

First record of the purple dye murex *Bolinus brandaris* (Gastropoda: Muricidae) and a revised list of non native molluscs from Galician waters (Spain, NE Atlantic)

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Abstract

The purple dye murex *Bolinus brandaris* (Linnaeus, 1758) has been reported for the first time from O Grove inlet (Galicia, NW Spain) in 2007. The presence of the shell mounds shows that this Mediterranean gastropod is commonly recorded in O Grove inlet together with another exotic muricid: *Hexaplex trunculus*. To the extent of our knowledge, this is the northernmost record of this species on the NE Atlantic coast. This species is the newest entry into a list of 23 aquatic and benthic exotic molluscs species from Galician waters. Most of them are introduced marine species, which arrived accidentally, or not, in the Galician region as a consequence of ship transport, shellfish culture and trade.

Key words: Spain, Galician waters, O Grove inlet, *Bolinus brandaris*, exotic molluscs

Two specimens of the purple dye *Bolinus brandaris* (Linnaeus, 1758) (Gastropoda: Muricidae) (61 and 63 mm height) were caught alive by gillnet during a commercial fishery survey on May 23rd 2007 in the O Grove inlet (42° 28.988'N, 8°50.332'W) at 2 m depth (Figure 1). *Bolinus brandaris* is a medium-sized species with shell heights up to 120 mm (Houart 2001). It is distributed throughout the Mediterranean Sea and in the NE Atlantic Ocean, from Morocco (as far south as Tanger) to Portugal (as far north as Cascais), living on sand and sand-mud

bottoms down to 200 m depth (Poppe and Goto 1991; Martín et al. 1995; Houart 2001).

After this unexpected record, interviews with local fishermen revealed the existence of several shell mounds in one coastal location. These mounds are composed of several hundred discarded gastropod shells. We have estimated the specific composition as being 70% *Hexaplex trunculus* (height range 53-84 mm, 70 ± 6.5 mm mean ± sd, n = 32) and 30% *Bolinus brandaris* (height range 48-91 mm, 71.4 ± 11.4 mm mean ± sd, n = 29).

Exotic species currently present in Galician waters [from the river Miño outlet (41°50'N, 9°40'W) to the river Eo outlet (43°32'N, 7°01'W)] are listed in Annex 1. In total 23 species are listed, of which 4 are freshwater (three of them are salt tolerant) and 19 are marine species. The most dominant class are gastropods with 16 species followed by 6 bivalves and 1 polyplacophore.

In the past, most alien species arrived in Galician waters as a result of secondary spread from other nearby European countries where their introductions were attributed to e.g. ship transport from distant locations such as Asia or South America (Kaas and van Belle 1987). This applied to the south American polyplacophore *Chaetopleura angulata* (Spengler 1797), registered in Galician waters in the early 20th century (Hidalgo, 1917), *Crassostrea gigas* (Thunberg, 1793) [= *C. angulata* (Lamarck, 1819)] first brought to Portugal from Asia, and the gastropod *Crepidula fornicata* (Linnaeus, 1758) (Fretter and Graham 1981).

Recently, the generally accepted hypothesis to explain the arrival of exotic specimens in Galician waters is the unintentional co-transport of larvae and/or juveniles of these species into commercial bivalve cultures, mainly clams and oysters from the Adriatic Sea (Rolán et al. 1985, 1994). Aquaculture activities such as the importation of middle-sized oysters from the Mediterranean Sea and their fattening during the favourable season, which began in the 1970's and the importation of clam spat, which commenced in the 1980's, are still on-going.

Rolán et al. (1985) have listed a series of exotic mollusc species, including *Bolinus brandaris* and *Hexaplex trunculus*, found in the packing material of Italian oysters [*Ostrea edulis* (Linné, 1758)]. The Galician populations of these two species, and also other alien species, are likely the consequence of survival and adaptation of some specimens to this new area after they were put into the sea.

The impact of alien species may result in changes in biological, chemical and physical properties of aquatic ecosystems and may also cause adverse economic consequences (Olenin et al. 2007).

During the last 20 years, an increase in the diversity and abundance of exotic marine species in Galicia has been detected, which represents a potential danger to the ecosystem. We want to provide a warning or alert signal for the potential unwanted impacts of these exotic organisms,



Figure 1. Specimens of *Bolinus brandaris* (height 61 and 63 mm) from O Grove inlet, Spain (Photograph by R. Bañón)

which may replace native harvested and cultivated species through competition or predation. Most of the introduced gastropod species are predominantly carnivorous, and feed on bivalves and other gastropods. Therefore their proliferation could result in negative consequences on the very important shellfish industry.

Further research is necessary to improve: 1) risks assessment of non-native species establishment, 2) cost-benefit analysis of the impacts of non-native species establishment and 3) techniques for eradication, containment, management and mitigation.

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Annex 1

List of non native molluscs from Galician waters. Habitat: marine (M); fresh water with some salt influence (S); fresh water (D)

| Scientific name | Habitat | Year of the first record | Localities | Main references |
|--|---------|--------------------------|--|---|
| Polyplacophora | | | | |
| <i>Chaetopleura angulata</i> (Spengler, 1797) | M | XIX century or before | Galician coasts | Kaas and van Belle 1987 |
| Gastropoda | | | | |
| <i>Bolinus brandaris</i> Linnaeus, 1758 | M | 2007 | O Grove Bay 42°28'N – 8°50'W | Present study |
| <i>Bulinus contortus</i> (Michaud, 1829) | D | 1999 | O Grove Bay in lagoons 42°28'N – 8°50'W | Rolán et al. 1999 |
| <i>Cancellaria cancellata</i> (Linnaeus, 1767) | M | 1999 | Only few records in Ría de Arousa 42°29'N – 8°50'W | Rolán et al. 1999 |
| <i>Crepidula fornicata</i> (Linnaeus, 1758) | M | 1983 | Galician coasts | Rolán 1983 |
| <i>Crepidatella dilatata</i> (Lamarck, 1822) | M | 2005 | Ría de Aldán 42°19'N – 8°50'W Ría de Arousa 42°29'N – 8°50'W O Grove Bay 42°28'N – 8°50'W | Rolán and Horro 2005 |
| <i>Cyclope neritea</i> (Linnaeus, 1758) | M | 1991 | Ría de Arousa 42°29'N – 8°50'W Ría de Pontevedra 42°22'N – 8°50'W | Rolán 1992; Rolán et al. 2005 |
| <i>Fusinus rostratus</i> (Olivi, 1792) | M | 2007 | Ría de Arousa 42°29'N – 8°50'W | Horro and Rolán 2007 |
| <i>Gibbula adansonii</i> (Payraudeau, 1826) | M | 1994 | O Grove Bay 42°28'N – 8°50'W | Rolán 1992 |
| <i>Gibbula adriatica</i> (Philippi, 1844) | M | 2000 | O Grove Bay 42°28'N – 8°50'W | Rolán and García 2000 |
| <i>Gibbula albida</i> (Gmelin, 1791) | M | 1985 | O Grove Bay 42°28'N – 8°50'W | Rolán et al. 1985 |
| <i>Haminoea japonica</i> (Pilsbry, 1822) | M | 1989 | O Grove Bay 42°28'N – 8°50'W | Álvarez et al. 1993 |
| <i>Hexaplex trunculus</i> (Linnaeus, 1758) | M | 2005 | O Grove Bay 42°28'N – 8°50'W O Grove Bay 42°28'N – 8°50'W | Quintas et al. 2005 |
| <i>Nassarius corniculus</i> (Olivi, 1792) | M | 1996 | Ría de Arousa 42°29'N – 8°50'W Ría de Vigo 42°13'N – 8°48'W | Rolán et al. 1996 |
| <i>Nassarius mutabilis</i> (Linnaeus, 1758) | M | 2006 | O Grove Bay 42°28'N – 8°50'W | Rolán and Trigo 2006 |
| <i>Potamopyrgus antipodarum</i> (Gray, 1843) | D, S | XIX century | All Galicia, freshwater | Rolán 2004 |
| <i>Rapana venosa</i> (Valenciennes, 1846) | M | 2007 | Ría de Arousa 42°31'N – 8°50'W | Rolán and Bañón 2007 |
| Bivalvia | | | | |
| <i>Anadara diluvii</i> (Lamarck, 1805) | M | 1996 | Some isolate places in deep water | Rolán et al. 1996 |
| <i>Chama gryphoides</i> (Linnaeus, 1758) | M | 2003 | Camelle 43°11'N – 9°05'W | Rolán and Trigo 2003 |
| <i>Corbicula fluminea</i> (Müller, 1774) | D, S | 1994 | Miño river mouth 41°52'N – 8°52'W | Rolán and Otero-Schmitt 1996 |
| <i>Crassostrea gigas</i> (Thunberg, 1793) | M | XIX century | Galician coasts | Hidalgo 1917 |
| <i>Ruditapes philippinarum</i> (Adams & Reeve, 1850) | M | 2005 | Ría de Arousa 42°29'N – 8°50'W Ría de Vigo 42°13'N – 8°48'W | Rolán and Horro 2005 |
| <i>Xenostrobus securis</i> (Lamarck, 1819) | D, S | 1995 | Ría de Vigo 42°13'N – 8°48'W | Rolán pers. comm., Garci et al. 2007 |