspecies are recognised) are widespread in warm-temperate and tropical latitudes of the western Atlantic and eastern Pacific Oceans, as well as in the eastern Mediterranean Sea (Butler 1985; Claremont et al. 2011). However, the species is under threat in the latter locations, the population in the southeastern Mediterranean collapsed due to too high seawater temperatures (Rilov 2016). Commonly named the red mouthed rock shell, *Stramonita haemastoma* has a large protoconch, a character typical for gastropods with a long pelagic larval duration (Claremont et al. 2011; Scheltema 1971; Richter and Thorson 1975). They are predatory snails (Clench 1947) commonly found in the intertidal zone of rocky shores, preferentially in the midlittoral (Ramírez et al. 2009) and subtidal (Rilov et al. 2001). The European species is *Stramonita haemastoma* (Claremont et al. 2011). *Stramonita haemastoma* is potentially the only amphi-Atlantic species, in the complex and the one with the broadest range, including the eastern Atlantic the continental coastline of the Mediterranean and West

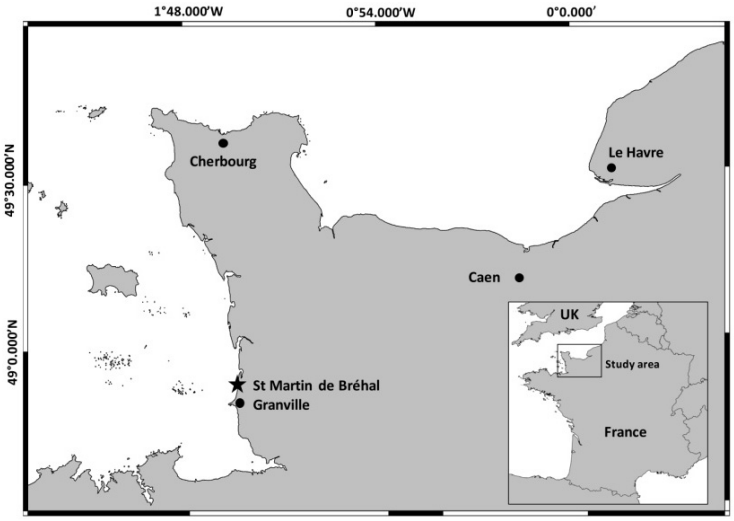


Figure 1. Map showing location of records of *Stramonita haemastoma* in the English Channel at the Saint-Martin-de-Bréhal site.

Africa and the oceanic islands of the Azores, Canaries and Cape Verde (Clench 1947; Claremont et al. 2011). Along the European Atlantic coast the northern species range boundary of *S. haemastoma* is thought to be situated in the southern part of the Bay of Biscay (de Casamajor et al. 2015).

Stramonita can be an extremely successful predator, because it has almost no natural predators in adulthood (Butler 1985). For example species of the *S. haemastoma* complex are important predators of oysters and mussels in shellfish aquaculture along the coast of Santa Catarina in Brazil (Ferreira and Magalhães 2004; Nascimento and Pereira 2004; Poli 2004). In the Mediterranean Sea, *S. haemastoma* is a widely distributed top consumer that adopts opportunistic strategies to consume a large number of species (Basedow 1994). For example, in the Mediterranean, it was an important predator of the native mussel *Mytilaster minimus* (Poli, 1795), but prefers now to prey on the invasive Lessepsian migrant mussel *Brachidontes pharaonis* (Fischer, 1870) where that species occurs (Giacoletti et al. 2016).

Material and methods

In the framework of the REGENI project (REalisation d'un Guide des Espèces Non Indigènes) in Normandy (France) we performed field research/ surveys in search of introduced species and to document the status of already present introductions. One of the main goals of the REGENI project is to produce an inventory of all Non-Native Species (NNS) along the 600 km of the Normandy coast. This project offers the opportunity to increase the discovery of unknown introduced species and recently discovered NNS (Pezy et al. 2017a, b).

On 2 February 2018, three individuals of a hitherto unknown gastropod were caught at low tide at Saint-Martin-de-Bréhal along the western coast of the Cotentin (Normandy) in the western part of the English Channel (coordinates: latitude 48.905429; longitude: −1.597425) (Figure 1). The

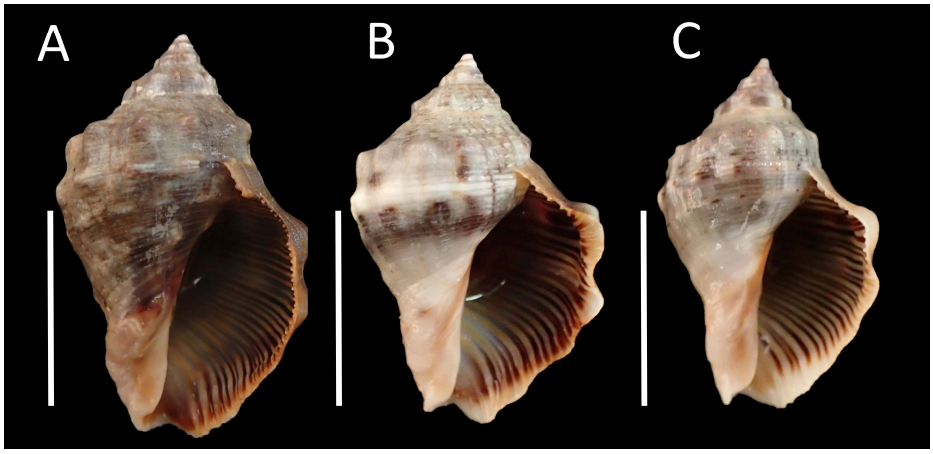


Figure 2. Entire *Stramonita haemastoma* individuals (IM-2014-6901). Scale bar for the total length: 25 mm. (A: 50.6 mm; B: 41.4 mm; C: 39.2 mm). Photographs by Jean-Philippe Pezy.

specimens were found on a rocky shore at low tide in the infralitoral fringe zone. When found they were alive and still attached on the shells of three living king scallops *Pecten maximus* stranded after a storm. The specimens were preserved in a 10% formaldehyde solution and taken to the laboratory for identification. We identified the snails using Claremont et al. (2011).

Results

We identified the snails as *S. haemastoma*, a member of the *S. haemastoma* complex that consists of six subspecies. *Stramonita haemastoma* is a typical representative of the gastropod family Muricidae with a medium-sized solid shell that commonly reaches between 70–80 mm in size with a prominent pointed spire and a nearly straight columella. The aperture is oval with a short, open siphonal canal and between 23–34 crenulations at the edge of the outer lip. An anal notch and parietal tubercle are present. Adults have between 5–7 whorls, that can be smooth or with a double row of pronounced knobs on the shoulder of the whorls, so-called sculptured forms sensu Claremont et al. (2011). The sculpture of the shell is highly variable and consists of very fine incised spiral lines. The suture between the whorls is usually very prominent. The colour of the shell is variable and consists usually of shades of dull greyish brown, while the interior of the smooth aperture is of a more orange-reddish colouration. The three *S. haemastoma* specimens measured 39.2 mm, 41.4 mm and 50.6 mm in length respectively and are adult. All individuals belonged to the sculptured form sensu Claremont et al. (2011) (Figure 2).

The sea temperature at the sampling station was 7.2 °C, with a salinity of 34 psu corresponding to fully marine conditions.

The *P. maximus* width shells measured 74 mm, 86 mm and 81 mm and are considered as young individuals (approximately two years). As such, they fell below the minimum landing size fixed at 110 mm in the EC. The three specimens of *S. haemastoma* are lodged in the mollusc reference

collection of the National Museum of Natural History in Paris under collection number IM-2014-6901.

Discussion

Stramonita haemastoma is a voracious predator of many bivalve species. It adds, to the known number of predatory sea snails that are already present on the western coast of the Cotentin peninsula such as the native Dogwhelk *Nucella lapillus* (Linnaeus, 1758) and European Sting Winkle *Ocenebra erinaceus* (Linnaeus, 1758) that preferentially consume blue mussels *Mytilus edulis* Linnaeus, 1758 and the introduced Japanese Oyster Tingle *Ocinebrellus inornatus* (Récluz, 1851). The latter is also a NNS that predates one the introduced Pacific oyster *Crassostrea gigas* (Thunberg, 1793) and on the introduced Manila clam or Japanese littleneck *Ruditapes philippinarum* (Adams and Reeve, 1850) (Bouget et al. 2001). In fact, these gastropod predators can affect all bivalve populations in the intertidal and shallow waters of the subtidal zone. It appears necessary to learn about their predation behaviour in order to anticipate their impact on ecosystem functioning. These predators have almost no natural competitors or predators, apart from humans, especially if they are located on isolated structures such as those used for the so-called "bouchot" (wooden pole) mussel culture or *C. gigas* tables.

The natural northern distribution range limit of *S. haemastoma* along the European Atlantic coast was thought to be the southern Bay of Biscay, including Biarritz and Arcachon Bay (Fischer 1865; Dautzenberg 1897; El Ayari et al. 2017). Until our findings there were no records further north along the French Atlantic coast, for example the species is not mentioned by de Montaudouin and Sauriau (2000) in their synoptic overview of the marine fauna of the Pertuis Charentais Sea, the region next to Arcachon Bay in the south. The species does not occur in the English Channel and is therefore not mentioned in the usual publications and guides dealing with Gastropods for this region such as Graham (1988) and Hayward and Ryland (2017). There is apparently an old record from the region of Brest by Collard des Cherres (1830) who found alive specimens amongst whelks on the fish market in Brest. This record was repeated by Fischer (1865) now stating "that it has been dredged off Brest". However, Dautzenberg (1897) did not mention this older record not having observed the species. The true origin of these specimens is, therefore uncertain as they could have been imported from elsewhere. The same holds true for 3 specimens, two live and one dead, that were found by Edgard Macculloch in the St Peter Port harbour in the 19th century – exact date unknown. The discovery triggered an extensive search for further specimens, but none were found (see Chambers 2008).

Possible mode of introduction

The individuals observed in St Martin-de-Bréhal, could have brought in by oyster farming activities that involve numerous exchanges—both legal and illegal—of oysters and other shellfish between the different French oyster farming regions, including Arcachon basin in the Bay of Biscay but also the Mediterranean. Rafting of adults is another possibility, for *Stramonita* spp. have been found at sea on floating logs (Clench 1947) and on the backs of turtles (Frazier et al. 1985). Recently, in the winter of 2015–2016 ten *S. haemastoma* were found on beaches in Cornwall, Dorset and Kent in southern England (Fenwick 2017). However, given the origin of the accompanying marine debris and other flotsam and jetsam that stranded in the same period, most likely these all belonged to the American species *S. floridana* and in fact the Cornish specimens were subsequently identified as *S. floridana* (Fenwick 2018).

Another possibility is a natural range expansion, as this species has a long teleplanic larval dispersal stage (Vermeij 2001; El Ayari et al. 2017). Despite this fact, until our finding, this species has never been recorded further north than Arcachon, hence some other factors may be inhibiting a further northward expansion. Therefore, an introduction through human activities seems the most likely introduction scenario.

Possible effects

Our observation of *S. haemastoma* on *Pecten maximus* is alarming due to the high economic importance of *P. maximus* populations in the English Channel, including in the Bay of Granville, that supports a very important king scallop fishery representing a valuable economic activity. However, as this species lives at shallow depths, the impact may be limited to intertidal and shallow waters outside the location of the abundant *P. maximus* population. If this predator were able to reproduce and expand its distribution along the coasts of the English Channel, other bivalve fisheries could be affected. The western coast of the Cotentin corresponds to an important fishing area (recreational and professional) for shellfish (Sécula 2011; Basuyaux et al. 2018), were several other commercial bivalves are present and harvested, such as *M. edulis, C. gigas,* the warty venus *Venus verrucosa* Linnaeus, 1758, *R. philippinarum,* the Chequered carpet shell *Ruditapes decussatus* (Linnaeus, 1758) and the European flat oyster *Ostrea edulis* Linnaeus, 1758 forming important economic resources. The warty venus *V. verrucosa* for example, is very abundant in the low intertidal levels and *S. haemastoma* could be a potential threat to this species in the Bay of Granville, which is the main fishery area for this target species of high economic value (Navon and Dauvin 2013).

If established, *Stramonita* would join the ranks of other rock snails already present in Normandy that have almost no natural predators

(except humans). They can have an impact on local economic resources by feeding on bivalve shellfish in aquaculture facilities and can also modify the structure and functioning of rocky intertidal ecosystems (Edwards et al. 1982; Liu et al. 1991; Rilov et al. 2001).

Acknowledgements

This study forms part of the REGENI (Realisation d'un Guide des Espèces Non-Indigènes) and ENBIMANOR (ENrichissement de la BIodiversité MARine en NORmandie) projects financed by the AESN (Agence de l'Eau Seine Normandie). The authors thank M. Carpenter for the English language revision, the thematic editor Cynthia McKenzie and the two anonymous reviewers for pertinent comments on an earlier version of the manuscript.

References

Adams A, Reeve L (1850) The zoology of the voyage of H.M.S. Samarang; under the command of Captain Sir Edward Belcher C.B., F.R.A.S., F.G.S., during the years 1843-1846. Reeve, Benham & Reeve: London. Parts I–III: 79

Basedow T (1994) Analysis of shells on beaches and rocky coasts of Europe: new findings on nutritional and population ecology of predatory marine gastropods (Muricidae and Naticidae). *Zoologische Beiträge NF* 36: 29–48

Basuyaux O, Beck F, Pezy JP, Baffreau B, Joncourt Y, Tetard X, Dauvin JC (2018) Evaluation of *Ruditapes* spp. clam stock on the western coast of Cotentin (English Channel). *Journal of Marine Biology & Oceanography* 7.1, https://doi.org/10.4172/2324-8661.1000186

Bouget JF, Camus P, Joly JP (2001) *Ocinebrellus inornatus* (Recluz, 1851), *Rapana venosa* (Valenciennes, 1846): deux nouveaux gastéropodes introduits dans la baie de Quiberon. Rapport de contrat Ifremer, Direction des Ressources vivantes, Département Ressources Aquacoles, 32 pp

Butler PA (1985) Synoptic review of the literature on the southern oyster drill *Thais haemastoma floridana*. *NOAA Technical Report NMFS series* 35: 1–12

Chambers P (2008) Channel Island Marine Molluscs. An illustrated guide to the seashells of Jersey, Guernsey, Alderney, Sark and Herm. Charonia Media, 321 pp

Claremont M, Williams ST, Barraclough TG, Reid DG (2011) The geographic scale of speciation in a marine snail with high dispersal potential. *Journal of Biogeography* 38: 1016–1032, https://doi.org/10.1111/j.1365-2699.2011.02482.x

Clench WJ (1947) The genera *Purpura* and *Thais* in the western Atlantic. *Johnsonia: Monographs of the marine mollusks of the Western Atlantic* 2(23): 61–92

Collard des Cherres (1830) Catalogue des Testacés marins du département du Finistère, principalement des côtes de Brest. *Actes de la Société Linnéenne de Bordeaux* 4(19): 3–60

Dautzenberg PH (1897) Atlas de poche des coquilles des côtes de France (Manche, océan, Méditerranée) communes, pittoresques ou comestibles. Paris, Librairie des sciences naturelles, Paul Klincksiek, 153 pp

de Casamajor MN, Lalanne Y, Huguenin L, Lissardy M, Bru N, d'Amico F (2015) BIGORNO - Biodiversité Intertidale sud Gascogne Observation et Recherche de Nouveaux Outils de surveillance et d'aide à la décision. Rapport Ifremer RBE/HGS/LRHAQ/15-003, 49 pp

de Montaudouin X, Sauriau PG (2000) Contribution to a synopsis of marine species richness in the Pertuis Charentais Sea with new insights in soft bottom macrofauna of the Marennes-Oléron Bay. *Cahiers de Biologie Marine* 41: 181–222

Edwards DC, Conover DO, Sutter F (1982) Mobile predators and the structure of marine intertidal communities. *Ecology* 63: 1175–1180, https://doi.org/10.2307/1937256

El Ayari T, Trigui El Menif N, Saavedra C, Cordero D, Viard F, Bierne N (2017) Unexpected mosaic distribution of two hybridizing sibling lineages in the teleplanically dispersing snail *Stramonita haemastoma* suggests unusual postglacial redistribution or cryptic invasion. *Ecology and Evolution* 7: 9016–9026, https://doi.org/10.1002/ece3.3418

Fenwick D (2017) Strandings including of non-native species. South-West Marine Ecosystems Report 2016, 67 pp

Fenwick D (2018) *Stramonita floridana* (Conrad, 1837) - Florida rock snail or Florida purple. Aphotomarine: http://www.aphotomarine.com/snail_stramonita_haemastoma_floridana.html (accessed 2018 July 10)

Ferreira JF, Magalhães ARM (2004) Cultivo de Mexilhões. In: Poli CR, Poli A, Andreatta E, Beltrame E (eds), Aquicultura: Experiências Brasileiras. Florianópolis: Ed. Multitarefa. cap. 9: 221–250

Fischer P (1865) Faune conchyliologique du département de la Gironde et des côtes du sudouest de la France. *Actes de la Société Linnéenne de Bordeaux* 25: 257–338

Fischer P (1870) Sur la faune conchyliologique marine des baies de Suez et de l'Akabah. *Journal de Conchyliologie* 18: 161–179

Frazier J, Margaritoulis D, Muldoon K, Potter CW, Rosewater J, Ruckdeschel C, Salas S (1985) Epizoan communities on marine turtles. I. Bivalve and gastropod mollusks. *Marine Ecology* 6: 127–140, https://doi.org/10.1111/j.1439-0485.1985.tb00134.x

Giacoletti A, Rinaldi A, Mercurio M, Mirto S, Sarà G (2016) Local consumers are the first line to control biological invasions: a case of study with the whelk *Stramonita haemastoma* (Gastropoda: Muricidae). *Hydrobiologia* 772: 117–129, https://doi.org/10.1007/s10750-016-2645-6

Graham A (1988) Molluscs: prosobranch and pyramidellid gastropods: keys and notes for the identification of the species. 2nd edition. Synopses of the British fauna, London, 662 pp

Hayward P, Ryland JS (2017) Handbook of the Marine Fauna of North-West Europe (2nd edition), Oxford University Press, Oxford, 785 pp, https://doi.org/10.1093/acprof:oso/9780199549443.001.0001

Linnaeus C (1758) Systema Naturae per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis. Editio decima, reformata. Laurentius Salvius: Holmiae. ii, 824 pp

Linnaeus C (1767) Systema naturae per regna tria naturae: secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis. Ed. 12. 1., Regnum Animale. 1 & 2. Holmiae, Laurentii Salvii. Holmiae [Stockholm], Laurentii Salvii, 1327 pp

Liu LL, Foltz DW, Stickle WB (1991) Genetic population structure of the southern oyster drill *Stramonita* (=*Thais*) *haemastoma*. *Marine Biology* 111: 71–79, https://doi.org/10.1007/BF01986348

Nascimento IA, Pereira SA (2004) Cultivo da ostra do mangue - *Crassostrea rhizophorae* (Guilding, 1828). In: Poli CR, Poli A, Andreatta E, Beltrame E (eds), Aquicultura: Experiências Brasileiras. Florianópolis: Ed. Multitarefa. cap. 11: 267–288

Navon M, Dauvin JC (2013) Immediate impact of intertidal pebble fork harvesting on the Warty venus *Venus verrucosa* benthic community. *Cahiers de Biologie Marine* 54: 385–392

Pezy JP, Baffreau A, Dauvin JC (2017a) Records of two introduced Penaeidae (Crustacea: Decapoda) species from Le Havre Harbour, France, English Channel. *BioInvasions Records* 6: 363–367, https://doi.org/10.3391/bir.2017.6.4.10

Pezy JP, Shahdadi A, Baffreau A., d'Udekem d'Acoz C, Schubart CD, Dauvin JC (2017b) An unexpected record of an African mangrove crab, *Perisesarma alberti* Rathbun, 1921, (Decapoda: Brachyura: Sesarmidae) in European waters. *Marine Biodiversity Records* 10: 33, https://doi.org/10.1186/s41200-017-0135-9

Poli CR (2004) Cultivo de ostras do Pacífico (*Crassostrea gigas*, 1852). In: Poli CR, Poli A, Andreatta E, Beltrame E (eds), Aquicultura: Experiências Brasileiras. Florianópolis: Ed. Multitarefa. cap. 10: 251–266

Poli JX (1795) Testacea Utriusque Siciliae eorumque historia et anatome. Parma, Regio Typographeio Volume 2: 75–264

Ramírez R, Tuya F, Haroun RJ (2009) Spatial patterns in the population structure of the whelk *Stramonita haemastoma* (Linnaeus, 1766) (Gastropoda: Muricidae) in the Canarian Archipelago (eastern Atlantic). *Scientia Marina* 73: 431–437, https://doi.org/10.3989/scimar.2009.73n3431

Récluz C (1851) Description de quelques coquilles nouvelles. *Journal de Conchyliologie* 2: 195–216

Richter G, Thorson, G (1975) Pelagische prosobranchier larven des Golfes von Neapel. *Ophelia* 13: 109–185, https://doi.org/10.1080/00785326.1974.10430594

Rilov G (2016) Multi-species collapses at the warm edge of a warming sea. *Scientific Reports* 6: 1–14, https://doi.org/10.1038/srep36897

Rilov G, Benayahu Y, Gasith A (2001) Low abundance and skewed population structure of the whelk *Stramonita haemastoma* along the Israeli Mediterranean coast. *Marine Ecology Progress Series* 218: 189–202, https://doi.org/10.3354/meps218189

Scheltema RS (1971) Larval dispersal as a means of genetic exchange between geographically separated populations of shallow water benthic marine gastropods. *Biological Bulletin* 140: 284–322, https://doi.org/10.2307/1540075

Sécula C (2011) Actors and coastal zone management. A social anthropology of the Mont-Saint-Michel bay. PhD Thesis National Museum of Natural History, Paris, France, 783 pp

Thunberg CP (1793) Tekning och Beskrifning på en stor Ostronsort ifrån Japan. *Kongliga Vetenskaps Academiens Nya Handlingar* 14: 140–142

Vermeij GJ (2001) Distribution, history, and taxonomy of the *Thais* clade (Gastropoda: Muricidae) in the Neogene of tropical America. *Journal of Palaeontology* 25: 697–705, https://doi.org/10.1017/S0022336000039731