



ARE MARINE DRIFTING SPECIES COSMOPOLITAN? THE EXAMPLE OF THE ISOPOD *Idotea metallica*

SHORT COMMUNICATION

RODRIGO RIERA*

Centro de Investigaciones Medioambientales del Atlántico, Arzobispo Elías Yanes, 44, 38206 La Laguna, Tenerife, Canary Islands, Spain.
*corresponding author: rodrigo@cimacanarias.com

ABSTRACT

Marine drifting species have been extensively considered as cosmopolitans. In the present study, the distribution of the isopod *Idotea metallica* is analyzed in order to explain its geographic ranges. This species is characterized by non-interconnected records around the globe.

Key words: drifting species, cosmopolitan, isopoda, *Idotea metallica*.

RESUMEN

Se ha considerado de forma habitual que las especies marinas asociadas a objetos a la deriva presentan una distribución cosmopolita. En el presente estudio se analiza la distribución del isópodo *Idotea metallica* con el fin de establecer las causas de su distribución geográfica, con registros en áreas muy alejadas entre sí.

Palabras clave: especies a la deriva, cosmopolita, isopoda, *Idotea metallica*.

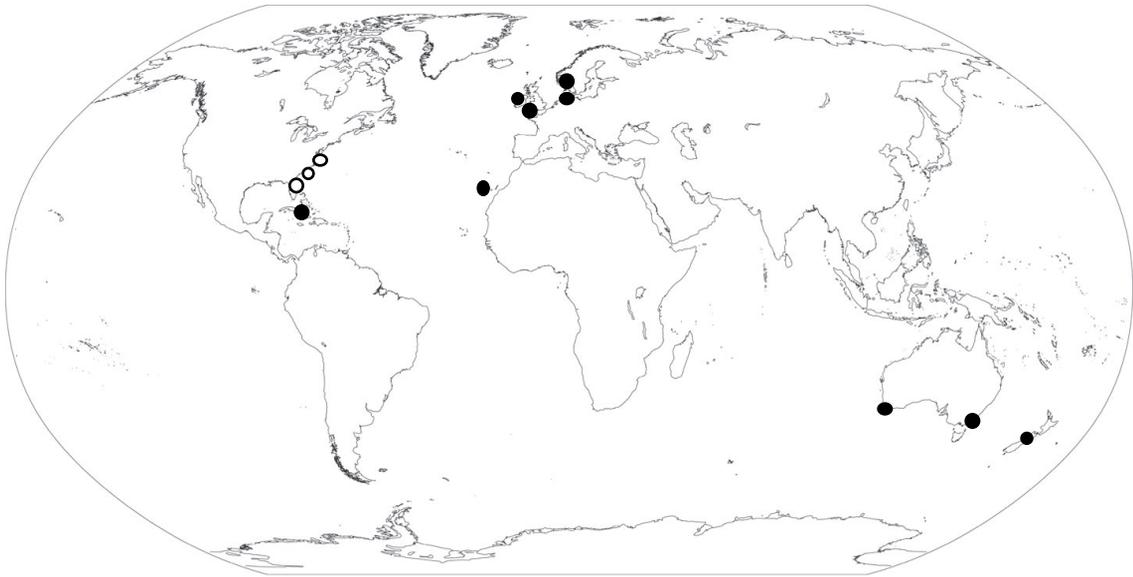


Figure 1: Geographic distribution of the isopod *Idotea metallica*. White dots, resident localities. Black dots, drifting localities.

INTRODUCTION

Many planktonic organisms occupy the neustonic zone (i.e. the top few centimetres of the surface layer) of the oceans, either temporarily, forming part of the merohyponeuston, (e.g. invertebrates larvae), or permanently (Pérès, 1982), such as some siphonophores, copepods and other crustaceans. All of these organisms must be adapted to the high environmental variability taking place at the oceans surface (turbulence, UV radiation, temperature and salinity variations, etc.) and must also be highly affected by currents, winds and waves (Barnes, 2002). Surface drift material represents a specific neustonic habitat which provides a considerable number of macrofaunal species with a substrate to cling to, shelter from pelagic predators, and/or food source. Isopods are a significant macrofaunal element inhabiting drift seaweed, e.g. several species of the genus *Idotea* (Franke *et al.* 1999).

The isopod *Idotea metallica* (Bosc, 1802) is a zooplanktonic oceanic crustacean whose habitat appears to be almost strictly neustonic, on which it can be transported passively over long distances by currents (Franke *et al.* 1999). Its abundance is strongly influenced by the distribution of the surface water masses and currents (Locke and Corey, 1989). Benthic populations of *I. metallica* are not known though this species is reported from coastal waters in many parts of the world (Sano *et al.* 2003; Abelló *et al.* 2004), probably as a consequence of interspecific competition with other benthic species (e.g. *Idotea baltica*) (Gutow and Franke 2003). Apparently, rafting is a specific and evolutionarily developed life

style of *I. metallica* (Gutow *et al.* 2006). *Idotea metallica* proved to be well adapted to typical feeding conditions of drifting species. This species exhibits a strong tendency towards carnivory and individuals not mature without animal food. *Idotea metallica* is able to reduce the total lipid content during an initial starvation period in favour of other compounds, as an adaptation to frequent starvation periods.

This species is known to cling to the undersides of flotsam (Locke and Corey, 1989), but they are also able to swim rapidly and actively (Tully and McGrath, 1987). *I. metallica* has been observed to prey upon by a wide range of marine organisms, ranging from seabirds (Furness and Todd, 1984), to pelagic and neustonic fishes such as *Belone belone* (Tully and McGrath, 1987) and *Coryphaena hippurus* (Massutí *et al.* 1998). Depending on the substrata, individuals are exposed to different conditions due to their resistance to biodegradation, (i) persistent objects (plastic, fishing nets and wood), represent efficient vectors for long-distance dispersal and (ii) ephemeral objects (drifting macroalgae), exposed to destruction by feeding. Thus, the efficiency of dispersal of *I. metallica* is linked to the persistence of local assemblages and this species is expected to set up permanent breeding populations on isolated surface-drifting on which they can be transported over long distances by currents (Gutow *et al.* 2006).

The isopod *Idotea metallica* has been frequently recorded in the Atlantic Ocean, however, there are scarce records in tropical and subtropical Atlantic areas

(Winfield and Ortiz, 2008; Rocha, 2011). Moreover, this species has been recorded in the Pacific Ocean (Australia and New Zealand) (Poore and Lew-Ton, 1993). Resident breeding localities are the east coast of North America, from Florida to Nova Scotia, as well as, the Mediterranean and Black Seas (Abelló and Frankland, 1997). The closest records of this species to the Canary Islands occurred in the Atlantic-mediterranean coasts, from Gibraltar to the Balearic Islands (Junoy and Castelló, 2003), but no previous observations has been recorded in the Macaronesian region (Azores, Madeira, Selvagens Islands and Cape Verde) (Fig. 1).

Naylor (1957) suggested that *I. metallica* is transported across the Atlantic Ocean, occasionally reaching British waters amongst floating objects, carried along by the North Atlantic Drift. McGrath (1980) and Tully and McGrath (1987) recorded individuals of this species from the Irish Sea. In the North Sea, only one single specimen has been reported for the Norwegian (Pethon 1970) and the Dutch coast (Huijsman and Huwae, 1978). Since 1994 it has been frequently observed in Helgoland (Germany) (Franke *et al.* 1999), however, Gutow and Franke (2001) showed that *I. metallica* is only a summer resident in the German coast. Populations go extinct in winter because temperatures are too low for reproduction. Nevertheless, due to repeated annual re-introduction, *I. metallica* has become a regular isopod of the German Bight.

The presence of this isopod in the Canary Islands implies the possibility of transport by drift from America via the Gulf Stream and the Azores and Canary Currents, as it has been proposed for other crustacean species, such as the tanaid *Zeuxo exsargasso* (Bamber and Costa, 2009) and the semi-terrestrial isopod *Ligia oceanica* (Ramírez *et al.* submitted).

However, the distribution of *I. metallica* can not only be explained by drifting (Fig. 1), since the records of Australia and New Zealand could be due to shipping, as has been observed by other species, such as, the dinoflagellate *Pfiesteria piscicida* (Ruble *et al.* 2005), the zebra mussel (*Dreissena polymorpha*) (Lori and Cianfanelli, 2006) and the crab *Carcinus maenas* (Carlton and Cohen, 2003). In the marine environment, the single largest transport vector of non-native species is exchange or partial exchange of ballast waters from transoceanic vessels as they pass through harbours throughout the world (Ruiz *et al.* 1997). The shipping industry is responsible for transferring more than 10 millions tons of ballast water worldwide annually (Rigby *et al.* 1999) and around 3,000 bacteria, animal and plant species are estimate to travel daily in ballast waters (IMO; 1998).

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