

ABUNDANCE, SIZE, AND GROWTH RATE OF *GEODIA CYDONIUM* (DEMOSPONGIAE: GEODIIDAE) IN THE NORTHERN ADRIATIC TEMPERATE BIOGENIC REEFS

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Abstract

Northern Adriatic subtidal biogenic reefs host a large population of *Geodia cydonium* showing heterogeneous distribution with patches of high densities and large mean sizes. Its optimal distance from the coast, in terms of bio-volume, was 4-5 nm. The growth rate in diameter of *G. cydonium* has been estimated in 25.60 ± 11.15 % year⁻¹ (\pm s.e.). Despite the relatively high growth rate, the heterogeneous and fragmented spatial distribution of *G. cydonium* suggests the needs of specific management and conservation strategies of this ecologically and aesthetically valuable species.

Keywords: Porifera, Conservation, Growth, Continental shelf, North Adriatic Sea

Introduction *Geodia cydonium* (Jameson, 1811) is an Atlanto-Mediterranean massive demospongiae very variable in size, shape and habitus, from sessile and non-sessile morphs ([1], [2]). *G. cydonium* is a habitat forming species, hosting many epibiotic and endobiotic species ([3]). It is listed among the endangered or threatened species (Annex II, Barcelona Convention, 1995), however, its abundance, distribution, and biology are still now not well known. In the northern Adriatic Sea, *G. cydonium* dwells on the subtidal biogenic reefs occurring at 7 to 30 m ([4]). The aims of the present study were to quantify the abundance, distribution, size, and growth rate of *G. cydonium*.

Material and methods Randomly selected specimens of *Geodia cydonium*, leaving on 2 outcrops off Chioggia, were labelled and measured (maximum height, diameter and circumference) since August 2006 and re-measured every time they have been found until 2011. During the summer 2011, population densities and specimens mean size were measured along 10x2 m transects on 5 randomly selected outcrops between Chioggia and Caorle, ranging from 7 to 22 m in depth and from 2 to 8 nm from the coast. A total of 34 transects and 114 specimens were measured. Differences among sites were assessed by one-way ANOVA after check of the homogeneity of variances using the Bartlett test (transform: square root). Volumes of the specimens were obtained by approximating the shape to a sphere. The relationship between distance from the coast and mean size was investigated by non-linear correlation. SCUBA diver volunteers data were obtained from the Reef Check Italia *onlus* database.

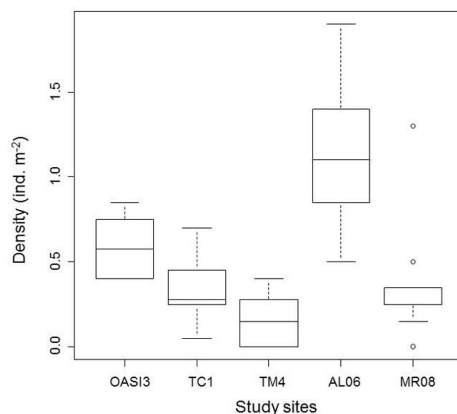


Fig. 1. Box-and-whisker plots of the densities of *Geodia cydonium* in the study sites, ordered by distance from the coast.

Results *Geodia cydonium* showed almost spherical shapes; size range was close to the largest reported in the literature. The estimated growth rates were 25.60 ± 11.15 % year⁻¹ (\pm s.e.) and 14.07 ± 5.15 % year⁻¹ (\pm s.e.) in terms of diameter and circumference, respectively. *G. cydonium* densities among outcrops varied from 0.16 ± 0.05 ind. m⁻² to 1.15 ± 0.24 ind. m⁻² (\pm s.e.; ANOVA $P < 0.001$; Fig. 1). The mean bio-volume of the single

specimens reached the higher values at 4-5 nm from the coast (Fig. 2). *G. cydonium* was very abundant in several places along the Adriatic and Ionian coasts (e.g. Porto Cesareo basin, Marsala lagoon, Rovinj) in the '70s, but since the end of the last century most of these populations have become progressively rarefied with smaller individuals (G. Corriero, pers. com.). Reports by volunteers show that the Italian distribution of *G. cydonium* is very fragmented (www.progettomac.it).

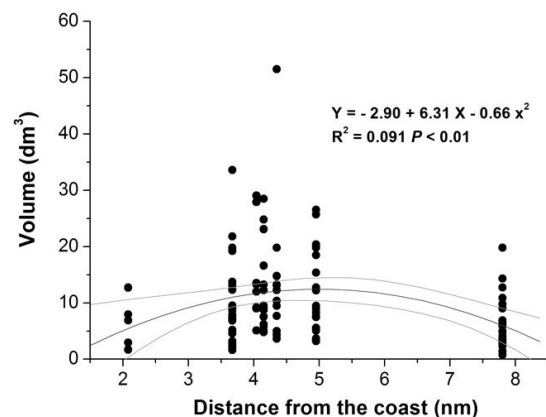


Fig. 2. Non-linear correlation between distance from the coast and specimens sizes in terms of estimated bio-volume.

Discussion *Geodia cydonium*, living on the northern Adriatic subtidal biogenic reefs, showed locally high densities and large mean sizes. Its largest sizes are reached at 4-5 nm from the coast, may be due to the interplay between water turbidity and food availability, largely affected by rivers load, sediments re-suspension, and planktonic blooms. Despite the relatively high growth rate, the heterogeneous and fragmented distribution of *G. cydonium* highlights the need of specific management and conservation strategies for this endangered and ecologically valuable species. **Acknowledgments** The Diving Center Tegnùe Chioggia provided the logistic support and Reef Check Italia *onlus* valuable data.

References

- 1 - Corriero G., Pansini M. and Sarà M., 1984. Sui poriferi della insenatura della Strea a Porto Cesareo (Lecce). *Thalassia Salentina* 14: 3-10.
- 2 - Mercurio M., Corriero G. and Gaino E., 2006. Sessile and non-sessile morphs of *Geodia cydonium* (Jameson) (Porifera, Demospongiae) in two semi-enclosed Mediterranean bays. *Mar. Biol.* 148: 489-501.
- 3 - Gherardi M., Giangrande A. and Corriero G., 2001. Epibiotic and endobiotic polychaetes of *Geodia cydonium* (Porifera, Demospongiae) from the Mediterranean Sea. *Hydrobiologia* 443: 87-101.
- 4 - Ponti M., Fava F. and Abbiati M., 2011. Spatial-temporal variability of epibenthic assemblages on subtidal biogenic reefs in the northern Adriatic Sea. *Mar. Biol.* 158: 1447-1459.