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A new addition to the Mediterranean Pleistocene «Boreal Guests»: *Hanleya nagelfar* (Lovén, 1864) (Mollusca, Polyplacophora) from Calabria (S. Italy)

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ABSTRACT – Recent research at Contrada Case Alte (Reggio Calabria) led to the discovery of a few plates belonging to the polyplacophoran *Hanleya nagelfar* (Lovén, 1864), a species previously known only from North Atlantic. These valves represent the first fossil record of this taxon which can be considered another «boreal guest» in the Mediterranean Pleistocene. The age of the outcrop is late Emilian or more recent.

RIASSUNTO – [Un nuovo «ospite boreale» nel Pleistocene dell'area Mediterranea: *Hanleya nagelfar* (Lovén, 1864) (Mollusca, Polyplacophora) della Calabria] – Recenti ricerche condotte nella sezione di Contrada Case Alte (Reggio Calabria) hanno permesso il ritrovamento di alcune piastre del poliplaceforo *Hanleya nagelfar* (Lovén, 1864). La specie, segnalata fino ad oggi solo lungo le coste del Nord Atlantico, può essere considerata, per la prima volta relativamente a questo taxon, come un «ospite boreale» nel Pleistocene del Mediterraneo. Il livello contenente le piastre è attribuibile al Pleistocene inferiore (Emiliano superiore) o ad un'età ancora più recente.

GEOLOGICAL AND PALEONTOLOGICAL INTRODUCTION

The Contrada Case Alte section (Reggio Calabria) outcrops in the area of the Strait of Messina, a complex tectono-sedimentary system (Barrier *et al.*, 1987).

This section, often cited in literature (Gaetani & Saccà, 1983), has been studied only recently from paleoecological and chronological points of view (Bellomo, 1993). Level 4 among others, proved to be the most interesting for the abundance of well preserved fossils.

The assemblage, characterized by a predominance of gastropods, bivalves and subordinately brachiopods and decapods can be referred to a «mixed fossil assemblage» (Fagerström, 1964).

The bionomical analysis of a bulk sample (10 dm³), collected at level 4 revealed that, among the eleven recognised biocoenotic stocks, only the SGCF (Pérès & Picard, 1964) one can be considered as autochthonous. The lack of bathyal species and the presence of Mollusks [*Calyptrea chinensis* (Linnaeus), *Gibbula magus* (Linnaeus), etc.], Crustaceans [*Ebalia tuberosa* (Pennant), *Munida iris* v. *rutlandi*, Zariquiey Alvarez], Echinoderms [*Echinocyamus pusillus* (O. F. Muller), *Spatangus purpureus* (O.F. Muller), *Sphaerechinus granularis* (Lamarck), *Paracentrotus lividus* (Lamarck), *Echinus acutus* (Lamarck), *Echinus melo* (Lamarck), *Psammechinus microtuberculatus* (Blainville)] and Brachiopods [*Terebratulina retusa* (Linneo), *Megathiris detruncata* (Gmelin), *Gryphus minor* (Philippi), *Crania* cf. *anomala*

(Mull.)] typical of Circalittoral zone (stocks C, DC, DE, DL) (Pérès & Picard, 1964), support a sedimentation in the last zone (Bellomo, 1993).

Among mollusks with a particular paleoclimatic interest, we recognised: *Buccinum undatum* Linnaeus; *B. humpreysianum* Bennet; *Spisula elliptica* (Brown) and *Limacina retroversa* (Fleming); their insertion into a biostratigraphic scheme (Raffi, 1986; Malatesta & Zarlenga, 1986) makes this level date back to the late Emilian (about 1.2 m.a.) or to a more recent age.

POLYPLACOPHORA

Polyplacophora from the Pleistocene deposits of the Messina Strait were only seldom taken into consideration (Seguenza, 1873-77; Costa *et al.*, 1987; Barrier *et al.*, 1987; Dell'Angelo & Palazzi, 1989).

In level 4 we recovered 1166 valves of Polyplacophora belonging to 12 different species [*Hanleya hanleyi* (Bean), *Hanleya nagelfar* (Lovén), *Lepidopleurus algesirensis* (Capellini), *L. cajetanus* (Poli), *L. cf. asellus* (Gmelin), *Ischnochiton rissoi* (Payraudeau), *Callochiton achatinus* (Brown), *Middendorffia caprearum* (Scacchi), *Chiton corallinus* (Risso), *C. olivaceus* Spengler, *Acanthochitona communis* (Risso), *A. fascicularis* (Linnaeus)]. Their detailed stratigraphic and paleoclimatic significance will be analysed in another paper (Bellomo, in prep.).

Such valves are biostratinomically non-homogenously arranged into the sediment and according to the level lamination. Most of them are very well preserved, and show traces of epizoic orga-

Determined species	Valve I	II-VII	VIII
<i>Hanleya hanleyi</i> (Bean)	2 (0)	8 (1)	1 (0)
<i>H. nagelfar</i> (Lovén)	3 (0)	12 (2)	1 (0)
<i>Lepidopleurus algesirensis</i> (Capellini)	4 (1)	5 (2)	10 (1)
<i>L. cajetanus</i> (Poli)	2 (0)	30 (5)	6 (1)
<i>L. cf. asellus</i> (Gmelin)	0 (0)	2 (1)	1 (0)
<i>Ischnochiton rissoi</i> (Payraudeau)	0 (0)	1 (1)	1 (0)
<i>Callochiton achatinus</i> (Brown)	0 (0)	2 (1)	2 (0)
<i>Middendorffia caprearum</i> (Scacchi)	0 (0)	6 (1)	0 (0)
<i>Chiton corallinus</i> (Risso)	32 (8)	122 (24)	16 (3)
<i>C. olivaceus</i> Spengler	18 (3)	108 (15)	6 (2)
<i>Acanthochitona communis</i> (Risso)	29 (9)	566 (31)	54 (7)
<i>A. fascicularis</i> (Linnaeus)	1 (0)	15 (2)	6 (1)
Undetermined	4 (0)	87 (7)	3 (0)

Tab. 1 - Number of different valves (I, II-VII, VIII) recovered in level 4 and their abundance (number in brackets) in the bulk sample.

nisms (calcareous algae, bryozoans, polychetes, etc.) on the inner and outer sides.

The abundance of different valves is reported in Tab. 1. The recent bathymetric distribution of various species is shown in Tab. 2.

The association can also be interpreted as a «mixed fossil assemblage» showing species replacement from meso-infra and circalittoral zones. There are no species of the SGCF stock, among them. The paleoecological significance and the abundance of the species support a sedimentation in the circalittoral zone, for this association.

GEOGRAPHIC AND PALEOCLIMATIC CONSIDERATIONS ON *HANLEYA NAGELFAR*

The discovery of some valves belonging to *Hanleya* Gray, 1857 (*H. hanleyi* and *H. nagelfar*) leads to new considerations about this taxon.

So far two taxa [*H. multigranosa* (Reuss) and *H. hanleyi* (Bean)] are known to occur in the European Neogene (Malatesta, 1962; Laghi, 1977 and Sabelli & Taviani, 1979).

According to Sabelli & Taviani, (1979), though this is not well proved, *H. multigranosa* is a typical neogenic form, while *H. hanleyi* appears from the Pliocene and is still living.

Three are the recent species of the genus *Hanleya* cited in literature as living along European coasts (Kaas & Van Belle, 1985; Warén & Klitgaard, 1991; Poppe & Goto, 1991): *H. hanleyi* (Bean), *H. nagelfar* (Lovén) and *H. abyssorum* (Sars).

The first two can be distinguished by different characteristics. Kaas & Van Belle (1985) separated them according to the sculpture of the needles of the perinotum. Warén & Klitgaard (1991), on the other hand, distinguished them on the base of their size,

habitat and trophism: «... we use the name *nagelfar* for specimens from sponges or specimens larger than 25 mm and the name *hanleyi* for other, smaller specimens».

H. hanleyi (Bean) is known from northern Iceland and northern Norway, the Kattegat and the Skagerrak (Warén & Klitgaard, 1991), south to the western Mediterranean (Sabelli, 1972; Laghi, 1977; Kaas & Van Belle, 1985) from 15 to about 600 m. The northern European specimens show a typical epifaunal habit (Warén & Klitgaard, 1991): they live on all kinds of hard substrates for example old shells, stones and ahermatypic coral and reach a maximum size of 25 mm.

H. nagelfar (Lovén) [for a more detailed description of the species see Kaas & Van Belle (1985); Warén & Klitgaard (1991)] (Text-fig. 1, g) is distributed from the Greenland Strait, southern and western Iceland, to northern Norway, along the Norwegian coasts, the Faroer, in the Skagerrak, Koster Area and Gullmarsfjorden, the Kattegat, Shetland and Rockall, and near Southwestern Portugal (Gorringe Bank) (Warén & Klitgaard, 1991). It presents an infaunal habit: it lives inside Choristidae sponges (*Geodia*, *Isops*, *Stryphnus*, etc.) (which also represent its nourishment) typical of rocky substrates, in a water depth range from 55 to 1000 m (more frequent at about 200-250 m). The sea-bottom temperature where they live in the Koster Area and around the Faroer is 5-8° C. The maximum size observed is 70 mm.

N. nagelfar is not recorded in the Mediterranean Sea, where it is, however, possible to find some species of sponges (genus *Geodia*, *Isops*, etc.), which host *H. nagelfar* in the Atlantic Ocean and represent

Determined species	Meso.	Infra.	Circalittoral	Bathyal
<i>Hanleya hanleyi</i> (Bean)		--	---	--
<i>H. nagelfar</i> (Lovén)		--	---	--
<i>L. algesirensis</i> (Capel.)	--			
<i>L. cajetanus</i> (Poli)		--	-	
<i>L. cf. asellus</i> (Gmelin)		--	---	--
<i>C. achatinus</i> (Brown)		--	---	
<i>M. caprearum</i> (Scacchi)	--			
<i>Chiton corallinus</i> (Risso)		--	---	
<i>C. olivaceus</i> Spengler		--		
<i>A. communis</i> (Risso)		--	---	
<i>A. fascicularis</i> (Linnaeus)	--	--		

Tab. 2 - Recent bathymetric distribution of the different Polyplacophora recovered in level 4 (data from Poppe & Goto, 1991).

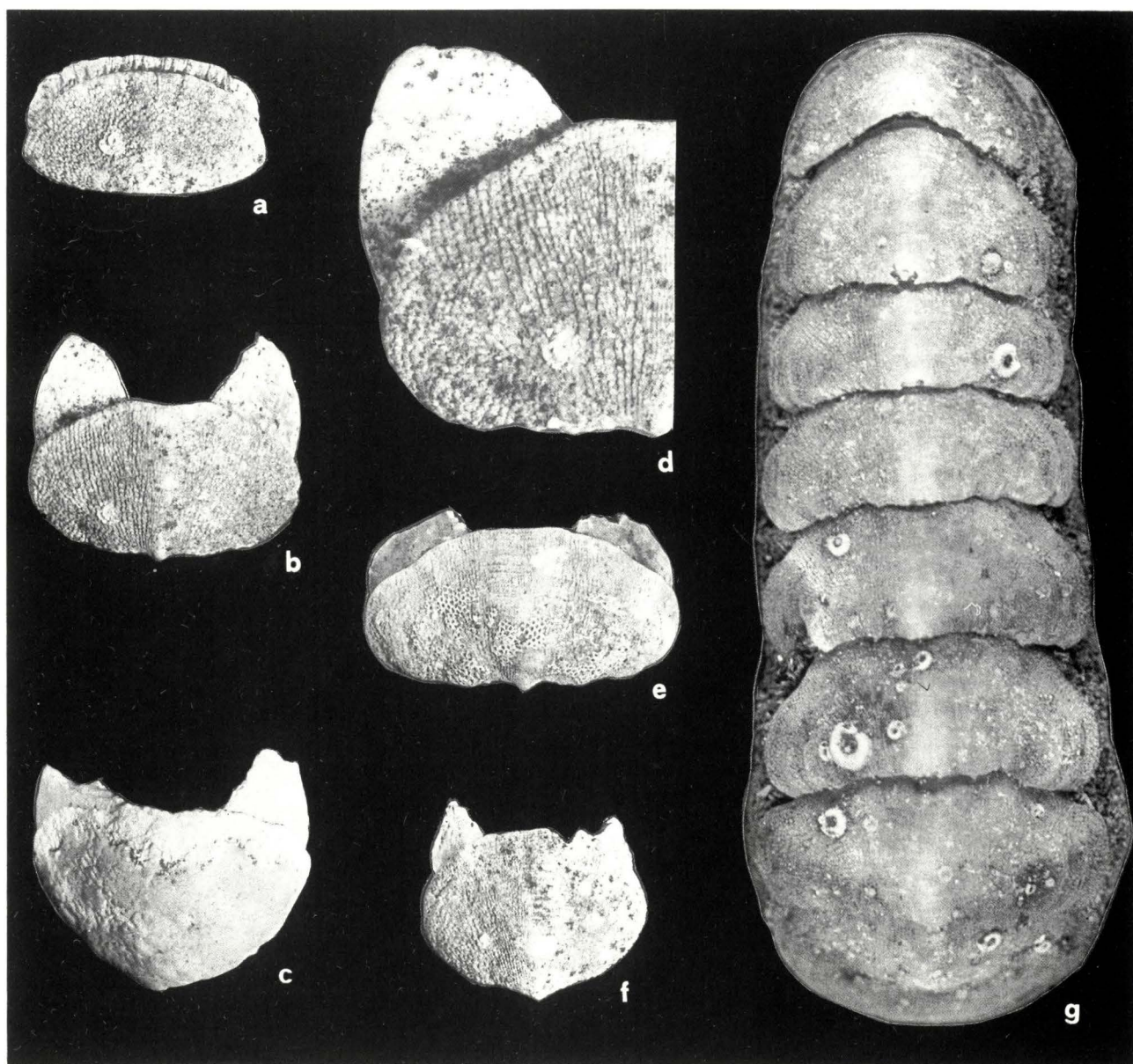
its nourishment. This does not support the possibility that *H. nagelfar* is an ecotype of *H. hanleyi* favoured by rich access to food.

The fossil valves of *H. nagelfar* (Text-fig. 1, a-f) we found belong to adult individuals having nearly the same size. It is possible to approximately determine the size of an individual (more than 4 cm), by simply approaching 8 valves of the three types (v. Text-fig. 1, a, b; c).

At the same time the comparison between fossil

and northern Atlantic valves (Text-fig. 1, a-g) and in particular their thin ornamentation, confirm our determination.

After all, if the presence in the Mediterranean Pleistocene of *L. asellus* (Gmelin) (another polyplacophoran with recent North-Atlantic distribution) has not been confirmed up to now with certainty (Malatesta, 1962), *H. nagelfar* represents the first sure example of «celtic-boreal guest» (Raffi, 1986; Malatesta & Zarlenga, 1986) in



Text-fig. 1 - *Hanleya nagelfar* (Lovén, 1864).

a,c) Valve I (a) and valve VIII (c); Pleistocene of Case Alte (Reggio Calabria) (x4).

b, d, e, f) Valves II-VII (b, e, f) (x3) and (d) detail of fig. b (x6); Pleistocene of Case Alte (Reggio Calabria).

g) Valves I-VIII (x3) of an actual specimen (Krügglo, Koster area, Sweden).

All the specimens reported in the Text-fig. 1 are housed in the Museum of Zoology collection of Bologna University.

the lower or more recent Pleistocene, among Polyplacophora. The species is also inserted in a typical subtropical faunistic association (*sensu* Raffi *et al.*, 1985).

Its climatic significance is at least compatible with the presence of other mollusks as *Buccinum undatum*, *B. humphreysianum*, *Spisula elliptica*, *Spiratella retroversa* (Bellomo, 1993) which are no longer present in the Mediterranean Sea.

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