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BIOTOPE CHARACTERISATION AND COMPILED GEOGRAPHICAL DISTRIBUTION OF THE DEEP-WATER OYSTER *NEOPYCNODONTE ZIBROWII* IN THE ATLANTIC OCEAN AND MEDITERRANEAN SEA

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Abstract

We collected and compared 261 geographical *Neopycnodonte zibrowii* records, retrieved from cruises, non-shipbased submersible expeditions and terrestrial field trips, carried out between June 1882 and January 2016. Hosted in a database, records further contain valuable site-specific metadata, including standardised describers for the variety of observed deep-sea oyster biotopes.

Keywords: Bathyal, Biodiversity, Bivalves, Canyons, Mediterranean Sea

It may seem surprising that probably one of the largest and most long-lived deep-water bivalves, the gryphaeid *Neopycnodonte zibrowii* Gofas, Salas & Taviani in Wisshak et al. (2009) [1], experienced a taxonomic description as late as in the early 21st century. Previously *N. zibrowii* oyster findings were informally treated as 'large oyster', *Ostrea* sp. or they were admixed with the cosmopolitan gryphaeid *Neopycnodonte cochlear* (Poli, 1795). Thus, a taxonomic re-evaluation of some *N. cochlear* and *Ostrea* sp. samples from unusual depths and/or sizes led to additional records for *N. zibrowii*. A large number of dead *N. zibrowii* records were accidental findings deriving from dredging and contributing to the fact that just some records of the data compilation have previously been published in the literature. The ever increasing number of *in situ* recordings and direct sampling of *N. zibrowii* in its specific biotopes over the last 2-3 decades is related to the systematic reconnaissance of cold-water coral habitats as biodiversity hotspots and their environmental controls along the continental margins of Europe and Africa, and jointly with the increase in applying advanced marine technologies, such as manned submersibles and remotely-operated vehicles (ROVs). This study is based on geographical *N. zibrowii* records retrieved from cruises, non-shipbased submersible expeditions and terrestrial field trips, carried out between June 1882 and January 2016.

The revealed geographical distribution of live *N. zibrowii* occurrences spans latitudinally from 48° N (Whittard Canyon, Celtic Sea) to 9° S (Anna Ridge off Angola, South Atlantic Ocean), and longitudinally from 28° W (Faial Channel, Azores, North Atlantic Ocean) to 13° E (Urania Bank, Sicilian Channel, central Mediterranean Sea). Late Pleistocene submerged occurrences further extent this distribution to 26° E (southeast off Crete, eastern Mediterranean Sea). Bathymetrically, live *N. zibrowii* are found between 234 m (off Mauritania, North Atlantic Ocean) and 983.5 m water depth (Emile Baudot Escarpment, western Mediterranean Sea), usually between 500 and 700 m.

Within suitable physical limits and nutritional settings, *N. zibrowii* grows on hard substrates and shows the highest colonisation densities in sediment-protected and current-exposed zones, such as rocky overhangs and (sub-) vertical rock exposures on seamounts, escarpments and in canyons. Nowadays, also anthropogenic items, like shipwrecks, serve as substrate. The lifespan of the thick-shelled *N. zibrowii* can exceed 500 years, thus belonging to the longest-living non-colonial animals; the largest valves with up to 30 cm length were reported from the Azores. Live *N. zibrowii* and their *post-mortem* remains serve as substrate for their own larvae, generating over several generations a built-up, formed as chaotic clusters or stacks. Also, they provide a suitable ecospace for a diverse associated community of attached/excavating sclerobionts, mobile organisms and for demersal benthopelagic fishes, and therefore configure a well-defined deep-sea habitat. *Neopycnodonte zibrowii* often co-occurs with scleractinians, such as *Lophelia pertusa*, *Madrepora oculata* and *Desmophyllum dianthus*. Based on video and image material from ROV and submersible dives, we characterise the *N. zibrowii* biotopes, following the "Coastal and Marine Ecological Classification Standard".

Fossil *N. zibrowii* can be preserved *in situ* (double valved) and contribute to a lithified oyster-*Desmophyllum* framestone, as reported off Crete, but more commonly, the non-cemented right valve falls off and is accumulated at or near the base of the steeply inclined substrate. The oldest geological record dates back to the Early to Mid-Pleistocene and is based upon shells putatively attributable to *N. zibrowii* occurring on outcrops at Capo Milazzo (Sicily, Italy) and St. Paul's Bay Limestone (Rhodes, Greece).

The present database contains 261 entries and provides valuable site-specific metadata, including standardised describers for the variety of observed deep-sea oyster biotopes.

References

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