SHORT COMMUNICATION

The discovery of an Antarctic epipelagic medusan in the Mediterranean*

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Abstract. A single specimen of the Antarctic anthomedusan Russellia mirabilis Kramp 1957 has recently been collected in the Alborán Sea. This is the first record for an Antarctic epipelagic organism in the Mediterranean Sea. Transport in the ballast water of a cargo ship seems the most plausible mechanism for explaining this rare occurrence. However, an alternative hypothesis is explored involving a possibly complex medusan life cycle together with the role of Antarctic (Intermediate and Bottom) water as dispersal mechanisms.

We report here the discovery of a single specimen of the hydromedusan Russellia mirabilis Kramp 1957 in the Mediterranean Sea; the first record of an Antarctic epipelagic organism in this enclosed temperate basin.

Russellia mirabilis was originally described from four specimens collected by RRS ‘Discovery’ in 1931 and 1936, between South Georgia (55°S) and the Antarctic Peninsula (67°S) (Kramp, 1957). It is easily recognizable, being the sole representative of the anthomedusan family Russellidae, by the presence of eight groups of marginal tentacles, with each group consisting of a large tentacle deeply sunk into a narrow fissure between two prominent lobes of the umbrella margin, and flanked by a pair of small ones (Figure 1). The western Mediterranean specimen, 8 mm in umbrella height, was collected on 8 January 1997 at Discovery Station 13066 (36°01’9’’N, 1°43’9’’W) in the 300–205 m depth range. In this depth range, where the potential temperature was 13.4–13.13°C and salinity was 38.13–38.36 p.s.u., the water mass is formed by mixing of superficial Atlantic waters (Modified Atlantic Water) with Mediterranean water (Levantine Intermediate Water) (Sparnocchia et al., 1994).

The only other published records for this species are an unstated number of specimens from a single sample collected at 60°S, 150°W in the Southern Ocean (Navas-Pereira and Vanucci, 1990), and three specimens from a single sample in the Caribbean (Dana Station 1245, 0–1000 mwo, 19°35’3’’N, 73°27’3’’W) (Kramp, 1959). However, a further 18 specimens, all sampled south of the Polar Front near the Antarctic Peninsula, have recently been identified from our collections (Table I). These indicate that R.mirabilis lives mainly in the 0–300 m depth range,

*This paper is dedicated to the memory of our research fellow Martin White.
although four individual specimens were collected at deeper depths. These additional Antarctic specimens add further to the conclusion of Navas-Pereira and Vannucci (1990) that the distribution of this species is mainly in the cold super-

ficial waters of the Southern Ocean. Those authors suggested further that it might spread northwards in Antarctic Deep or Intermediate waters.

Could the Caribbean specimens of \textit{R.mirabilis} have been transported there from the Southern Ocean by natural means? Much is known about the spread of Antarctic waters into the Northern Hemisphere, both as Antarctic Intermediate Water (AAIW) and Antarctic Bottom Water (AABW) (e.g. Nowlin, 1991; Rhein et al., 1998). \textit{Russellia mirabilis} is primarily epipanlktonic in the limited area of the Southern Ocean where it has been found, and it is possible that it could become entrained in the AAIW, or even AABW, as the region around the Drake Passage is thought to be very important for the injection of superficial waters into the former (Talley, 1996). In the South Atlantic, the AAIW sinks to 600–700 m depth and spreads out. Although the northward spread is inexorable, it is also extremely slow, and it would take decades to reach the Caribbean region.

The lifespan of the medusa stage of Anthomedusae, based on studies of 19 species, ranges from 20 days at 6–10°C (Brinckmann-Voss, 1979) to 6 months at
19°C (Boero et al., 1997a), but no relationship between lifespan and temperature is discernible. Thus, the lifespan of *R. mirabilis* probably would be too short to allow for direct transportation in AAIW, unless it was able to reproduce during that period. However, although the polyp stage of *R. mirabilis* is not known, it should be noted that polyps of other Hydromedusae have not been found north of the Antarctic Polar Front, and that there are no records for the settlement of Antarctic invertebrate larvae in temperate regions.

Most anthomedusans develop a benthic polyp, although a few have a planktonic one. Some of the latter also develop resting stages or dormant cysts, from the medusa stage, that sink to the sea floor. They remain there until unknown mechanisms promote the production of pelagic hydroids which will subsequently form free medusae (Kubota, 1993). In addition, some anthomedusans can reproduce asexually by budding medusae from the tentacular bulbs (Berrill, 1950), or budding polyps and/or medusae from the stomach walls (Rees and Roa, 1966; Uchida and Sugiura, 1976). If free medusae are again entrained in either the AAIW or AABW, or in a faster northward-flowing current, then the species could again be carried toward the Caribbean. The animals might also be carried across the Mid-Atlantic Ridge into the eastern basin of the North Atlantic and toward the latitude of the Straits of Gibraltar. However, they would then have to migrate vertically or be upwelled into superficial waters in order to be carried into the Mediterranean.

The most likely mechanism for the transport of *R. mirabilis* into the Mediterranean appears to be in the ballast waters of a large bulk carrier or supertanker, as it has been demonstrated for many planktonic organisms including medusae (Carlton and Geller, 1993). Despite the remoteness of the point of origin, large ships are known to have routes that round Cape Horn (the late Martin White.
British Antarctic Survey, personal communication) and they may take on ballast waters near the region of known occurrence of this medusan species. However, the shipping trade between Subantarctic waters and the Mediterranean is very difficult to track down and evaluate. Transport in ballast waters cannot, however, explain the record of *R. mirabilis* in the Caribbean (Kramp, 1959), as the specimens were collected in 1922, pre-dating by a long time the era of supertankers and bulk carriers.

Another known method of transport of hydrozoans is by attachment of the polyp stage to the hull of a ship (Millard, 1959). The planula larva might have settled on a ship’s hull in the Southern Ocean and the hydroid might have thrived for a while, although it is unlikely that it could survive in superficial tropical waters, where the temperature is always >25°C. However, it might have regressed to a dormant hydrorhiza, waiting for favourable environmental conditions before redeveloping. Many Hydromedusae can survive adverse conditions as resting cysts (Boero *et al*., 1996) and hydrorhizae are nothing else than cysts (F. Boero, personal communication). However, the environmental conditions in the Mediterranean are very different from those in the Antarctic.

The non-Antarctic records for *R. mirabilis* suggest that the occasional occurrences of Antarctic planktonic organisms in temperate waters may not only be the result of transport in ballast waters. Natural mechanisms involving several life cycles coupled to advective processes could also explain their occurrence in warmer waters. Indeed, the life cycles of many medusans, including *R. mirabilis*, remain unknown, but in addition to the medusa–cyst–polyp cycle mentioned herein, other previously unknown life cycles have recently been discovered (Boero *et al*., 1997b). Thus, it is possible that there are other ways by which the dispersal of a species may be achieved.

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**References**


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