15th International Congress of the Geological Society of Greece
Athens, 22-24 May, 2019 | Harokopio University of Athens, Greece
Bulletin of the Geological Society of Greece, Sp. Pub. 7 Ext. Abs. GSG2019-338

Spatial distribution of epibenthic molluscs on a Tortonian reef in central Crete, Greece

C. Psarras[1], E. Koskeridou[1], D. Merle[2], A. Antonarakou[1], G., Kontakiotis[1], I. Kyriakoulis[1]

(1) National and Kapodistrian University of Athens, Department of Geology and Geoenvironment, Section of Hist. Geology-Paleontology, Athens (Greece) cpsarras@geol.uoa.gr
(2) Muséum national d'Histoire naturelle, Département Histoire de la Terre, Unité de Paléontologie, UMR 5143 du CNRS, case postale 38, 57 rue Cuvier, F-75231 Paris cedex (France)

Coral reefs are hosts of a remarkable variety of animals and plants, ranging from a few hundred species living in the Amazon Reef, to thousands of species living in the Great Barrier Reef. The structures are made mainly from corals and shelter many species that are endangered, while some are endemic to specific niches. The health, abundance and diversity of the organisms that make up a coral reef are directly linked to the surrounding terrestrial and marine environments. For this reason, molluscs are used as bioindicators in reef ecosystems, because they are situated in a variety of ecological niches in hard substrate environments (Zuschin, 2001, Koskeridou *et al*. 2017). In this study, the community structure of Tortonian coral reef associated molluscs from Central Crete (Greece) is investigated.

In Messara basin, near Filippi village (Crete), in proximity to the reef, mollusc fossils were extracted from pebbly sandstone deposits. When evaluating the abundance of mollusc species, we detected a dominance of carnivore gastropods (53% of the species), hosting 34 species belonging to 25 genera. Some examples of carnivore species are included in families like Cassidae which feed on echinoids (Tewfik, 2013), Conidae that feed mainly on polychaete worms (Jiménez-Tenorio *et al*. 2019) and Muricidae with Naticidae that drill to feed on mollusc shells (Sawyer & Zuschin, 2011). Also, we observed a striking presence of bivalve suspension feeders, for example *Megacardita sp*., which require relatively high hydrodynamics. Furthermore, herbivore species like *Persististrombus sp*. and *Alvania sp*., as well as the spongivore *Cerithiopsis sp*. were present. Finally, considering the small coral parts and red algae in the deposits, the samples indicate a well oxygenated shallow marine paleoenvironment on a sandy bottom, with sponges, coral patches and seagrasses.

Additionally, skeletal parts of fish, as well as echinoid spines were found in sieved material. According to previous published studies, a sirenian fossil has been found in Filippi (Svana *et al*. 2010), an herbivore sea mammal, similar to those existing today on tropical coral reefs. We also gathered information about other animals living in the ecosystem, without obtaining any fossils, either because their bodies were not found or they did not have hard parts to be fossilized. The shells form habitats for a series of organisms (Alberti & Reich, 2018). Trace fossils of *Entobia* and *Caulostrepsis* are formed from sponges and boring polychaetes, respectively (Alberti & Reich, 2018). Broken and healed shells are indications of crustaceans preying on gastropod shells (Lindström & Peel, 2005, Alberti & Reich, 2018).

We are aware that our sampling material is not enough for estimating species richness (Kusworo *et al*. 2015). Despite of that fact, by taking into account the information on spatial variability and distribution patterns of organisms in modern coral reef environments (Taylor, 1968), we can address our material to a specific ecological niche in this Tortonian coral ecosystem. Using statistical analysis on our quantitative and qualitative results of the fossil fauna, we identified the ecosystem of the coral reef, for the first time in Greece. Our findings point towards a sandy environment between the beach and the reef, with a proximity towards the reef. Trophic relationships, of the organisms living in ecosystems such as the present one, have been recently discussed (Alberti & Reich, 2018). Using a similar model, we can show the trophic food chain of the niche and the complexity of the life in a Tortonian coral reef in the Mediterranean Sea. Further research will compare this material with other Miocene sampling areas, for example the Gatun locality in Panama (Alberti & Reich, 2018), and their paleoenvironmental implications, improving our knowledge about how such ecosystems functioned in the past.

Figure 1. A: Mark of a Naticid drilling mark. B: Balanid and ichnofossils *Entobia*. C: *Caulostrepsis* ichnofossils.

Acknowledgments

We thank the Special Account for Research Grants and the National and Kapodistrian University of Athens for funding our attendance to this Conference.

References

Alberti, M. & Reich, S., 2018. A palaeoecological review of the lower Gatun Formation (Miocene) of Panama with special emphasis on trophic relationships. Palaeobio Palaeoenv 98: 571.

Jiménez-Tenorio, M, Abalde, S, Uribe, J, Zardoya, R., 2019. Conidae phylogenomics and evolution. Zoologica Scripta. 48. 194-214.

Koskeridou, E., Giamali, C., Antonarakou, A., Kontakiotis, G., Karakitsios, V., 2017. Early Pliocene gastropod assemblages from the eastern Mediterranean (SW Peloponnese, Greece) and their palaeobiogeographic implications, Geobios, 50: 267–277.

Kusworo, A., Reich, S., Wesselingh, F., Santodomingo, N.,Johnson, K.,Todd, J.,Renema, W., 2015. Diversity and paleoecology of Miocene coral-associated mollusks from East Kalimantan (Indonesia). Palaios. 30. 116-12.

Lindström, A. and Peel, J.S. 2005. Repaired injuries and shell form in some Palaeozoic pleurotomarioid gastropods. Acta Palaeontologica Polonica 50 (4): 697–704.

Sawyer J., Zuschin M., 2011. Drilling predation in mollusks from the lower and middle Miocene of the central Paratethys. Palaios, 26, p. 284–297.

Svana K., Iliopoulos G., Fassoulas C., 2010. New Sirenian findings from Crete Island. Bulletin of the Geological Society of Greece, 43, 746-753.

Taylor, J., 1968. Coral Reef and Associated Invertebrate Communities (Mainly Molluscan) Around Mahe, Seychelles. Philosophical Transactions of the Royal Society B: Biological Sciences. 254. 129-206.

Tewfik, A., 2013. Ecology of the King Helmet, Cassis tuberosa (L.), in South Caicos. Caribbean Naturalist. 2. 1-10.

Zuschin, M., Hohenegger, J., Steininger, F., 2001. Molluscan assemblages on coral reefs and associated hard substrata in the Northern Red Sea. Coral Reefs. 20. 107-116.