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About the wide Mediterranean distribution of the "geographically localized" *Clelandella myriamae* (Gofas, 2005) (Gastropoda Trochidae)

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ABSTRACT Almost one thousands of empty shells recognized as *Clelandella myriamae* (Gofas, 2005) (Gastropoda Trochidae) have been collected from the Gioia Basin (South Tyrrhenian) and, in minor number, from the Strait of Messina. The records remarkably increase the areal known for this bathyal species, previous known only from Levantine Basin.

KEY WORDS bathyal; *Clelandella*; first record; gastropod; Mediterranean.

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INTRODUCTION

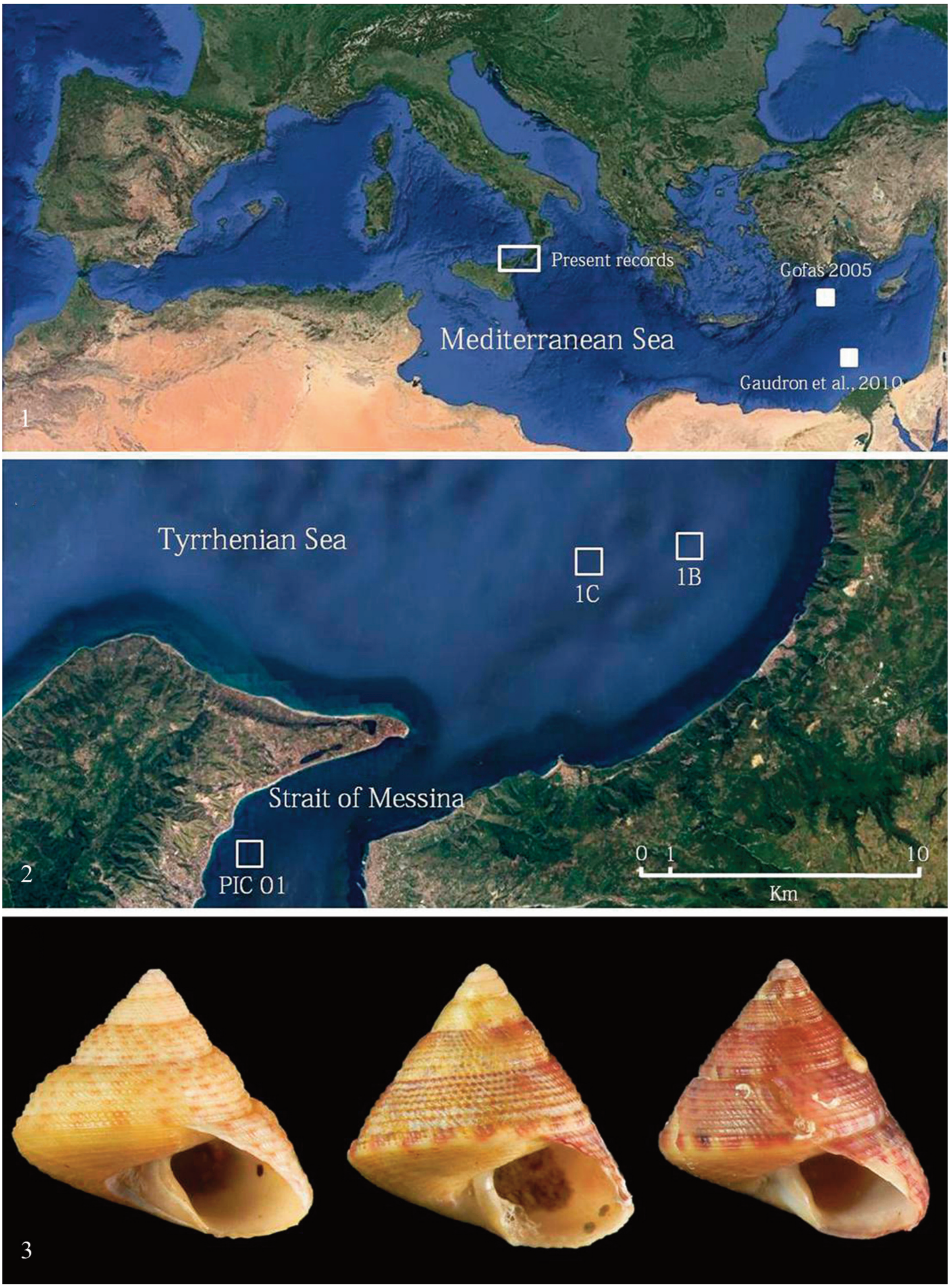
Before Gofas (2005), who described five new species from northeastern Atlantic and Mediterranean, the genus *Clelandella* Winckworth, 1932 (Gastropoda Trochidae), was only known for *C. miliaris* (Brocchi, 1814), whose areal extends from Norway to West Africa and Mediterranean Sea. A further species has been added by Vilvens et al. (2011) for Western Sahara. All such new species appeared geographically localized, as an effect of insular segregation, as suggested for the endemic Mediterranean *C. myriamae* (Gofas, 2005). This latter species, that has been first collected south of Crete, broadly sympatric with *C. miliaris* (Gofas, 2005), has been later recorded in the Nile Deep-Sea Fan, both located in the eastern Mediterranean (Gaudron et al., 2010).

In this paper, the finding of numerous *C. myriamae* dead specimens from the Messina Strait and close Tyrrhenian sea, is reported, testifying of a wider areal than previous known.

MATERIAL AND METHODS

The Strait of Messina and Tyrrhenian coasts of Calabrian (Fig. 1) have been respectively explored in the framework of the projects POP '95 and POR Calabria 2005. Seafloor sediments, in both investigations, have been sampled by means of a modified van Veen crab covering 0.25 square meter surface (75 dm^3 in volume).

Samples have been washed on board with seawater, by means of sieve series of 8 mm, 4 mm, 1 mm, 0.5 mm meshes, and fixed in ethylene 75%. In laboratory, after removing of benthic fauna, sediments have been washed with fresh water and dried at 45°C. From dried sediments, all shell remains have been extracted and classified at the



Figures 1–3. *Clelandella myriamae.* Mediterranean distribution (Fig. 1) and new findings (Fig. 2). The shell-shape variability (Fig. 3).

species level, as far as possible. All *C. myriamae* specimens have been counted and set aside for further investigation.

RESULTS AND DISCUSSION

From the investigated death assemblages, nearly a thousand of empty shells were recognized as *C. myriamae*. Most specimens have been collected in the Gioia Basin, south Tyrrhenian (Fig. 2), by two sampling stations located 371 m (St. 1B) and 335 m depth (St. 1C). Both stations were characterized by a mixture of coarse sand (80–90%) and gravel (9–10%), rich in bioclastic fragments. A further dozen specimens, sampled inside the Messina Strait (Fig. 2), were found at lower depth (-185 m: St. PIC01), in a coarse bioclastic substrate.

The sampled shells showed a remarkable morphological variability (Fig. 3), ranging between the two "typical" and "aberrant" forms cited by Gofas (2005). Such variability has been recently investigated by Sanfilippo et al. (in press) on the specimens collected in the 1C station. The present samplings of *C. myriamae* testify of a wider distribution of this species rather than the Levantine Basin only, overcoming the eastern-western Mediterranean boundary (Bianchi, 2007). Furthermore, the two records from Tyrrhenian and Messina should be considered as bio-geographically distinct, although separate by twenty kilometers only.

The Strait of Messina, in fact, is interposed between two basins, Tyrrhenian at north, and Ionian at south, with different oceanographic characteristics. Moreover, the Strait of Messina itself is quite different from both the close Tyrrhenian and Ionian basins, due to the peculiar tidal regime and related upwelling phenomena, and for this reason is considered a biogeographically distinct "micro-sector" (Bianchi et al., 2010).

The bathymetric range of the species is also wider than known, extending at least from the upper (present records) to the deeper bathyal zone (first records). In terms of habitat, the peculiar environment of mud volcanoes which provided the first specimens of *C. myriamae* (Carlier et al., 2010) does not involve a specialized adaptation towards extreme habitats supported by chemosynthetic production.

In fact, the finding of juveniles in different devices with organic and inorganic substrate, according to Gaudron et al. (2010), might indicate *C. myriamae* a sulphide tolerant species that opportunistically colonizes locally enriched substrates in oligotrophic areas. Such an opportunistic behavior might explain the relevant number of dead specimens (very higher than each other associated mollusc species) that have been found in a relatively small sediment volume, thus suggesting *C. myriamae* may reach high population densities. Nevertheless, is unclear what food source might support a high population density in the Strait, lacking any evidence of present hydrothermal activity as well as of massive organic matter deposition. In this respect, records of alive specimens from the same area (Vazzana, pers. comm.), if confirmed, might provide useful indications about the population dynamics and life strategy of such scarcely known species.

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