



Natural History Collections and Alien Species: an Overlooked Sample of *Bursatella leachii* Blainville, 1817 (Mollusca: Gastropoda: Aplysiida) Backdates its Confirmed Presence in Italy

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Abstract

The ragged sea hare *Bursatella leachii* Blainville, 1817 is a heterobranch mollusc with a circumtropical distribution, that since the mid-1900s colonized the Mediterranean Sea and is now considered as one of the alien taxa most widespread in the basin. Here, we backdate its confirmed presence in the Gulf of Naples and Italy as a whole based on an overlooked sample preserved in the natural history collections of Stazione Zoologica Anton Dohrn (Naples, Italy). The finding reported in the present paper confirms the importance of natural history museums in documenting biogeographic distribution patterns. It also casts doubts on the often assumed pattern of colonization of the Mediterranean basin (combining a Lessepsian origin and natural secondary spread), as it contributes to disrupt the nearly perfect Lessepsian-like spreading highlighted in recent articles.

Keywords Mediterranean Sea · Alien species · Geographic distribution · Natural history museums

Introduction

Natural history museums (NHMs) are facing a profound crisis in Italy due to cuts in financial support (Andreone et al. 2014; Andreone 2015). However, NHMs constitute fundamental repositories of data on biological diversity, as collections preserved in these institutions are essential tools for research (Alberch 1993). Main values include the documentation of patterns and processes behind present and past biogeographic distributions, housing types and voucher specimens, and providing research material for the investigation of the causes of evolutionary and ecological phenomena, which may inform conservation planning policies (Allmon 1994; Shaffer et al. 1998; Krishtalka and Humphrey 2000).

The decline in support and general interest in museums comes at a critical time, when global changes are affecting worldwide biotas, a phenomenon which seems to be amplified in the marine realm (Tuner et al. 1990; Harvell et al. 2002; Harley et al. 2006; Perry et al. 2010; Bellard et al. 2012).

Among multiple stressors acting synergistically, alien species constitute one of the most important threats to biodiversity, causing serious ecological and socio-economic impacts (Ricciardi et al. 2013; Jeschke et al. 2014). Several stakeholders proposed diverse frameworks for managing them. For example, the European Union's Marine Strategy Framework Directive lists, among the main criteria for assessing Good Environmental Status, the inventory of non-indigenous species present in a marine area/country/region and the documentation of temporal occurrences and trends in new introductions (European Commission 2015). However, faunal data are often biased by taxonomic impediments and the absence of critical field data, as well as by limited information on the exact arrival date and site of alien species into new ranges (Hoagland 1996; Boakes et al. 2010; Hanson et al. 2013). In fact, once an alien species is established and has spread, sightings may be multiple and span a wide portion of the coastline. Therefore samples resulting from continuous monitoring, often stored in NHMs or private collections, could be helpful to address those questions.

In the present paper, we add another piece of evidence to this discussion through the discovery of an overlooked molluscan sample belonging to *Bursatella leachii* Blainville, 1817 (Mollusca: Gastropoda: Aplysiida), a herbivorous sea slug typically found in muddy and sandy bottoms of protected bays and estuaries with a worldwide circumtropical distribution,

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