

CAN FOSSIL SHELLS BE USED AS HOUSING?

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Abstract

The use of fossil gastropods belonging to the Buccinidae as housing by the large-sized hermit crab *Dardanus arrosor* is reported for the first time in the Mediterranean.

Keywords: Crustacea, Gastropods, Sicily Channel, Mediterranean Sea

Recently Massi et al. [1], investigating a thanatocoenosis with the fossil gastropods *Neptunea contraria* (Linnaeus, 1771) and *Buccinum undatum* Linnaeus, 1758 in the Strait of Sicily, found that the benthic community associated to the thanatocoenosis had a higher biodiversity compared to those of similar areas where the two fossil gastropods were not present. This contribution addresses the question of whether fossil shells within these thanatocoenoses can be used by living organisms for housing. The role of host structures as a major “protective” resource and a limiting factor for hermit crab natural populations has been extensively investigated. In general, more than 60% of useable shells are inhabited by hermit crabs, that show a marked preference for gastropod shells. Shell attributes such as weight, shape and, more importantly, size and volume, are accurately “selected” by hermit crabs and are known to affect their growth and reproduction [2]. Few examples of the use of fossil shells by hermit crabs are reported in the scientific literature. In Bermuda, the terrestrial hermit crab *Coenobita clypeatus* (Fabricius, 1787) uses fossil shells of *Cittarium pica* (Linnaeus, 1758) as housing [3] and the large semi-terrestrial hermit crab *Coenobita rugosus* H. Milne Edwards, 1837 utilizes fossil shells deriving from marine erosion of the limestone coast of Madagascar when no other suitable casing is available [4]. Here we examine samples of marine hermit crabs inhabiting fossil gastropods collected on soft bottoms. They were derived from the “MEDITS 2015” scientific trawl survey as well as sampling of commercial catches “CAMPBIOL 2015”, within the European Data Collection Framework. Shells and crabs were measured and weighed according to [2]. We found five hermit crabs *Dardanus arrosor* (Herbst, 1796) living in the fossil shells of *Buccinum humphreysianum* Bennett, 1824 (sample n. 1), *Buccinum undatum* Linnaeus, 1758 (samples n. 2, 3 and 4) and *Neptunea contraria* (Linnaeus, 1771) (sample n. 5) (Table1).

References

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- 3 - Walker S.E., 1994. Biological Remanie: Gastropod Fossils Used by the Living Terrestrial Hermit Crab, *Coenobita clypeatus*, on Bermuda. *Palaios*, 9 (4): 403-412.
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Tab. 1. Measures of fossil gastropods and *Dardanus arrosor* (length in mm, volume in cm³ and weight in g): shell length (SL), shell width (SW), shell aperture width (AW), shell internal volume (SiV) and shell weight (SWe); crab cephalothorax length (CFL), crab cephalothorax width (CFW), cheliped length (ChL), cheliped width (ChW) and crab weight (CW). Approximate geographical position and mean depth (in m) of the hauls are given.

Shell species	Shell parameters						Dardanus arrosor					Geographic position		
	SL	SW	AH	AW	SiV	SWe	CFL	CFW	ChL	ChW	CW	LAT.	LONG.	DEPTH
1.B. humphreysianum	63	37	35	16	16	8	30	15	29	17	20	373237	122340	157
2.B. undatum	57	32	28	15	10	6	17	7	12	8	3	374240	121131	210
3.B. undatum	69	38	36	17	12	15	25	11	22	10	10	374050	122215	120
4.B. undatum	63	35	32	16	14	10	20	8	16	9	8	373848	120821	107
5.N. contraria	90	45	53	22	25	36	30	13	25	14	21	not av.	not av.	not av.

Our samples pertain to the north-western shelf to slope sectors of the Adventure Bank (Strait of Sicily), where late Pleistocene biocalcarenes with reworked cold faunal assemblages form small infralittoral prograding wedges. In the Mediterranean, *D. arrosor* may reach sizes of 6-10 cm; it lives between 5 m and 669 m depth and inhabits available gastropod shells, often associated with the anemone *Calliactis parasitica* [5]. On the trawable bottoms of the Strait of Sicily we observed that the species is rather ubiquitous with the larger individuals selecting shells belonging to the Buccinidae, Ranellidae, Tonnididae, Cassidae, Muricidae and Naticidae families. To the best of our knowledge, these results provide the first reporting of a marine hermit crab utilizing fossil shells as housing and the fact they belong to the Buccinidae family is worthy of note. Although the examined specimens are few and do not allow to obtain significant relationship, the size of *D. arrosor* appears to be linearly related to the internal volume (SiV) and width (SW) of the fossil shells.